

## ***ANEJO N° 6. ESTRUCTURAS***

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### ***4.3 Viaducto Anoia***

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## **ANEJO DE CÁLCULO DEL VIADUCTO SOBRE EL RÍO ANOIA**

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# VIADUCTO SOBRE EL RÍO ANOIA.

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## 1 GEOMETRÍA

### 1.1 GEOMETRÍA Y ESQUEMA ESTRUCTURAL

El viaducto sobre el río Anoia se halla ubicado en la línea de alta velocidad Madrid-Zaragoza-Barcelona-Frontera Francesa, tramo Lleida-Martorell, subtramo XI-A. El puente permite el paso de la línea de alta velocidad sobre el río Anoia junto a la población de Sant Sadurní d'Anoia.

El tablero del puente presenta un total de 8 vanos divididos en 6 vanos centrales con luces de 45 m y dos vanos laterales de 36 m. La longitud total del tablero es de 342 m entre ejes de apoyo en estribos. La sección transversal tipo del tablero es un cajón unicelular de 2,87 m de canto en sus bordes y 3,01 m en el eje del tablero (efecto del bombeo). Se construirá con hormigón postesado HP-50. Dicho postesado estará compuesto por 3 familias de 4 tendones formados por cables de 28 a 31 torones de  $\phi$  0,6".

La plataforma tiene 14 m de ancho que soporta la capa de balasto del ferrocarril, dos canaletas para el paso de cables y las barandillas con sus impostas. El desarrollo en planta de la estructura es curvo, con un radio variable que a efectos de cálculo de acciones se ha tomado igual a 7250 metros.

Las pilas del tablero están formadas por 2 partes bien diferenciadas: El cabecero o parte superior de la pila formado por una sección rectangular maciza de hormigón de ancho (dimensión medida en el sentido transversal al puente) variable según un acuerdo curvo. La longitud de este tramo de fuste es de 9 m. El tronco o parte inferior de la pila está constituido por una sección rectangular hueca cuyo ancho varía linealmente con pendiente constante del 2,5 %. Los espesores de esta sección hueca son constantes de 0,4 m. En sentido longitudinal al puente el ancho de las pilas es constante con un valor de 2,4 m. en toda su altura.

Hay que destacar que las alturas de los fustes de las pilas van de 15 m (pila 1) a 21,2 m. en la pila 4. Todas las pilas se construirán con hormigón HA-30.

Los estribos se han proyectado cerrados con aletas en vuelta. Se construirán con hormigón HA-25.

Se ha optado por cimentación superficial para los estribos (tanto el móvil como el fijo) así como por cimentaciones profundas mediante pilotes en las pilas, de acuerdo con las indicaciones del estudio geotécnico. La tensión media admisible para el estribo 1 (fijo) se ha tomado de 4,5 kp/cm<sup>2</sup>. En el estribo 2 (móvil) se ha tomado 3,5 kp/cm<sup>2</sup>. En las pilas se han empleado pilotes de 2.0 m. de diámetro.

Así mismo, cabe señalar que el tablero se ancla a uno de los estribos (estribo 1) mediante un taco para transmitir los eventuales empujes de frenado y arranque sobre el mismo. El resto de apoyos no toman fuerzas horizontales longitudinales, salvo las inducidas por el rozamiento entre el apoyo y el tablero a través de los apoyos de neopreno confinado tipo POT (unidireccionales o bidireccionales, dependiendo de su posición). La sección longitudinal del viaducto se puede ver en la figura adjunta.

El tablero se construirá vano a vano mediante cimbra autoportante y autolanzable.

DESARROLLO POR EJE DE TRAZADO  
Escala: 1:1500

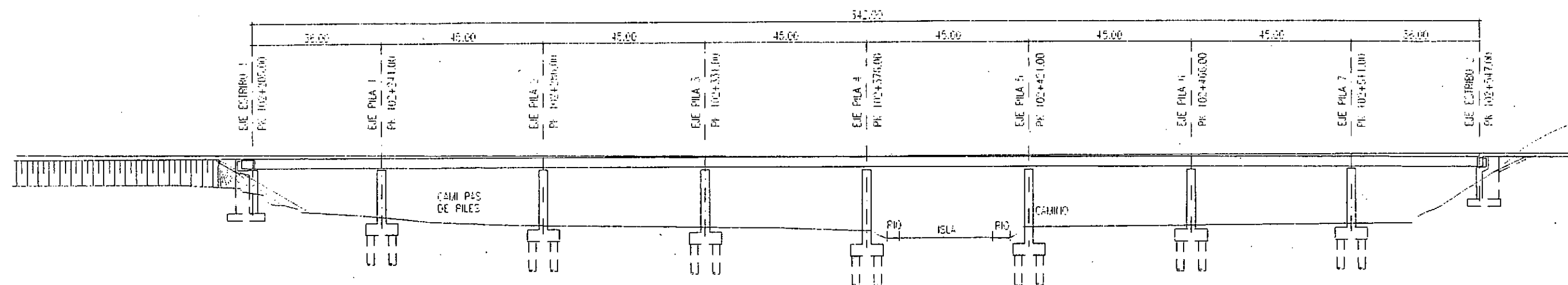


Figura 1. Alzado longitudinal del Viaducto de Anoia.



La sección transversal del tablero tiene un ancho de plataforma de 14 m y como ya se ha explicado anteriormente está constituida por un cajón de hormigón postesado de canto constante (3,005 m. en el eje del tablero). Su cara superior presenta un bombeo del 2 % para favorecer el drenaje de la plataforma ferroviaria.

SECCION TIPO  
ESCALA 1:100

14.00

7.00

7.00

1.44

1.63

1.63

1.44

0.35

0.35

EJE POSTE DE CATEPIA

EJE CHALETA

0.14

0.20

0.55

0.20

2.67

2.41

0.60

0.60

0.34

2.37

0.30

5.95

0.43

0.43

3.60

3.60

2%

2%

104

## 2 ACCIONES, MATERIALES, COEFICIENTES DE SEGURIDAD Y NORMATIVAS

### 2.1 ACCIONES

En el cálculo de los elementos estructurales se han considerado las siguientes acciones:

#### Acciones permanentes (G):

g<sub>1</sub>, PESO PROPIO.

El peso propio de los distintos elementos se ha calculado a partir de su geometría (secciones transversales) adoptando una densidad de valor  $\gamma = 2,5 \text{ T/m}^3$  para el hormigón.

g<sub>2</sub>, PESO DEL BALASTO Y CARGAS MUERTAS

Las cargas permanentes distintas del propio peso del tablero son las siguientes:

- Impermeabilización
- Balasto
- Vías y traviesas
- Conductos de cableado y paseos
- Soportes de catenarias
- Impostas y barandillas

El peso de balasto sobre el tablero se calcula a partir de la plataforma en la estructura de vía tomando como densidad  $\gamma = 1,6 \text{ t/m}^3$ .

Para la plataforma sobre el puente se obtiene  $g_{2, \text{balasto}} = 9,44 \text{ T/m}$ .

De acuerdo a las Bases de Cálculo se adoptarán para esta carga los siguientes valores característicos superior e inferior:

valor inferior (0.70 x peso medio)  $g_{2, \text{bal inf}} = 6,61 \text{ T/m de tablero}$   
valor superior (1.3 x peso medio)  $g_{2, \text{bal, sup}} = 12,27 \text{ T/m de tablero}$

Se consideran dos hipótesis de desbalastado.

- 50% de una vía en toda su longitud.
- 100% de una vía sobre 15 metros.

El peso de vías y traviesas para la plataforma con doble vía es:

$$g_{2, \text{vías+traviesas}} = 2 \times (0,52 + 0,12) = 2 \times 0,64 = 1,28 \text{ T/m de tablero (trav) + (carril)}$$

El peso de los conductos para cableados y zona de paseos es:

$$g_{2, \text{conductos}} = 0,3 \text{ t/ml (peso de hormigón } \gamma = 2,5 \text{ t/m}^3 \text{) (peso de 1 canaleta)}$$

$q_{\text{paseos}} = 0,50 \text{ t/m}^2$  (esta carga en paseos se ha tratado como sobrecarga y no como carga permanente pudiendo actuar en las dos zonas extremas de paseo de 1,45 m de ancho).

$$q_{\text{conductos}} = 2 \times 0,3 = 0,60 \text{ t/m}$$

El peso de la imposta y barandilla es:

Se toma  $g_{2, \text{imposta+barandilla}} = 1,77 \text{ T/m}$  de acuerdo a la sección tipo de plataforma.

El peso de los soportes de catenarias se tienen en cuenta sólo para efectos locales de anclaje de la catenaria y armado local de losa, pero no para el cálculo general del tablero.

|                       | g <sub>2</sub> , medio<br>(T/m) | g <sub>2</sub> , inf<br>(T/m) | G <sub>2</sub> , sup<br>(T/m) |
|-----------------------|---------------------------------|-------------------------------|-------------------------------|
| Impermeabilización    | 0,79                            | 0,79                          | 0,79                          |
| Balasto               | 9,44                            | 6,61                          | 12,27                         |
| Vías y traviesas      | 1,28                            | 1,28                          | 1,28                          |
| Conductos cableado    | 0,60                            | 0,60                          | 0,60                          |
| Imposta y barandillas | 1,77                            | 1,77                          | 1,77                          |
| <b>TOTAL</b>          | <b>13,88 T/m</b>                | <b>11,05 T/m</b>              | <b>16,72 T/m</b>              |

Tabla 1. Carga permanente, g<sub>2</sub>



**Acciones permanentes de valor no constante ( $G^*$ ):**

**PRETENSADO**

Las fuerzas del pretensado se calculan para cada fase de construcción de acuerdo con las especificaciones de la normativa vigente para el proyecto con hormigón estructural (EHE).

Para la determinación de las pérdidas de pretensado se han utilizado los siguientes valores de los parámetros de cálculo:

El efecto de la relajación del acero de pretensado a 1000 horas es:  $\rho_{1000\text{horas}} = 2\%$  y la relajación a tiempo infinito ( $\rho_f = \rho_{1000000\text{horas}}$ ).

| Tensión inicial                     | 0.60 $f_{\text{max}}$ | 0.70 $f_{\text{max}}$ | 0.80 $f_{\text{max}}$ |
|-------------------------------------|-----------------------|-----------------------|-----------------------|
| $\rho_{1000\text{horas}} (\%)$      | 1.0                   | 2.0                   | 5.5                   |
| $\rho_f (1000000\text{horas}) (\%)$ | 2.9                   | 5.8                   | 16                    |

Coefficiente de envejecimiento para el hormigón a tiempo infinito  $\chi = 0.80$

Las acciones indirectas derivadas de las deformaciones impuestas se estiman de acuerdo con la rigidez de los elementos de apoyo. En los aparatos de apoyo tipo POT se considera el efecto de rozamiento de acuerdo con los criterios indicados en el apartado 8 de este anejo.

## ACCIONES REOLÓGICAS

Las acciones reológicas se han determinado de acuerdo con las especificaciones de la normativa vigente para hormigón (EHE) diferenciando la retracción y la fluencia del hormigón.

### RETRACCIÓN

$$\begin{aligned}\epsilon_{cs}(t, t_s) &= \epsilon_{cs0} \beta_s(t - t_s) \\ \epsilon_{cs0} &= \beta_{HR} (570 - 5 f_{ck}) 10^{-6} \quad (f_{ck} \text{ en MPa}) \\ \beta_{HR} &= -1.55 (1 - (HR/100)^3)\end{aligned}$$

$$\beta_s = \sqrt{\frac{t - t_s}{0.035 e^2 + (t - t_s)}} \quad e = \frac{2 A_c}{u}$$

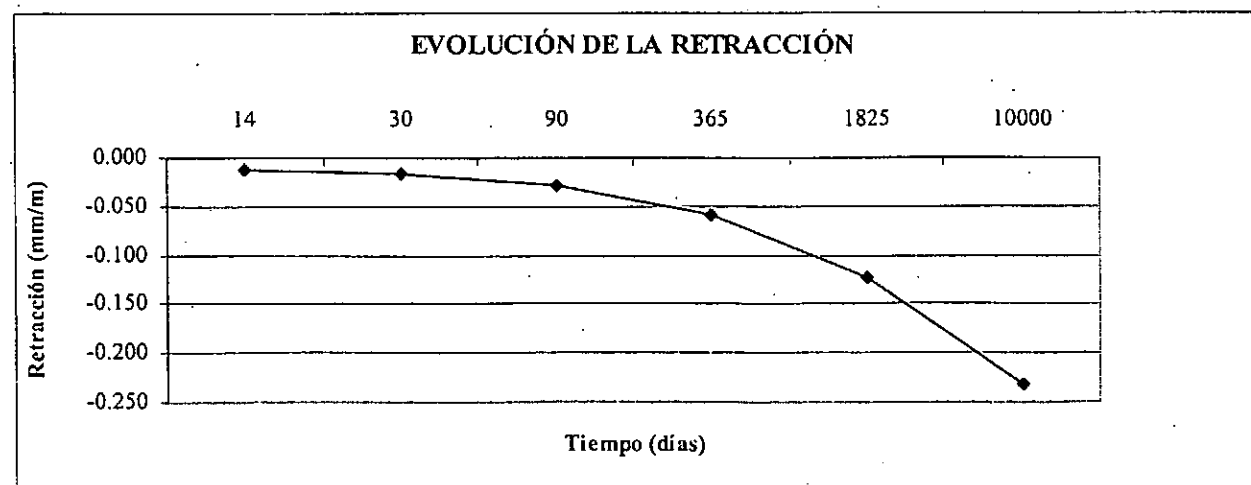
t = edad del hormigón en el instante de evaluación (en días)  
t<sub>s</sub> = edad del hormigón al comienzo de la retracción (en días)  
ε<sub>cs0</sub> = coeficiente básico de retracción  
HR = humedad relativa  
β<sub>s</sub> = coeficiente que define la evolución de la retracción en el tiempo  
e = espesor medio en mm  
A<sub>c</sub> = área de la sección transversal  
u = perímetro en contacto con la atmósfera

Los valores de la sección transversal tipo del tablero son los siguientes:

En la zona de construcción de las estructuras HR= 65 %

Sección transversal tipo : A<sub>c</sub>= 9,67 m<sup>2</sup> u= 32,51 m e=595mm

Cálculo del valor de la retracción en el tablero: ε<sub>cs</sub>(t, t<sub>s</sub>)= 2,4 10<sup>-4</sup>



### FLUENCIA

$$\epsilon_c(t, t_0) = \sigma(t_0) \left[ \frac{1}{E_{o, t_0}} + \frac{\varphi(t, t_0)}{E_{o, 28}} \right]$$

σ<sub>c</sub> = tensión media en el hormigón aplicada en el tiempo t<sub>0</sub>

E<sub>o, t<sub>0</sub></sub> = módulo de deformación en el tiempo t<sub>0</sub>

φ(t, t<sub>0</sub>) = coeficiente de fluencia

φ<sub>0</sub> = coeficiente básico de fluencia

$$\varphi(t, t_0) = \varphi_0 \beta_c(t - t_0)$$

$$\varphi_0 = \varphi_{HR} \beta(f_{cm}) \beta(t_0)$$

$$\varphi_{HR} = 1 + \frac{100 - HR}{9.9 e^{1/3}}$$

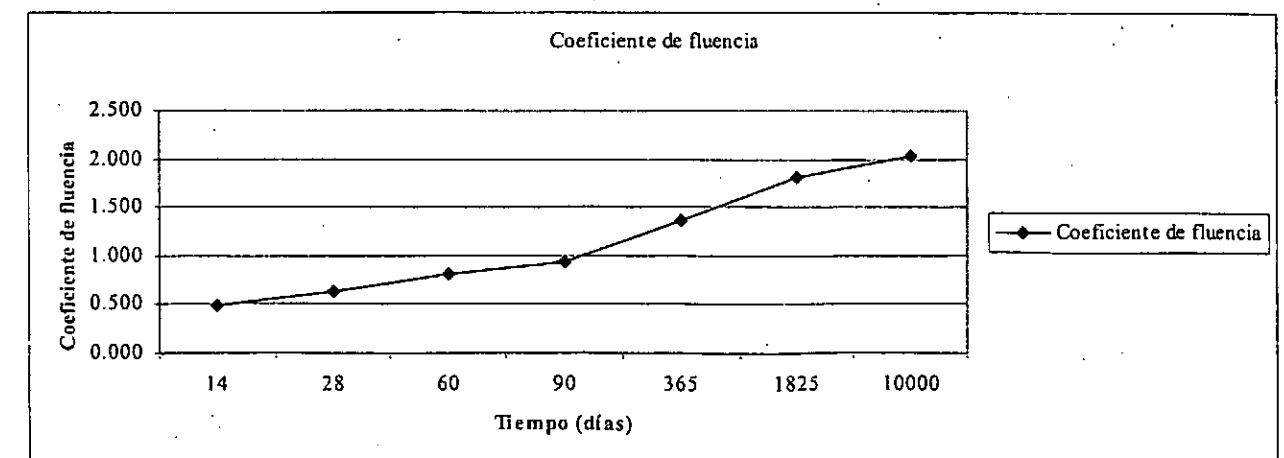
$$\beta(f_{cm}) = \frac{16.8}{\sqrt{f_{ck} + 8}}$$

$$\beta_{t_0} = \frac{1}{0.1 + t_0^{0.2}}$$

$$\beta_c(t - t_0) = \left[ \frac{t - t_0}{\beta_H + (t - t_0)} \right]^{0.3}$$

$$\beta_H = 1.5 e \left[ 1 + (0.012 HR)^{18} \right] + 250 > 1500$$

En el caso del tablero, adoptando un valor de aplicación de la fuerza de postesado t<sub>0</sub>= 5 días tenemos un coeficiente de fluencia a tiempo infinito (10000 días) φ<sub>f</sub>=2,049



### ACCIONES DEBIDAS AL TERRENO

Carga sobre zapatas y empuje de las tierras en alzados de estribos y aletas, con una densidad  $2,0 \text{ T/m}^3$  y un ángulo de rozamiento interno de  $30^\circ$  (con presiones horizontales correspondientes a un empuje con coeficiente  $K_a = 0,33$ ).

### ASIENTOS DIFERENCIALES

Se ha previsto un asiento máx. de 3 cm. en el estribo 1 y de 5 cm. en el estribo 2. En las pilas por estar cimentadas mediante pilotes no se prevé la existencia de asientos significativos, por lo cual solo se ha considerado un asiento diferencial en los vanos laterales.

### SOBRECARGAS DE USO. COMPONENTES VERTICALES.

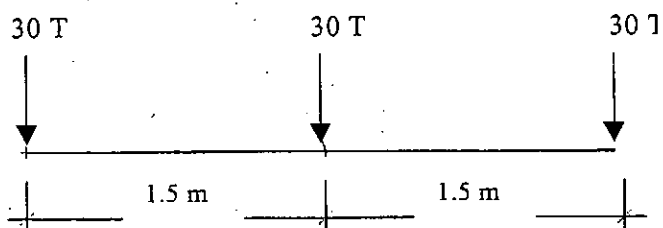
En el cálculo de esfuerzos se ha empleado la envolvente de esfuerzos debidos a los trenes de carga de IPF-75 y del Eurocódigo 1 (parte 3, acciones en puentes) EC1-3 tomando como coeficiente de impacto correspondiente en cada caso.

Los coeficientes de impacto no afectan al cálculo de apoyos, pilas y estribos, salvo aquellos casos en que la unión tablero-estructura fuera rígido. Esto conduciría a que el coeficiente de impacto afectaría a la subestructura para las fuerzas de frenado, transmitida al estribo a través del tope rígido longitudinal, y fuerza centrífuga, transmitida a través de apoyos tipo POT guiados. No obstante, la presencia del balasto supone una liberación en la rigidez de la transmisión de las fuerzas horizontales a los apoyos y topes, por lo que no se considera el coeficiente de impacto para estas acciones.

De acuerdo con la normativa IPF-75 Existen dos trenes de carga

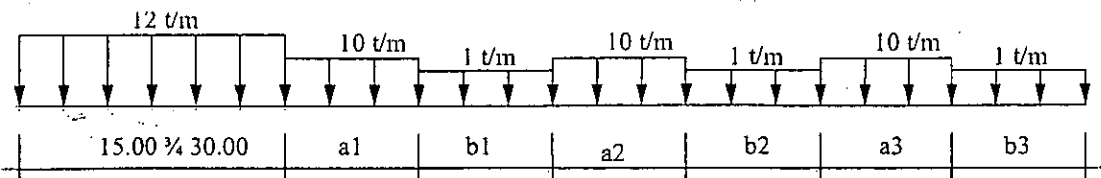
Tipo A

Por cada vía:  $Q_A = 3$  ejes de 30 T separados 1.50 m



Tipo B

Por cada vía: Sobrecarga uniforme de 12 T/m sobre 15 ó 30 metros, más un conjunto de cuchillos de carga de 10 T/m y 1 T/m de longitud arbitraria.

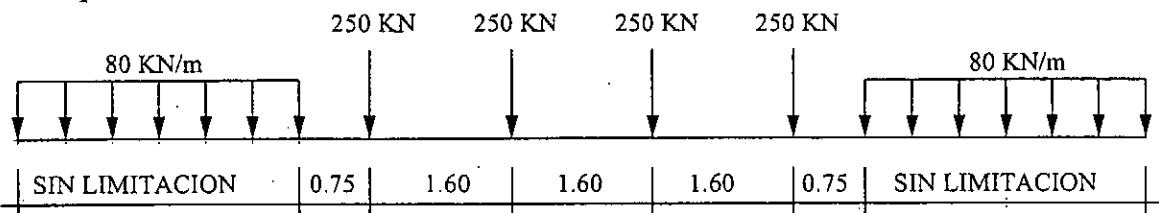


El tren tipo A suele condicionar el trabajo local de reparto de la losa y el tren tipo B condiciona el dimensionamiento general de la mayor parte de los Estados Límites Últimos o de Servicio.

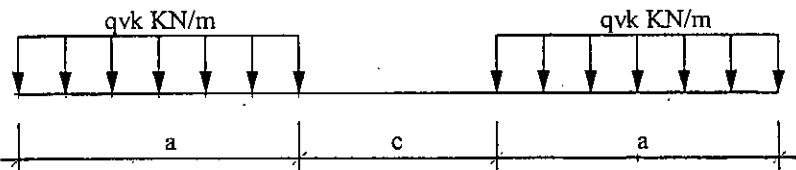
De acuerdo con las especificaciones de la IPF, no se admite reducción de cargas por simultaneidad entre ambas vías. En cualquier caso se debe contemplar la posibilidad de un ripado de la vía respecto al eje teórico de 0.30 m.

El tren de cargas de Eurocódigo 1 (parte 3, acciones en puentes) EC1-3 se define de acuerdo con las configuraciones indicadas en las 2 figuras siguientes. En ambos casos, a efectos de cálculo se contemplará un eventual ripado de la vía de 0.30 m.

Tren tipo 71



Modelo de carga SW



Se considera adicionalmente un tren pesado equivalente al siguiente esquema de cargas (SW/0) ó (SW2) en una de las vías y el tren tipo 71 en la otra vía.

|                       | SW0 | SW2 |
|-----------------------|-----|-----|
| $Q_{vk} \text{ (kN)}$ | 133 | 150 |
| $a \text{ (m)}$       | 15  | 25  |
| $c \text{ (m)}$       | 5,3 | 7   |

De acuerdo con la IPF-75, para algunas comprobaciones específicas asociadas a combinaciones de carga con viento transversal se considerará un tren sin carga de 12.5 KN/m.

Coeficientes de mayoración por impacto

De acuerdo con la normativa IPF75, se aplica la formulación siguiente:

$$I = 65 \frac{\mu}{1 - \mu + \mu^2}$$

El valor del coeficiente  $\mu$  depende de la velocidad, la luz y el periodo de vibración de la estructura. En este viaducto se ha obtenido una primera frecuencia de flexión de valor  $T = 0.49$  s. Para una velocidad máxima de 200 Km/h se obtiene:  $I = 24,9 \%$ .

De acuerdo con el Eurocódigo EC-1, para vías de mantenimiento cuidadoso.

$$\phi_2 = \frac{1,44}{\sqrt{L\phi} - 0,20} + 0,82 = 1,0$$

$$L\phi = K * L_m = 64,13 \text{ m}$$

Este valor se debe emplear en el cálculo longitudinal del tablero. Los coeficientes a aplicar en el cálculo local se estudiarán en el apartado correspondiente.

En las zonas del tablero destinadas a mantenimiento (zonas de paseo) se considera una sobrecarga de 0,5 T/m<sup>2</sup>, considerándose concomitante con las sobrecargas ferroviario un 50 % de dicha carga.

## ***SOBRECARGAS DE USO. COMPONENTES HORIZONTALES.***

### **EFFECTO LAZO**

En la estructura se considerará una única fuerza transversal concomitante con la sobrecarga vertical para contemplar el efecto lazo. El valor de dicha carga (que no debe ser mayorada con el coeficiente de impacto) es el siguiente:

Según IPF-75  $H_T = 5 \text{ T}$  para el conjunto de ambas vías, aplicada a cota superior del carril.

Según EC1  $H_T = 10,2 \text{ T}$  para el conjunto de ambas vías, aplicada a cota superior del carril.

### **FUERZA CENTRÍFUGA**

En puentes de trazado curvo en planta se debe considerar la fuerza centrífuga, cuyo valor se puede obtener mediante la expresión siguiente:

$$\text{IPF 75 : } F_c = Q \times \frac{V^2}{127R}$$

El Eurocódigo 1 permite una reducción de la fuerza centrífuga en función de la longitud cargada. Se constata que la IPF-75 da un valor mayor de fuerza centrífuga que el EC1 y por tanto, si el puente es curvo se tomará dicho valor, combinado con el efecto del peralte. Se supondrá la carga actuando 1,80 m por encima del carril.

El puente está ubicado en un acorde circular, con un radio de curvatura en planta de valor  $R=7250 \text{ m}$ .

EFFECTOS DE FRENADO Y ARRANQUE

En el presente proyecto se adoptan las acciones más desfavorables de las especificadas en el Eurocódigo EC-1 considerando el carril discontinuo en ambos estribos, las propuestas por la IPF-75 y las calculadas según la ficha 774-3 de la UIC teniendo en cuenta el efecto de la interacción entre vía y estructura, que incluye el efecto del frenado y arranque, la diferencia de temperatura entre el carril y la estructura y el giro de la estructura en estribos.

En la siguiente tabla se expone el cálculo de las fuerzas horizontales según la IPF-75, que resulta ser 1/8 de la carga vertical en el tablero:

Cálculos intermedios

|                                           |        |
|-------------------------------------------|--------|
| Carga vertical tren tipo A en primera vía | 90 T   |
| Carga vertical tren tipo A en segunda vía | 90 T   |
| Carga vertical tren tipo B en primera vía | 3480 T |
| Carga vertical tren tipo B en segunda vía | 3132 T |
| Valor total de la carga vertical          | 6612 T |

Resultado

|                                     |       |
|-------------------------------------|-------|
| Valor de la fuerza de frenado total | 827 T |
|-------------------------------------|-------|

Según el EC-1, considerando el carril discontinuo en ambos extremos del tablero:

Cálculos intermedios

|                                      |       |
|--------------------------------------|-------|
| Longitud cargada LM 71               | 335 m |
| Longitud sin carga LMT1              | 7 m   |
| Longitud cargada SW0                 | 30 m  |
| Longitud sin carga SWO               | 312 m |
| Longitud cargada SW2                 | 50 m  |
| Longitud sin carga SW2               | 292 m |
| Fuerza horizontal por arranque vía 1 | 100 T |
| Fuerza horizontal por frenado vía 1  | 600 T |
| Fuerza horizontal por arranque vía 2 | 100 T |
| Fuerza horizontal por frenado vía 2  | 600 T |

Resultado

|                                                            |       |
|------------------------------------------------------------|-------|
| Fuerza de frenado sin reducción por-continuidad del carril | 700 T |
|------------------------------------------------------------|-------|

Para el cálculo de los anteriores valores se han aplicado las siguientes fórmulas:

Fuerzas de arranque (por vía) LM71 y SW

$F_a = 33 \text{ (KN/m)} \times L(m) \leq 1.000 \text{ KN.}$

Fuerzas de frenado (por vía)

$F_f = 20 \text{ (KN/m)} \times L(m) \leq 6.000 \text{ (KN)} \quad \text{LM71 y SW0}$   
 $F_f = 35 \text{ (KN/m)} \times L(m) \leq 6.000 \text{ (KN)} \quad \text{SW2}$

El cálculo de las fuerzas en el punto fijo en sentido longitudinal de la estructura según la ficha 774-3 de la UIC se expone en el apartado 13 del presente anejo. A continuación se resumen los valores de esta reacción debido al efecto de la interacción vía-estructura y a la acción en simultáneo de frenado, diferencia de temperatura entre carril y estructura y giro del tablero en los apoyos verticales.

Fuerzas en el apoyo fijo

$F = 11441,8 \text{ KN}$  hacia trasdós  
 $F = -14028,3 \text{ KN}$  hacia intradós

EMPUJE SOBRE BARANDILLAS.

En el elemento superior de la barandilla se considera una fuerza horizontal de valor 1.5 kN/m actuando de modo simultáneo con la sobrecarga uniforme.

DESCARRILAMIENTO

El efecto de descarrilamiento se estudiará como una situación accidental, mayorándose las acciones por un coeficiente de seguridad  $\gamma_f = 1,0$  y minorándose los parámetros mecánicos de los materiales por los coeficientes indicados en el apartado 2.2.

Para el estudio del Estado Límite Último de estabilidad se empleará, según el Eurocódigo, una carga vertical de 80 KN/m en una longitud total de 20,00 m a una distancia máxima del eje de la vía de 1,5 veces el ancho.

Para el análisis local de elementos estructurales se tomarán 2 cargas verticales a cada lado del eje de vía de 5 T/m en 6.4 m y separadas entre sí 1.4 m

## Acciones climáticas

### VIENTO

La velocidad de cálculo se puede determinar a partir de una velocidad de referencia de  $v_{ref}=24$  m/s corregida con los siguientes parámetros multiplicadores:

$C_t$  = factor de topografía

$C_r$  = factor de riesgo (se toma un periodo de retorno de 100 años)

$C_z$  = factor de altura (se adopta un entorno Tipo I, zona plana con algunos obstáculos)

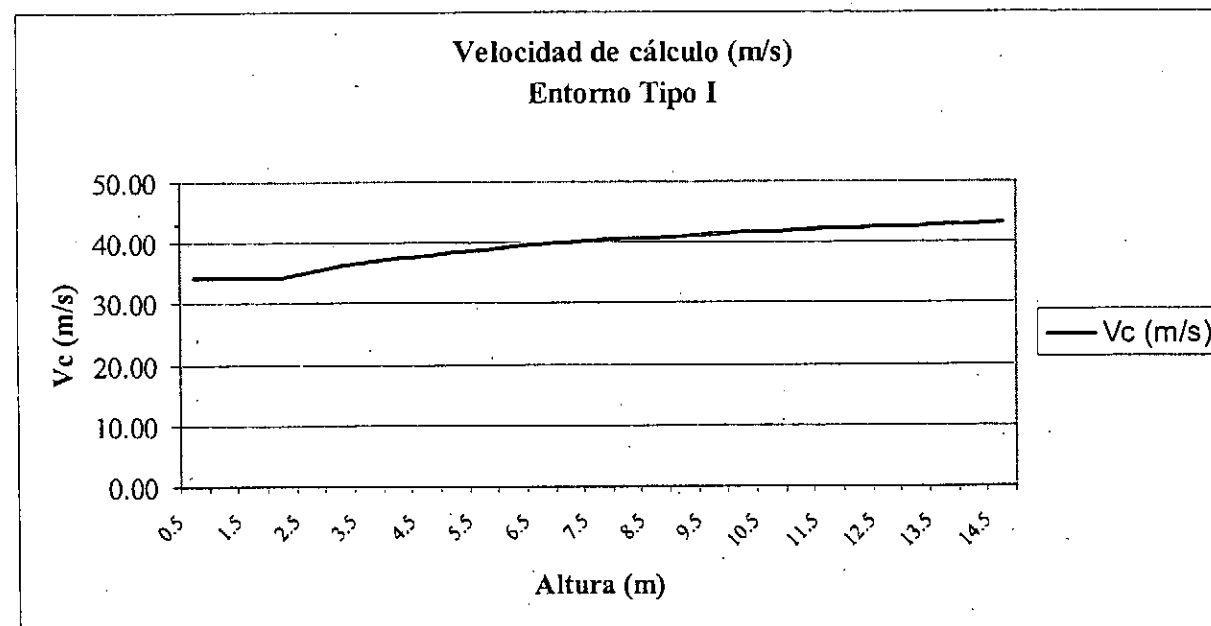
$C_g$  = factor de ráfaga

$$C_z = K_z \ln\left(\frac{z}{z_0}\right) \quad \text{si } z \geq z_{min}$$

$$C_z = K_z \ln\left(\frac{z_{min}}{z_0}\right) \quad \text{si } z \leq z_{min}$$

$$C_g = \sqrt{1 + \frac{7K_z}{C_z C_t}}$$

$V_{ref}=24$  m/s,  $C_t=1.0$  y  $C_r=1.04$



Para un entorno Tipo I

$$K_z = 0.17 \quad z_0 = 0.01 \text{ m} \quad z_{min} = 2 \text{ m}$$

Para determinar el empuje de viento sobre el tablero, la velocidad de cálculo es:

$$V_c = C_t \cdot C_r \cdot C_z \cdot C_g \cdot V_{ref} = 43,7 \text{ m/s}$$

Esta velocidad de viento da lugar a una presión de  $0,173 \text{ T/m}^2$ .

Las situaciones consideradas han sido:

Puente sin sobrecarga

Puente con tren en una vía

Puente con trenes en ambas vías

Se tiene en cuenta en el cálculo del empuje total del viento sobre el tablero los coeficientes de ocultamiento entre zonas expuestas.

Cuando se combina con la sobrecarga se reduce en un 50% esta acción.

### NIEVE

Según al IAP se debe aplicar una carga de nieve sobre la superficie de tablero en la que no se considere sobrecarga de uso. Para el cálculo del tablero se considera la posibilidad de tener sobrecarga en toda su superficie, por lo tanto no es necesario aplicar la sobrecarga de nieve.



## Acciones Térmicas

### VARIACIÓN UNIFORME DE TEMPERATURA

El puente está emplazado en la región climática III (Figura 7 de la IAP)

Por ser una tablero con sección cajón de hormigón, la variación uniforme de temperatura viene dada por:

$$\Delta T = K \cdot z^a \cdot h^b \cdot s^c = 34,5 \text{ } ^\circ\text{C}$$

Este incremento nos define un incremento de temperatura de cálculo de:

$$\Delta T_d = \Delta T / 2 + 5 = 22,2 \text{ } ^\circ\text{C}$$

### GRADIENTE TÉRMICO

$$\nabla T_{Si,ref} = 9.0 \text{ } ^\circ\text{C}$$

$$K_1 = 0.75$$

$$K_2 = 1.045$$

$$K_3 = 0.70$$

$$\text{Vertical positivo } \nabla T_{Si} = (K_1 K_2 K_3) \cdot \nabla T_{Si,ref} = 4.9 \text{ } ^\circ\text{C}$$

$$\text{Vertical negativo } \nabla T_{Si} = 0^\circ\text{C (tablero de hormigón con pavimento bituminoso)}$$

$$\text{Transversal } \nabla T_T = 2.5 \text{ } ^\circ\text{C si la estructura tiene dirección Este-Oeste (+/- 25 g)}$$

## ACCIÓN SÍSMICA

La aceleración sísmica básica de la zona, según la normativa vigente, es  $a_b = 0,04 \text{ g}$ .

La categoría de la estructura puede considerarse de especial importancia, lo que es equivalente a un factor de nivel de daño  $\gamma_1 = 1.3$ .

La aceleración de cálculo es:  $a_c = \gamma_1 a_b = 0.052 \text{ g}$

Las acciones sísmicas en puentes sólo se consideran, de acuerdo con la IAP, para aceleraciones de cálculo superiores a  $0.06\text{g}$ , por lo tanto no es necesario realizar el análisis sísmico del puente.

## 2.2 COEFICIENTES DE SEGURIDAD, MATERIALES, NIVELES DE CONTROL Y NORMATIVAS

### NORMATIVAS

#### HORMIGONES

- Hormigón de Limpieza HM-15
- Cimentaciones y estribos HA-25 / B / 20 / IIa
- Alzados de pilas HA-30 / B / 20 / IIa
- Tablero HP-50 / P / 20 / IIa

Control del hormigón ESTADÍSTICO

$\gamma_c = 1.50$  (Situación persistente o transitoria)

$\gamma_c = 1.30$  (Situación accidental)

El módulo de elasticidad se ha evaluado en todos los casos de acuerdo a la expresión de la EHE:

$$E_c = 8500 \sqrt[3]{f_{ck} + 8} \text{ (N/mm}^2\text{)}$$

La resistencia a tracción se ha calculado como:

$$\text{Valor medio} \quad f_{ctm} = 0,30 \sqrt[3]{f_{ck}^2} \text{ (N/mm}^2\text{)}$$

$$\text{Valor característico inferior} \quad f_{ctk} = 0,21 \sqrt[3]{f_{ck}^2} \text{ (N/mm}^2\text{)}$$

Los límites establecidos para la consistencia en la puesta en obra podrán superarse con el empleo de aditivos superfluidificantes, siempre que el valor de la relación agua-cemento cumpla los requisitos prefijados en EHE.

#### ACEROS

- Acero corrugado para la armadura pasiva B500S, con  $f_{yk} > 500 \text{ MPa}$  (5100 Kp/cm<sup>2</sup>)
- Acero de pretensado tipo 170/190 con tendones de 0,6 " (Y 1860 S7 15.2).

Control de los aceros NORMAL

$\gamma_s = 1.15$  (Situación persistente o transitoria)

$\gamma_s = 1.0$  (Situación accidental)

#### CONTROL DE EJECUCIÓN

El control de ejecución será INTENSO ( $\gamma_g = 1.35$  y  $\gamma_{rq} = 1.5$ ) en tablero y estribos de acuerdo con las especificaciones de la normativa EHE.

### NORMAS UTILIZADAS

Para el establecimiento de acciones y las combinaciones necesarias para la obtención de las solicitaciones de cálculo que se emplearán en la comprobación de los diferentes Estados Límite se realizarán los cálculos empleando la normativa IPF-75 y los criterios especificados en los Eurocódigos, adoptándose el más desfavorable de ambos.

#### Cálculo según IPF-75

Para el cálculo de las acciones se utilizarán las siguientes instrucciones.

- Instrucción relativa a las acciones a considerar en el Proyecto de Puentes de Ferrocarril", correspondiente a la O.M. 25 de Junio de 1.975 (IPF-75).

Para el cálculo de las acciones ambientales se utilizará la siguiente instrucción.

- Instrucción relativa a las acciones a considerar en el proyecto de Puentes de Carreteras I.A.P. 12 de Febrero de 1998.

Para establecer las hipótesis y combinaciones de cálculo y sus correspondientes coeficientes de ponderación se utilizarán las siguientes Instrucciones:

- Instrucción de Hormigón Estructural (EHE) R.D. 2661/1998 de 11 de Diciembre.

#### Cálculo según Eurocódigos y EHE

- Eurocódigo 1: *Bases de proyecto y acciones. Parte 3. Cargas de tráfico en puentes.* UNE-ENV 1991-3. Octubre 1997. (EC1.1.3.)

Para establecer las hipótesis y combinaciones de cálculo y sus correspondientes coeficientes de ponderación se utilizarán las siguientes Instrucciones:

- Eurocódigo 1: *Bases de proyecto y acciones en estructuras. Parte 1; Bases de proyecto.* UNE-ENV 1991-1, Octubre 1997 (EC1.1)

Para dimensionamiento y comprobación de secciones se actuará, en todo momento, de acuerdo con la normativa española;

- Instrucción de Hormigón Estructural EHE. R.D. 2661/1998 de 11 de Diciembre

El estudio de la fatiga de los materiales se hará de acuerdo con la siguiente norma:

- Eurocódigo 2: *Proyecto de estructuras de hormigón. Parte 2: Puentes de hormigón.* ENV 1992.2: Septiembre 1996. (EC2.2).



La comprobación de flechas, deformaciones y vibraciones se hará de acuerdo con la norma:

- Eurocódigo 1: *Bases de proyecto y acciones en estructuras. Parte 3: Cargas de tráfico en puentes* UNE-ENV 1991-3. Octubre 1997. (EC1.1.3).

Para el análisis de la interacción vía-estructura se empleará la siguiente norma:

- Norma U.I.C. Ficha 774.3 R. 1ª edición. Febrero 1999 (U.I.C. 774.3).

Subsidiariamente, y en lo no contemplado en las normas anteriores se emplearán las siguientes:

- Norma UIC. Ficha 776.1. 3ª edición. 1 de Julio de 1.979. (U.I.C. 776.1)
- Norma UIC. Ficha 774-2. 1ª Edición. 1 de Julio de 1.974. (U.I.C. 774.2)
- Norma UIC. Ficha 702.0. 2ª Edición. 1 de Enero de 1.974. (U.I.C. 702.0)

2.3 AMBIENTES, RECUBRIMIENTOS, FISURACIÓN Y CUANTÍAS MÍNIMAS

De acuerdo con la normativa EHE se consideran los ambientes indicados en la tabla siguiente.

| Elemento          | Ambiente | Recubrimiento de Armadura pasiva (mm) | Límite de abertura de fisura Wmax (mm) |                                          |
|-------------------|----------|---------------------------------------|----------------------------------------|------------------------------------------|
|                   |          |                                       | Hormigón armado                        | Hormigón postesado                       |
| Tablero           | Ila      | 35                                    | -                                      | Descompresion bajo comb. cuasipermanente |
| Alzados de pilas  | Ila      | 30                                    | 0.2                                    | -                                        |
| Cimentaciones     | Ila      | 30                                    | 0.1                                    | -                                        |
| Pilotes/Pantallas | Ila      | 75                                    | 0.1                                    | -                                        |

Para las armaduras postesas el recubrimiento es el máximo de los siguientes valores: 4 cm o el diámetro de la vaina.

Las cuantías mínimas de armadura pasiva B500S serán las expuestas en la siguiente tabla (EHE, art. 4.3.5)

| Elemento | Posición | Tipo | Cuantía geométrica |
|----------|----------|------|--------------------|
|----------|----------|------|--------------------|

|                                  |                          |                            | o/oo |
|----------------------------------|--------------------------|----------------------------|------|
| Zapatas                          | cara superior o inferior | transversal o longitudinal | 0.90 |
| Pilotes                          | vertical                 | -                          | 4.0  |
| Pilas                            | vertical                 | -                          | 4.0  |
| Alzados de estribos y aletas (1) | horizontal               | lado tierras               | 1.07 |
|                                  |                          | lado visto                 | 2.13 |
|                                  | vertical                 | lado tierras               | 0.90 |
|                                  |                          | lado visto                 | 0.30 |
| Tablero                          | cara superior o inferior | transversal o longitudinal | 0.90 |

(1) las cuantías geométricas horizontales se pueden reducir un 50 % si se colocan juntas de contracción distanciadas menos de 7,5 m.

## 2.4 HIPÓTESIS DE COMBINACIÓN DE ESFUERZOS

Se han considerado las combinaciones de hipótesis de las acciones recogidas en la Normativas IAP y EHE, basados en la teoría de Estados Límites, para las distintas situaciones de cálculo de la estructura.

### 2.4.1 ESTADOS LÍMITES ÚLTIMOS

Las hipótesis de cálculo consideradas son:

- Situaciones persistentes o transitorias

$$\sum_{j \geq 1} \gamma_{Gj} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \gamma_{Q1} Q_{k1} + \sum_{i > 1} \gamma_{Qi} \Psi_{0i} Q_{ki}$$

- Situaciones accidentales

$$\sum \gamma_{Gaj} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \gamma_A A_k + \Psi_{11} Q_{k1} + \sum_{i > 1} \gamma_{Qi} \Psi_{2i} Q_{ki}$$

- Situaciones accidentales de sismo

$$\sum_{j \geq 1} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \gamma_i A_{Ed} + \sum_{i > 1} \gamma_{Qi} \Psi_{2i} Q_{ki}$$

donde:

- G = Valor característico de las cargas permanentes.  
G\* = Valor característico de las cargas permanentes de valor no constante.  
Q<sub>k1</sub> = Valor característico de la carga variable dominante.  
A<sub>k</sub> = Valor característico de la acción accidental  
A<sub>eq</sub> = Valor característico de la acción sísmica, calculado según la Norma Sismorresistente.

Los coeficientes de seguridad y de combinación de acciones empleados se definen en la EHE para control de ejecución intenso.

### 2.4.2 ESTADOS LÍMITES DE SERVICIO

Las hipótesis de cálculo consideradas son:

- Combinación característica

$$\sum_{j \geq 1} \gamma_{Gj} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \gamma_{Q1} Q_{k1} + \sum_{i > 1} \gamma_{Qi} \Psi_{0i} Q_{ki}$$

- Combinación frecuente

$$\sum \gamma_{Gaj} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \Psi_{11} Q_{k1} + \sum_{i > 1} \gamma_{Qi} \Psi_{2i} Q_{ki}$$

- Combinación casi permanente

$$\sum_{j \geq 1} G_{kj} + \sum \gamma_{Gj} G^*_{kj} + \sum_{i > 1} \gamma_{Qi} \Psi_{2i} Q_{ki}$$

Los valores representativos de las acciones se han obtenido de acuerdo con las especificaciones de las normativas vigentes, tomándose los siguientes valores de los coeficientes  $\psi$ :

| Acción             | $\psi_0$ | $\psi_1$                | $\psi_2$ |
|--------------------|----------|-------------------------|----------|
| Sobrecargas de uso | 0.8      | 0.8 (a) 0.6 (b) 0.4 (c) | 0        |
| Viento             | 0.6      | 0.5                     | 0.2      |
| Temperatura        | 0.6      | 0.5                     | 0.2      |

Nota: (a) Una vía cargada (b) dos vías cargadas (c) 0.4 tres o más vías cargadas

Proyecto: L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo: St. Sadurn d'Anoia - Subirats  
 Estructura: Viaducto de Anoia

CALCULO DE LAS CARGAS MUERTAS EN LOS PUENTES DE L.A.V. DE VIA DOBLE

Impermeabilización del tablero

|                                         |           |
|-----------------------------------------|-----------|
| Ancho con impermeabilización bituminosa | 10.10     |
| Espesor                                 | 0.034 m   |
| Densidad                                | 2.30 T/m3 |
| Valor de la carga                       | 0.79 T/m  |

Para ancho de puente de 14,00 m, distancia entre muretes guardabalasto = 10,10 m  
 0,03 m para impermeabilización tipo 1.

Cableado y paseos

|                   |         |                                                         |
|-------------------|---------|---------------------------------------------------------|
| Valor de la carga | 0.6 T/m | Según especificaciones de las bases de cálculo del GIF. |
|-------------------|---------|---------------------------------------------------------|

Traviesas y carriles

|                   |          |
|-------------------|----------|
| Número de vías    | 2        |
| Carga por vía     | 0.64 T/m |
| Valor de la carga | 1.28 T/m |

Impostas y barandillas

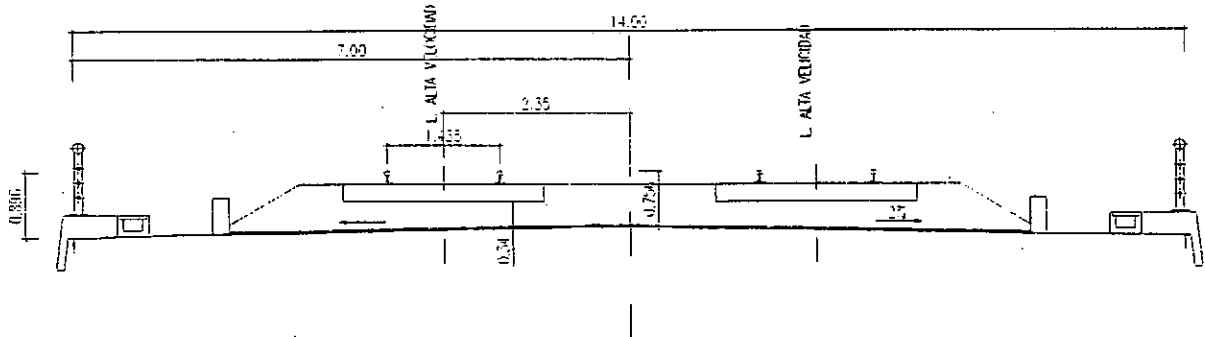
|                    |          |                                         |
|--------------------|----------|-----------------------------------------|
| Número de impostas | 2        |                                         |
| Carga por imposta  | 0.89 T/m | Por defecto 1 T/m imposta y barandilla. |
| Valor de la carga  | 1.77 T/m |                                         |

Soportes de catenarias

|                   |        |                                                                                    |
|-------------------|--------|------------------------------------------------------------------------------------|
| Valor de la carga | 5.00 T | Dos cargas de este valor a 5,70 m a cada lado del eje del tablero sobre cada pila. |
|-------------------|--------|------------------------------------------------------------------------------------|

VALOR TOTAL DE LAS CARGAS MUERTAS (VALORES MÁXIMOS)

|                |           |                                                                                     |                                        |
|----------------|-----------|-------------------------------------------------------------------------------------|----------------------------------------|
| CARGA VERTICAL | 16.715 T  |  | Positivo hacia el exterior de la curva |
| MONENTO TORSOR | 6.892 T*m |                                                                                     |                                        |



Carga de balasto

|                                                                          |         |                          |
|--------------------------------------------------------------------------|---------|--------------------------|
| Peralte                                                                  | 140 mm  |                          |
| Espesor de balasto bajo traviesa                                         | 0.366 m | Mínimo 0,30 m.           |
| Espesor de traviesa                                                      | 0.242 m | 0,242 m para monobloque. |
| Altura de carril                                                         | 0.172 m | 0,172 m para UIC-60.     |
| Separación entre carriles                                                | 1.435 m | 1,435 m para vía UIC.    |
| Distancia entre eje de vía y centro de tablero                           | 2.35 m  | 2,35 m para vía UIC.     |
| Distancia entre eje de vía exterior y borde superior de balasto (hombro) | 2.08 m  |                          |
| Distancia entre eje de tablero e interior de guardabalasto               | 5.05 m  |                          |

|                                        |            |  |
|----------------------------------------|------------|--|
| Resultados para la vía exterior        |            |  |
| Distancia de eje de tablero a hombro   | 4.43 m     |  |
| Altura de balasto en centro de tablero | 0.416 m    |  |
| Altura de balasto en extremo de hombro | 0.937 m    |  |
| Area 1-1                               | 1.843 m2   |  |
| Area 1-2                               | 1.154 m2   |  |
| Area 2                                 | 0.2904 m2  |  |
| Excentricidad 1-1                      | 2.2150 m   |  |
| Excentricidad 1-2                      | 2.9533 m   |  |
| Excentricidad 2                        | 4.637 m    |  |
| Area total                             | 3.287 m2   |  |
| Excentricidad total                    | 2.688 m    |  |
| Peso total                             | 5.260 T    |  |
| Momento torsor                         | 14.138 T*m |  |

|                                        |           |       |
|----------------------------------------|-----------|-------|
| Resultados para la vía interior        |           |       |
| Distancia de eje de tablero a hombro   | 4.43 m    |       |
| Altura de balasto en centro de tablero | 0.735 m   |       |
| Altura de balasto en extremo de hombro | 0.391 m2  |       |
| Area 1-1                               | 3.254 m2  |       |
| Area 1-2                               | -0.761 m2 |       |
| Area 2                                 | 0.121 m2  |       |
| Excentricidad 1-1                      | 2.215 m   |       |
| Excentricidad 1-2                      | 2.953 m   |       |
| Excentricidad 2                        | 4.637 m   |       |
| Area total                             | 2.615 m2  |       |
| Excentricidad total                    | 2.112 m   |       |
| Peso total                             | 4.183 T   | 5.302 |
| Momento torsor                         | 8.836 T*m |       |

Valores totales para el conjunto de ambas vías. Valores máximos (=1,30\*valores nominales)

|                |           |                                        |
|----------------|-----------|----------------------------------------|
| Peso total     | 12.276 T  |                                        |
| Momento torsor | 6.892 T*m | Positivo hacia el exterior de la curva |

Valores totales para el conjunto de ambas vías. Valores mínimos (=0,70\*valores nominales)

|                |           |                                        |
|----------------|-----------|----------------------------------------|
| Peso total     | 6.610 T   |                                        |
| Momento torsor | 3.711 T*m | Positivo hacia el exterior de la curva |

CÁLCULO DE LA FUERZA CENTRÍFUGA SEGÚN LAS ESPECIFICACIONES DEL EUROCÓDIGO 1.

Proyecto: L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo: St. Sadurní d'Anoia - Subirats  
Estructura: Viaducto de Anoia

DATOS BÁSICOS

RADIO MEDIO DEL PUENTE (m) = R = 7,250  
VELOCIDAD DE DISEÑO (km/h) = V = 350  
PUENTE CONTÍNUO (Sí = 1) = 1

DATOS COMPLEMENTARIOS

COEFICIENTE DE CLASIFICACIÓN  $\alpha = 1.00$   
COEFICIENTE DE IMPACTO =  $\phi = 1.00$   
LONGITUD CARGADA EN PILAS (en m) =  $L_p = 90.00$   
LONGITUD CARGADA EN ESTRIBO (en m) =  $L_e = 36.00$

VALORES DE LAS CARGAS

TREN LM71  $q_k = 80$  kN/m  
 $Q_k = 250$  kN  
 $c = 6.4$  m  
TREN SW/0  $q_k = 133$  kN/m  
 $a = 15$  m  
 $c = 5.3$  m  
TREN SW/2  $q_k = 150$  kN/m  
 $a = 25$  m  
 $c = 7.0$  m

RESULTADOS

FUERZA CENTRÍFUGA SEGÚN EL TREN DE CARGA TIPO

|         | TREN LM71 |       |        |       | TREN SW/0 |        | TREN SW/2 |
|---------|-----------|-------|--------|-------|-----------|--------|-----------|
|         | Caso a    |       | Caso b |       | Caso a    | Caso b |           |
|         | $q_k$     | $Q_k$ | $q_k$  | $Q_k$ | $q_k$     | $q_k$  |           |
|         | kN/m      | kN    | kN/m   | kN    | kN/m      | kN/m   | kN/m      |
| PILA    | 1.25      | 3.91  | 3.73   | 11.64 | 2.08      | 6.19   | 1.04      |
| ESTRIBO | 1.25      | 3.91  | 4.51   | 14.10 | 2.08      | 7.50   | 1.04      |

Caso a  $v=120$  km/h  
Caso b  $v=350$  km/h

FUERZA CENTRÍFUGA. VALOR DE LA RESULTANTE MÁXIMA EN KN.

|         | LM71   | SW/0   | SW/2  |
|---------|--------|--------|-------|
| PILA    | 357.99 | 185.80 | 52.13 |
| ESTRIBO | 189.92 | 224.99 | 30.24 |

Hipótesis de cálculo:

De acuerdo con el EC1 la expresión utilizada para el cálculo de la fuerza centrífuga es la siguiente.

$$Q_{centrifuga} = \frac{V^2}{127 \cdot R} \cdot (f \cdot Q_{trafico})$$

Para los trenes LM71 y SW/0 se han considerado dos casos de carga:

Caso a:  $V = 120$  km/h y  $f$  (factor de reducción) = 1  
Caso b:  $V$  igual a la de diseño y  $f$  según la expresión del EC.

$$f = \left[ 1 - \frac{V - 120}{1000} \cdot \left( \frac{814}{V} + 1,75 \right) \cdot \left( 1 - \sqrt{\frac{2,88}{L_f}} \right) \right]$$

Si  $V \leq 120$  km/h  $\Rightarrow f = 1$ .  
Si  $L_f \leq 2,88$  m  $\Rightarrow f = 1$ .  
 $f \geq 0,35$

En el cálculo del factor de reducción  $f$  se ha tomado como velocidad máxima 300 km/h.

Los valores obtenidos son válidos para el caso de tráfico en una sola vía.  
La velocidad de diseño de la vía se ha supuesto mayor o igual a 80 km/h.  
La longitud de aplicación de las cargas se ha supuesto mayor que 2,88 m.

CÁLCULO DE LA FUERZA CENTRÍFUGA SEGÚN LAS ESPECIFICACIONES DE LA IPF-75

Proyecto: L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo: St. Sadurní d'Anoia - Subirats  
Estructura: Viaducto de Anoia

DATOS BÁSICOS

RADIO MEDIO DEL PUENTE (m) = R = 7,250  
VELOCIDAD DE DISEÑO (km/h) = V = 200  
COEFICIENTE DE IMPACTO =  $\phi$  = 1.00  
LONGITUD CARGADA (m) = L = 45.00

VALORES DE LAS CARGAS

TREN TIPO A Qk = 300 kN  
c = 1.5 m  
TREN TIPO B qk1 = 120 kN/m  
a = 30 m  
qk2 = 100 kN/m

CÁLCULOS INTERMEDIOS

COCIENTE V2/127R 0.04344  
Longitud aplicación qk1 30.00  
Longitud aplicación qk2 15.00  
Número de cargas Qk 3

RESULTADOS

FUERZA CENTRÍFUGA SEGÚN EL TREN DE CARGA

| TREN A | TREN B |      |
|--------|--------|------|
| Qk     | qk1    | qk2  |
| kN     | kN/m   | kN/m |
| 13.03  | 5.21   | 4.34 |

FUERZA CENTRÍFUGA. VALOR TOTAL RESULTANTE

| TREN TIPO A | TREN TIPO B |
|-------------|-------------|
| 39.10       | 221.56      |

Hipótesis de cálculo:

De acuerdo con la instrucción IPF-75 la expresión utilizada para el cálculo de la fuerza centrífuga es la siguiente:

$$Q_{centrifuga} = \frac{V^2}{127 \cdot R} \cdot Q_{trafico}$$

Los valores obtenidos son válidos para el caso de tráfico en una sola vía.

CÁLCULO DE EXCENTRICIDADES - LINEA DE ALTA VELOCIDAD

Proyecto: L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo: St. Sadurn d'Anoia - Subirats  
Estructura: Viaducto de Anoia

REFERENCIA  
V= 350 km/h  
R=7250 m

|                                             |                   |        |     |
|---------------------------------------------|-------------------|--------|-----|
| EC-1 LM71                                   | Carga vertical    | 8      | T/m |
|                                             | Fuerza centrífuga | 0.451  | T/m |
| EC-1 SW/0                                   | Carga vertical    | 13.3   | T/m |
|                                             | Fuerza centrífuga | 0.75   | T/m |
| EC-1 SW/2                                   | Carga vertical    | 15     | T/m |
|                                             | Fuerza centrífuga | 0.104  | T/m |
| IPF-75 TIPO A                               | Carga vertical    | 30     | T   |
|                                             | Fuerza centrífuga | 1.303  | T   |
| IPF-75 TIPO B                               | Carga vertical    | 12     | T/m |
|                                             | Fuerza centrífuga | 0.521  | T/m |
| Distancia fib. sup. al c.d.g. del tablero   |                   | 1.1529 | m   |
| Peralte                                     |                   | 140    | mm  |
| Altura del c.d.g. del tren sobre carril     |                   | 1.8    | m   |
| Distancia entre carriles                    |                   | 1.435  | m   |
| Distancia eje vía-eje tablero               |                   | 2.35   | m   |
| Dif de cotas carril director-centro tablero |                   | 0.788  | m   |

|                      |       |                     |  |
|----------------------|-------|---------------------|--|
| Excentricidades      |       | respecto eje de vía |  |
| Ripado               | 0.3   | m                   |  |
| Peralte              | 0.175 | m                   |  |
| L.M. 71 y SW/0 (EC1) | 0.080 | m                   |  |

|                                       |       |                                                 |       |
|---------------------------------------|-------|-------------------------------------------------|-------|
| Fuerza centrífuga                     |       | respecto eje de vía                             |       |
| b=                                    |       | 3.802                                           | m     |
| Momento debido a la Fuerza Centrífuga |       | Excentricidad debida a la Fuerza Centrífuga (m) |       |
| LM-71                                 | 1.715 | LM-71                                           | 0.214 |
| SW/0                                  | 2.852 | SW/0                                            | 0.214 |
| SW/2                                  | 0.395 | SW/2                                            | 0.026 |
| TIPO A                                | 4.955 | TIPO A                                          | 0.165 |
| TIPO B                                | 1.981 | TIPO B                                          | 0.165 |

|                       |        |                     |        |        |        |     |
|-----------------------|--------|---------------------|--------|--------|--------|-----|
| Excentricidad total   |        | respecto eje de vía |        |        |        |     |
|                       | LM-71  | SW/0                | SW/2   | TIPO A | TIPO B |     |
| Peralte-f.cent+ripado | 0.340  | 0.340               | 0.448  | 0.310  | 0.310  | [m] |
| Peralte-f.cent-ripado | -0.419 | -0.419              | -0.152 | -0.290 | -0.290 |     |
| Peralte+ripado        | 0.555  | 0.555               | 0.475  | 0.475  | 0.475  |     |

|                       |        |                         |        |        |        |
|-----------------------|--------|-------------------------|--------|--------|--------|
| Excentricidad total   |        | respecto eje de tablero |        |        |        |
| VÍA INTERIOR          |        |                         |        |        |        |
|                       | LM-71  | SW/0                    | SW/2   | TIPO A | TIPO B |
| Peralte-f.cent+ripado | 2.690  | 2.690                   | 2.798  | 2.660  | 2.660  |
| Peralte-f.cent-ripado | 1.931  | 1.931                   | 2.198  | 2.060  | 2.060  |
| Peralte+ripado        | 2.905  | 2.905                   | 2.825  | 2.825  | 2.825  |
| VÍA EXTERIOR          |        |                         |        |        |        |
|                       | LM-71  | SW/0                    | SW/2   | TIPO A | TIPO B |
| Peralte-f.cent+ripado | -2.010 | -2.010                  | -1.902 | -2.040 | -2.040 |
| Peralte-f.cent-ripado | -2.769 | -2.769                  | -2.502 | -2.640 | -2.640 |
| Peralte+ripado        | -1.795 | -1.795                  | -1.875 | -1.875 | -1.875 |



Proyecto: L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo: St. Sadurní d'Anoia - Subirats  
Estructura: Viaducto de Anoia

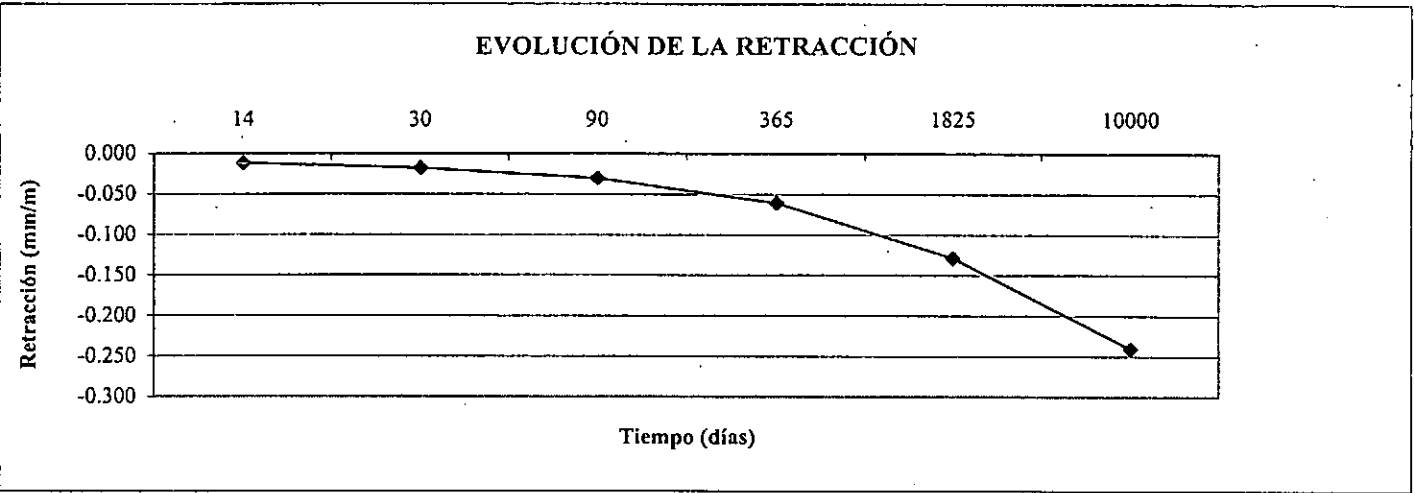
CALCULO DE RETRACCIÓN DEL HORMIGÓN

Area de la sección 9.6742 m2  
Perímetro de la sección 32.5117 m  
fck 50 MPa  
Humedad Relativa 65 %  
Módulo de deformación (Ec,28) 32902 MPa  
Módulo de deformación (Ec,7) 26322 MPa  
Módulo de deformación cargas rápidas (Ec,28) 38709 MPa  
fctk 2.85 MPa  
fctm 4.07 MPa

Espesor equivalente 595 mm  
Comienzo retracción 0 días  
Final de retracción 10,000 días

BetaHR -1.124  
Coef. básico de retracción -0.00035979  
Retracción final -0.000240

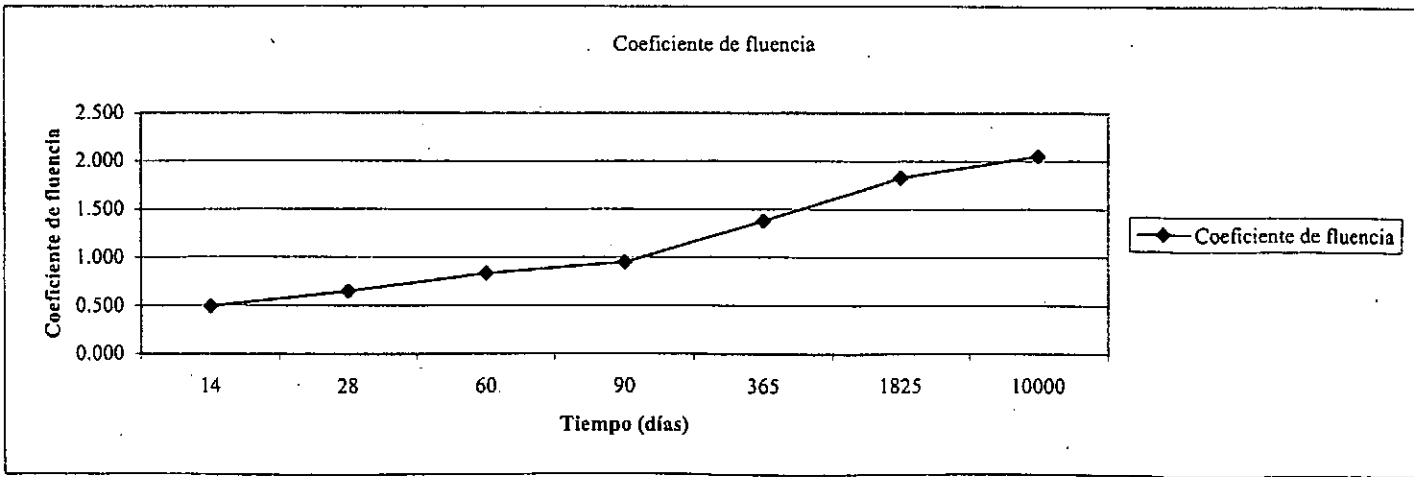
| Evolución de la retracción del hormigón |         |              |              |
|-----------------------------------------|---------|--------------|--------------|
| Tiempo (días)                           | beta,s  | eps,cs       | eps,cs(mm/m) |
| 14                                      | 0.03359 | -1.20844E-05 | -0.012       |
| 30                                      | 0.04914 | -1.76783E-05 | -0.018       |
| 90                                      | 0.08490 | -3.05461E-05 | -0.031       |
| 365                                     | 0.16912 | -6.08485E-05 | -0.061       |
| 1825                                    | 0.35823 | -0.000128888 | -0.129       |
| 10000                                   | 0.66821 | -0.000240414 | -0.240       |



CALCULO DE LA FLUENCIA DEL HORMIGÓN

Phi,HR 1.420  
beta(fcm) 2.206  
Puesta en carga, to, en días 5  
beta(to) 0.676  
betaH 1153  
betac (10000) 0.968  
Phi (t=10000) 2.049  
Coeficiente de relajación 0.691

| Evolución de la fluencia del hormigón |        |       |               |
|---------------------------------------|--------|-------|---------------|
| Tiempo (días)                         | beta,c | Phio  | Phi (t=10000) |
| 14                                    | 0.233  | 2.117 | 0.493         |
| 28                                    | 0.307  | 2.117 | 0.650         |
| 60                                    | 0.396  | 2.117 | 0.838         |
| 90                                    | 0.448  | 2.117 | 0.948         |
| 365                                   | 0.650  | 2.117 | 1.376         |
| 1825                                  | 0.863  | 2.117 | 1.828         |
| 10000                                 | 0.968  | 2.117 | 2.049         |



PROYECTO:  
OBRA DE FÁBRICA:

L.A.V. Madrid - Zaragoza - Barcelona - Frontera Francesa. Tramo Lleida-Martorell. Subtran  
Viaducto de Anoia

CÁLCULO DE LA VARIACIÓN UNIFORME DE TEMPERATURA EN EL TABLERO

| Datos                                                     |      |
|-----------------------------------------------------------|------|
| Zona                                                      | 3    |
| Tipo de tablero (ver tabla adjunta)                       | 3    |
| Canto, m                                                  | 3.01 |
| Separación entre ejes de vigas (sólo puentes de vigas), m | 0.00 |

| Cálculos intermedios                 |        |
|--------------------------------------|--------|
| k                                    | 29.13  |
| a                                    | 0.301  |
| b                                    | -0.148 |
| c                                    | 0.000  |
| Canto de cálculo, m                  | 3.005  |
| Separación de cálculo entre vigas, m | 1.000  |

| Resultados                                                   |      |
|--------------------------------------------------------------|------|
| Valor total de la variación uniforme de temperatura, °C      | 34.5 |
| Valor de cálculo de la variación de temperatura, Δtd= Δt/2+5 | 22.2 |

CÁLCULO DEL GRADIENTE TÉRMICO EN EL TABLERO

| Datos                                                     |       |
|-----------------------------------------------------------|-------|
| Gradiente de referencia                                   | 9.0   |
| Factor de corrección relativo al canto del tablero, K1    | 0.750 |
| Factor de corrección K2 (relación ancho inf/sup)          | 1.045 |
| Factor de corrección relativo a existencia de balasto, K3 | 0.700 |

(se podría reducir a 0.6, según IAPF)

| Resultados                               |     |
|------------------------------------------|-----|
| Valor del gradiente térmico positivo, °C | 4.9 |

| Valores de k, a, b, c y h  |                 |       |       |        |       |              |              |
|----------------------------|-----------------|-------|-------|--------|-------|--------------|--------------|
| Tipología de tablero       | Tipo de tablero | k     | a     | b      | c     | Canto mínimo | Canto máximo |
| Losa maciza de hormigón    | 1               | 23.89 | 0.292 | -0.139 | 0     | 0.3          | 1.2          |
| Losa aligerada de hormigón | 2               | 24.91 | 0.292 | -0.172 | 0     | 0.6          | 1.5          |
| Cajón de hormigón          | 3               | 29.13 | 0.301 | -0.148 | 0     | 1.7          | 4            |
| Vigas de hormigón          | 4               | 26.9  | 0.3   | -0.088 | 0.057 | 0.6          | 2.5          |
| Cajón metálico             | 5               | 39.77 | 0.234 | -0.069 | 0     | 1.5          | 4.5          |
| Vigas metálicas            | 6               | 40.11 | 0.228 | -0.072 | 0     | 2            | 6            |

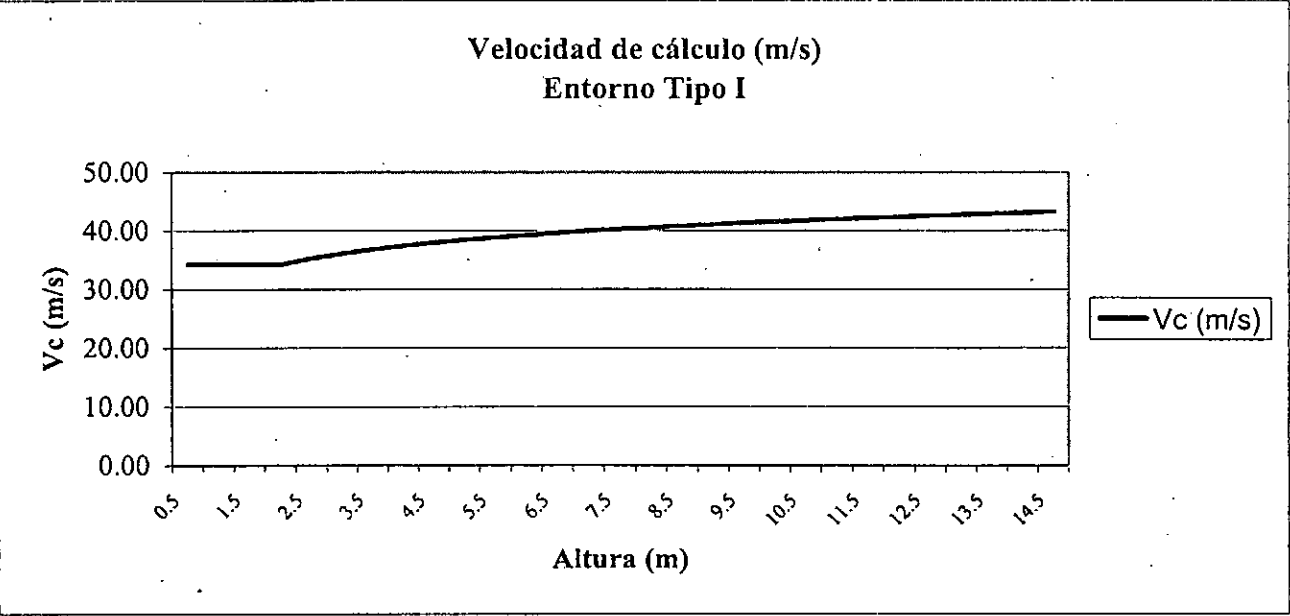


VIADUCTO DE ANOIA

CÁLCULO DE EMPUJES DE VIENTO

|                    |        |
|--------------------|--------|
| Vref               | 24 m/s |
| Ct                 | 1      |
| Periodo de retorno | 100    |
| Cr                 | 1.04   |
| Entorno Tipo       | 1      |
| Kz                 | 0.17   |
| zo                 | 0.01 m |
| Zmin               | 2 m    |

| Altura (m) | Cz    | Cg    | Vc (m/s) |
|------------|-------|-------|----------|
| 0.5        | 0.901 | 1.524 | 34.25    |
| 1.0        | 0.901 | 1.524 | 34.25    |
| 1.5        | 0.901 | 1.524 | 34.25    |
| 2.0        | 0.901 | 1.524 | 34.25    |
| 2.5        | 0.939 | 1.506 | 35.28    |
| 3.0        | 0.970 | 1.492 | 36.12    |
| 3.5        | 0.996 | 1.482 | 36.83    |
| 4.0        | 1.019 | 1.473 | 37.44    |
| 4.5        | 1.039 | 1.465 | 37.97    |
| 5.0        | 1.056 | 1.458 | 38.45    |
| 5.5        | 1.073 | 1.452 | 38.89    |
| 6.0        | 1.087 | 1.447 | 39.28    |
| 6.5        | 1.101 | 1.442 | 39.64    |
| 7.0        | 1.114 | 1.438 | 39.98    |
| 7.5        | 1.125 | 1.434 | 40.29    |
| 8.0        | 1.136 | 1.431 | 40.58    |
| 8.5        | 1.147 | 1.428 | 40.86    |
| 9.0        | 1.156 | 1.424 | 41.12    |
| 9.5        | 1.166 | 1.422 | 41.36    |
| 10.0       | 1.174 | 1.419 | 41.59    |
| 10.5       | 1.183 | 1.416 | 41.81    |
| 11.0       | 1.191 | 1.414 | 42.02    |
| 11.5       | 1.198 | 1.412 | 42.22    |
| 12.0       | 1.205 | 1.410 | 42.41    |
| 12.5       | 1.212 | 1.408 | 42.59    |
| 13.0       | 1.219 | 1.406 | 42.77    |
| 13.5       | 1.225 | 1.404 | 42.94    |
| 14.0       | 1.232 | 1.402 | 43.10    |
| 14.5       | 1.237 | 1.401 | 43.26    |
| 15.0       | 1.243 | 1.399 | 43.41    |
| 15.5       | 1.249 | 1.397 | 43.56    |
| 16.0       | 1.254 | 1.396 | 43.70    |
| 16.5       | 1.259 | 1.395 | 43.84    |
| 17.0       | 1.265 | 1.393 | 43.97    |
| 17.5       | 1.269 | 1.392 | 44.10    |
| 18.0       | 1.274 | 1.391 | 44.23    |
| 18.5       | 1.279 | 1.389 | 44.35    |
| 19.0       | 1.283 | 1.388 | 44.47    |
| 19.5       | 1.288 | 1.387 | 44.59    |
| 20.0       | 1.292 | 1.386 | 44.70    |



### **3 CÁLCULO ESTRUCTURAL DEL TABLERO**

### 3.1 CÁLCULO ESTRUCTURAL CON MODELO DE VIGA CONTINUA

#### 3.1.1 DISCRETIZACIÓN Y CARACTERÍSTICAS MECÁNICAS

Se modela el tablero mediante un emparrillado plano constituido por un nervio longitudinal, coincidente con el eje de viga en planta, considerándose 3 grados de libertad por nudo (desplazamiento vertical, giro de flexión longitudinal de la barra y giro a torsión). El nervio longitudinal se ha dividido para cada uno de los vanos del tablero en 20 barras de igual longitud asignando las características mecánicas en cada uno de los extremos de la barra. Las propiedades mecánicas de la barra se obtienen como media de las características de sus secciones extremas. En la zona de estribos se ha simulado la riostra de apoyo mediante 2 barras transversales, una a cada lado del nervio longitudinal, con su extremo final coincidente con la posición real de los apoyos tipo POT. En las barras transversales de las riostras de apoyo se ha despreciado su rigidez a torsión. En los apoyos se han prescrito únicamente los movimientos verticales del nudo.

La numeración de nudos y barras es correlativa, tomando como origen el extremo izquierdo del nervio longitudinal, en último lugar se numeran las barras y nudos que permiten simular las riostras de apoyo en los dos estribos. La discretización adoptada aparece en las hojas y esquemas adjuntos.

#### 3.1.2 CÁLCULO DE ESFUERZOS LONGITUDINALES

El cálculo de esfuerzos longitudinales con el modelo de análisis estructural expuesto se detalla a continuación.

La notación adoptada para cada una de las hipótesis de carga es la siguiente:

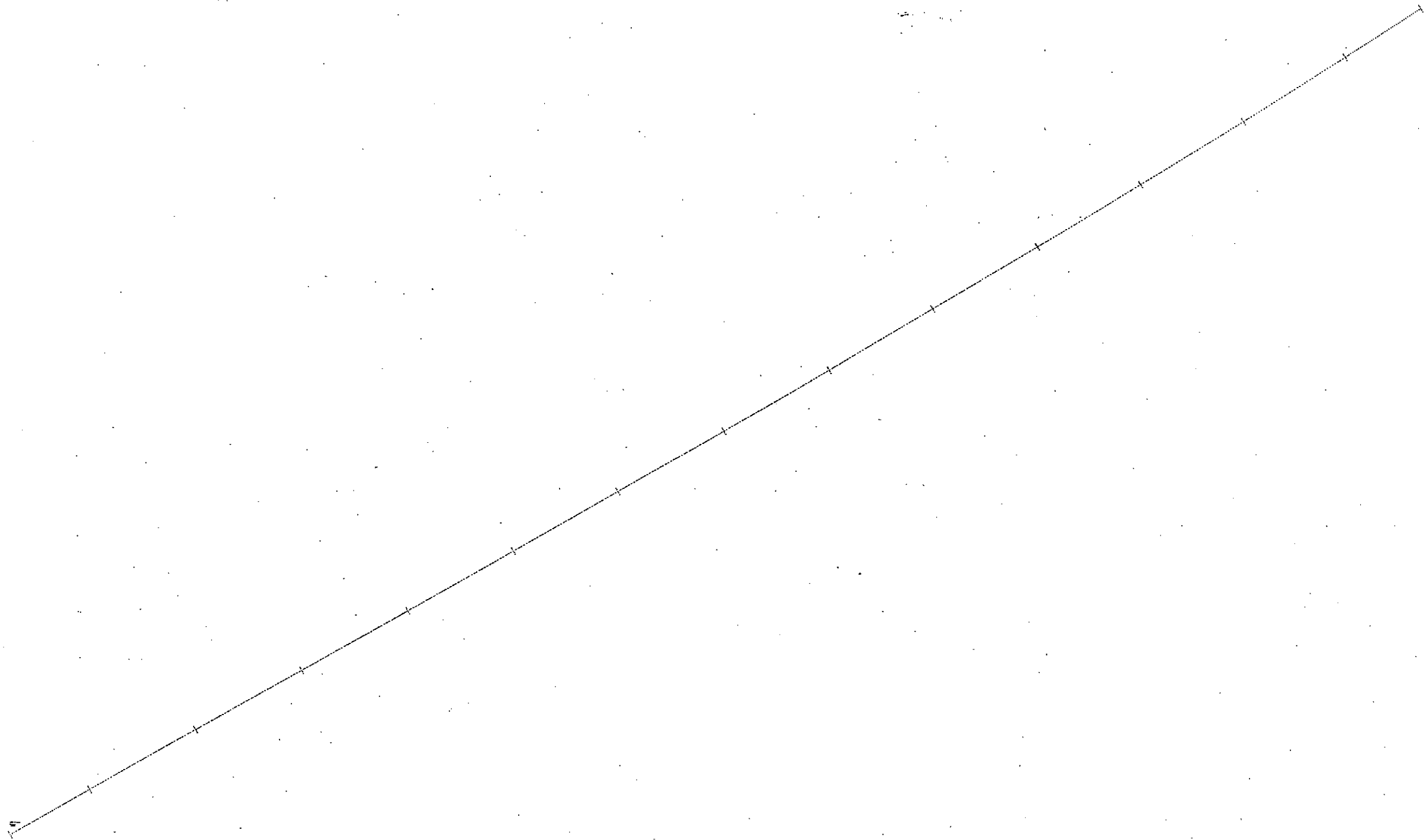
- $g_1$  Peso propio de la estructura.
- $g_2$  Carga permanente.
- $q$  Sobrecarga uniforme de ferrocarril.
- $\Delta T$  Gradiente de temperatura.
- $P_{ii}$  Pretensado inicial de descimbrado (pretensado parcial con pérdidas iniciales).
- $P_i$  Pretensado inicial (con pérdidas iniciales).
- $P_{\infty}$  Pretensado final (con pérdidas iniciales y diferidas).

En los listados aparece la siguiente información:

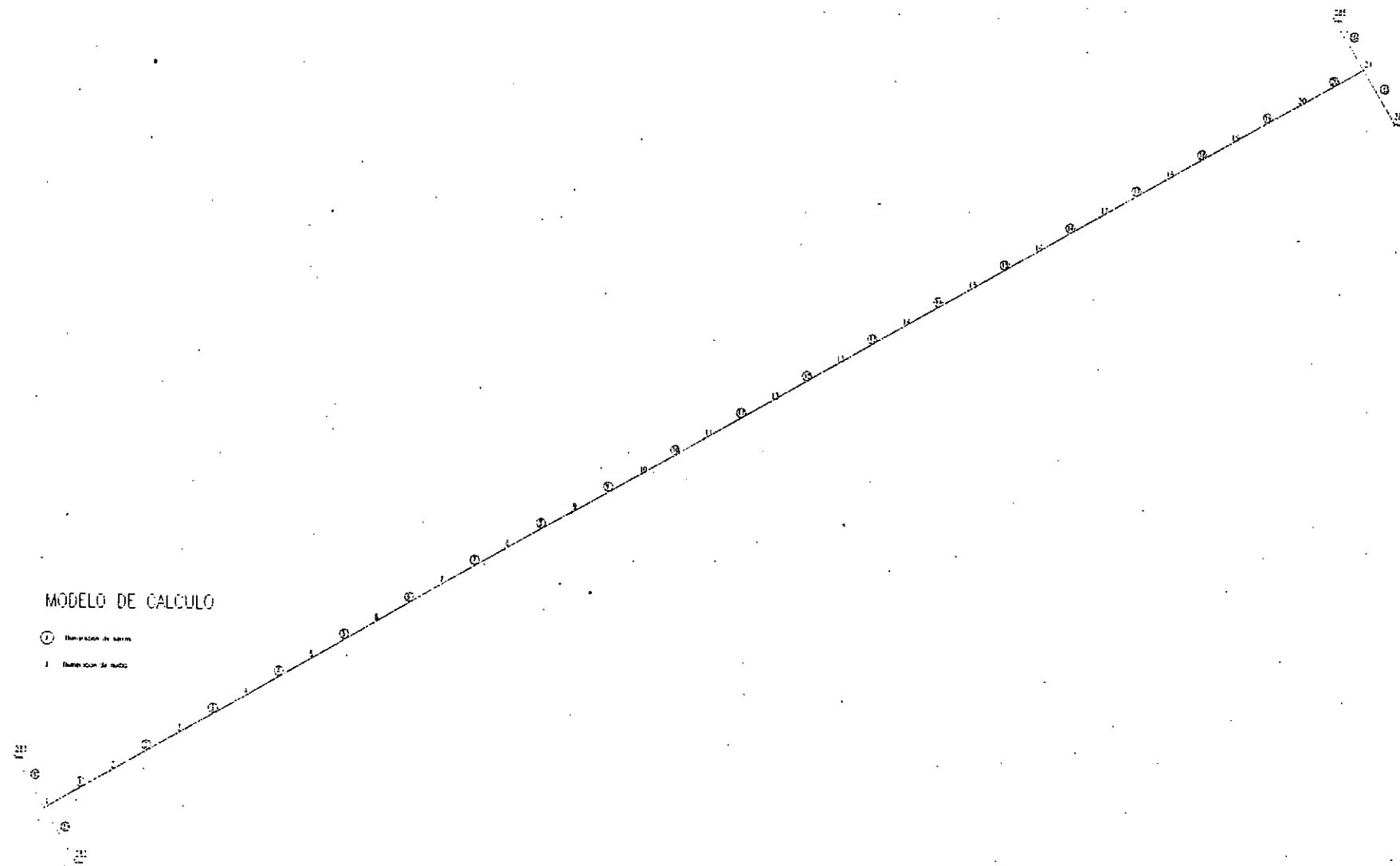
1. Datos generales.
2. Discretización: numeración de barras y nudos, coordenadas de los nudos condiciones de vinculación.
3. Cargas en los nudos para cada hipótesis de carga.
4. Reacciones para cada hipótesis de carga.
5. Esfuerzos en extremo de barra para cada hipótesis de carga.

**CÁLCULO ESTRUCTURAL DEL TABLERO CON MODELO DE  
EMPARRILLADO**

## MODELO DE CÁLCULO



# CRITERIO DE NUMERACIÓN DETALLE VANO 1





### **3.1.2 ESFUERZOS EN ESQUEMA ESTRUCTURAL DEFINITIVO**

Referencia del Proyecto:

Viaducto sobre Rio Anoia

DATOS GENERALES DEL EMPARRILLADO

No. de Barras = 178  
No. de Nudos = 179  
No. de Nudos con condiciones impuestas = 18  
No. de Materiales = 3  
No. de Hipotesis de carga = 1

Propiedades de barras =1, de secciones =0

TIPO DE PROPIEDADES = 0

PROPIEDADES DE LOS MATERIALES

MATERIAL/SECCION 1

Inercia a Flexion (m4) = 11.3277998  
Modulo de Torsion (m4) = 22.2520008  
Area a Cortante (m2) = 0.0000000  
Modulo de elasticidad (T/m2) = 3300000.00  
Coeficiente de Poisson = 0.16  
Canto (m) = 3.00500  
Vsup (m) = 1.15240  
Vinf (m) = 1.85260

MATERIAL/SECCION 2

Inercia a Flexion (m4) = 13.5714998  
Modulo de Torsion (m4) = 24.8073997  
Area a Cortante (m2) = 0.0000000  
Modulo de elasticidad (T/m2) = 3300000.00  
Coeficiente de Poisson = 0.16  
Canto (m) = 3.00500  
Vsup (m) = 1.31800  
Vinf (m) = 1.68700

PROPIEDADES DE LOS MATERIALES

MATERIAL/SECCION 3

Inercia a Flexion (m4) = 2.0000000  
Modulo de Torsion (m4) = 0.0000100  
Area a Cortante (m2) = 0.0000000  
Modulo de elasticidad (T/m2) = 3300000.00  
Coeficiente de Poisson = 0.16  
Canto (m) = 3.00000  
Vsup (m) = 1.50000  
Vinf (m) = 1.50000



DISCRETIZACION. DATOS DE LAS BARRAS

| Barra | Nudo 1 | Nudo 2 | No.de Secc<br>Nud.1 Nud.2 | No. MAT |   |
|-------|--------|--------|---------------------------|---------|---|
| 1     | 1      | 2      | 1                         | 1       | 1 |
| 2     | 2      | 3      | 1                         | 1       | 1 |
| 3     | 3      | 4      | 1                         | 1       | 1 |
| 4     | 4      | 5      | 1                         | 1       | 1 |
| 5     | 5      | 6      | 1                         | 1       | 1 |
| 6     | 6      | 7      | 1                         | 1       | 1 |
| 7     | 7      | 8      | 1                         | 1       | 1 |
| 8     | 8      | 9      | 1                         | 1       | 1 |
| 9     | 9      | 10     | 1                         | 1       | 1 |
| 10    | 10     | 11     | 1                         | 1       | 1 |
| 11    | 11     | 12     | 1                         | 1       | 1 |
| 12    | 12     | 13     | 1                         | 1       | 1 |
| 13    | 13     | 14     | 1                         | 1       | 1 |
| 14    | 14     | 15     | 1                         | 1       | 1 |
| 15    | 15     | 16     | 1                         | 1       | 1 |
| 16    | 16     | 17     | 1                         | 1       | 1 |
| 17    | 17     | 18     | 1                         | 1       | 1 |
| 18    | 18     | 19     | 1                         | 1       | 1 |
| 19    | 19     | 20     | 2                         | 2       | 2 |
| 20    | 20     | 21     | 2                         | 2       | 2 |
| 21    | 21     | 22     | 2                         | 2       | 2 |
| 22    | 22     | 23     | 2                         | 2       | 2 |
| 23    | 23     | 24     | 1                         | 1       | 1 |
| 24    | 24     | 25     | 1                         | 1       | 1 |
| 25    | 25     | 26     | 1                         | 1       | 1 |
| 26    | 26     | 27     | 1                         | 1       | 1 |
| 27    | 27     | 28     | 1                         | 1       | 1 |
| 28    | 28     | 29     | 1                         | 1       | 1 |
| 29    | 29     | 30     | 1                         | 1       | 1 |
| 30    | 30     | 31     | 1                         | 1       | 1 |
| 31    | 31     | 32     | 1                         | 1       | 1 |
| 32    | 32     | 33     | 1                         | 1       | 1 |
| 33    | 33     | 34     | 1                         | 1       | 1 |
| 34    | 34     | 35     | 1                         | 1       | 1 |
| 35    | 35     | 36     | 1                         | 1       | 1 |
| 36    | 36     | 37     | 1                         | 1       | 1 |
| 37    | 37     | 38     | 1                         | 1       | 1 |
| 38    | 38     | 39     | 1                         | 1       | 1 |
| 39    | 39     | 40     | 2                         | 2       | 2 |
| 40    | 40     | 41     | 2                         | 2       | 2 |
| 41    | 41     | 42     | 2                         | 2       | 2 |
| 42    | 42     | 43     | 2                         | 2       | 2 |
| 43    | 43     | 44     | 1                         | 1       | 1 |
| 44    | 44     | 45     | 1                         | 1       | 1 |
| 45    | 45     | 46     | 1                         | 1       | 1 |
| 46    | 46     | 47     | 1                         | 1       | 1 |
| 47    | 47     | 48     | 1                         | 1       | 1 |

DISCRETIZACION. DATOS DE LAS BARRAS

| Barra | Nudo 1 | Nudo 2 | No.de Secc<br>Nud.1 Nud.2 | No. MAT |   |
|-------|--------|--------|---------------------------|---------|---|
| 48    | 48     | 49     | 1                         | 1       | 1 |
| 49    | 49     | 50     | 1                         | 1       | 1 |
| 50    | 50     | 51     | 1                         | 1       | 1 |
| 51    | 51     | 52     | 1                         | 1       | 1 |
| 52    | 52     | 53     | 1                         | 1       | 1 |
| 53    | 53     | 54     | 1                         | 1       | 1 |
| 54    | 54     | 55     | 1                         | 1       | 1 |
| 55    | 55     | 56     | 1                         | 1       | 1 |
| 56    | 56     | 57     | 1                         | 1       | 1 |
| 57    | 57     | 58     | 1                         | 1       | 1 |
| 58    | 58     | 59     | 1                         | 1       | 1 |
| 59    | 59     | 60     | 2                         | 2       | 2 |
| 60    | 60     | 61     | 2                         | 2       | 2 |
| 61    | 61     | 62     | 2                         | 2       | 2 |
| 62    | 62     | 63     | 2                         | 2       | 2 |
| 63    | 63     | 64     | 1                         | 1       | 1 |
| 64    | 64     | 65     | 1                         | 1       | 1 |
| 65    | 65     | 66     | 1                         | 1       | 1 |
| 66    | 66     | 67     | 1                         | 1       | 1 |
| 67    | 67     | 68     | 1                         | 1       | 1 |
| 68    | 68     | 69     | 1                         | 1       | 1 |
| 69    | 69     | 70     | 1                         | 1       | 1 |
| 70    | 70     | 71     | 1                         | 1       | 1 |
| 71    | 71     | 72     | 1                         | 1       | 1 |
| 72    | 72     | 73     | 1                         | 1       | 1 |
| 73    | 73     | 74     | 1                         | 1       | 1 |
| 74    | 74     | 75     | 1                         | 1       | 1 |
| 75    | 75     | 76     | 1                         | 1       | 1 |
| 76    | 76     | 77     | 1                         | 1       | 1 |
| 77    | 77     | 78     | 1                         | 1       | 1 |
| 78    | 78     | 79     | 1                         | 1       | 1 |
| 79    | 79     | 80     | 2                         | 2       | 2 |
| 80    | 80     | 81     | 2                         | 2       | 2 |
| 81    | 81     | 82     | 2                         | 2       | 2 |
| 82    | 82     | 83     | 2                         | 2       | 2 |
| 83    | 83     | 84     | 1                         | 1       | 1 |
| 84    | 84     | 85     | 1                         | 1       | 1 |
| 85    | 85     | 86     | 1                         | 1       | 1 |
| 86    | 86     | 87     | 1                         | 1       | 1 |
| 87    | 87     | 88     | 1                         | 1       | 1 |
| 88    | 88     | 89     | 1                         | 1       | 1 |
| 89    | 89     | 90     | 1                         | 1       | 1 |
| 90    | 90     | 91     | 1                         | 1       | 1 |
| 91    | 91     | 92     | 1                         | 1       | 1 |
| 92    | 92     | 93     | 1                         | 1       | 1 |
| 93    | 93     | 94     | 1                         | 1       | 1 |
| 94    | 94     | 95     | 1                         | 1       | 1 |

DISCRETIZACION. DATOS DE LAS BARRAS

| Barra | Nudo 1 | Nudo 2 | No.de Secc |       | No. MAT |
|-------|--------|--------|------------|-------|---------|
|       |        |        | Nud.1      | Nud.2 |         |
| 95    | 95     | 96     | 1          | 1     | 1       |
| 96    | 96     | 97     | 1          | 1     | 1       |
| 97    | 97     | 98     | 1          | 1     | 1       |
| 98    | 98     | 99     | 1          | 1     | 1       |
| 99    | 99     | 100    | 2          | 2     | 2       |
| 100   | 100    | 101    | 2          | 2     | 2       |
| 101   | 101    | 102    | 2          | 2     | 2       |
| 102   | 102    | 103    | 2          | 2     | 2       |
| 103   | 103    | 104    | 1          | 1     | 1       |
| 104   | 104    | 105    | 1          | 1     | 1       |
| 105   | 105    | 106    | 1          | 1     | 1       |
| 106   | 106    | 107    | 1          | 1     | 1       |
| 107   | 107    | 108    | 1          | 1     | 1       |
| 108   | 108    | 109    | 1          | 1     | 1       |
| 109   | 109    | 110    | 1          | 1     | 1       |
| 110   | 110    | 111    | 1          | 1     | 1       |
| 111   | 111    | 112    | 1          | 1     | 1       |
| 112   | 112    | 113    | 1          | 1     | 1       |
| 113   | 113    | 114    | 1          | 1     | 1       |
| 114   | 114    | 115    | 1          | 1     | 1       |
| 115   | 115    | 116    | 1          | 1     | 1       |
| 116   | 116    | 117    | 1          | 1     | 1       |
| 117   | 117    | 118    | 1          | 1     | 1       |
| 118   | 118    | 119    | 1          | 1     | 1       |
| 119   | 119    | 120    | 2          | 2     | 2       |
| 120   | 120    | 121    | 2          | 2     | 2       |
| 121   | 121    | 122    | 2          | 2     | 2       |
| 122   | 122    | 123    | 2          | 2     | 2       |
| 123   | 123    | 124    | 1          | 1     | 1       |
| 124   | 124    | 125    | 1          | 1     | 1       |
| 125   | 125    | 126    | 1          | 1     | 1       |
| 126   | 126    | 127    | 1          | 1     | 1       |
| 127   | 127    | 128    | 1          | 1     | 1       |
| 128   | 128    | 129    | 1          | 1     | 1       |
| 129   | 129    | 130    | 1          | 1     | 1       |
| 130   | 130    | 131    | 1          | 1     | 1       |
| 131   | 131    | 132    | 1          | 1     | 1       |
| 132   | 132    | 133    | 1          | 1     | 1       |
| 133   | 133    | 134    | 1          | 1     | 1       |
| 134   | 134    | 135    | 1          | 1     | 1       |
| 135   | 135    | 136    | 1          | 1     | 1       |
| 136   | 136    | 137    | 1          | 1     | 1       |
| 137   | 137    | 138    | 1          | 1     | 1       |
| 138   | 138    | 139    | 1          | 1     | 1       |
| 139   | 139    | 140    | 2          | 2     | 2       |
| 140   | 140    | 141    | 2          | 2     | 2       |
| 141   | 141    | 142    | 2          | 2     | 2       |

DISCRETIZACION. DATOS DE LAS BARRAS

| Barra | Nudo 1 | Nudo 2 | No.de Secc |       | No. MAT |
|-------|--------|--------|------------|-------|---------|
|       |        |        | Nud.1      | Nud.2 |         |
| 142   | 142    | 143    | 2          | 2     | 2       |
| 143   | 143    | 144    | 1          | 1     | 1       |
| 144   | 144    | 145    | 1          | 1     | 1       |
| 145   | 145    | 146    | 1          | 1     | 1       |
| 146   | 146    | 147    | 1          | 1     | 1       |
| 147   | 147    | 148    | 1          | 1     | 1       |
| 148   | 148    | 149    | 1          | 1     | 1       |
| 149   | 149    | 150    | 1          | 1     | 1       |
| 150   | 150    | 151    | 1          | 1     | 1       |
| 151   | 151    | 152    | 1          | 1     | 1       |
| 152   | 152    | 153    | 1          | 1     | 1       |
| 153   | 153    | 154    | 1          | 1     | 1       |
| 154   | 154    | 155    | 1          | 1     | 1       |
| 155   | 155    | 156    | 1          | 1     | 1       |
| 156   | 156    | 157    | 1          | 1     | 1       |
| 157   | 157    | 158    | 1          | 1     | 1       |
| 158   | 158    | 159    | 1          | 1     | 1       |
| 159   | 159    | 160    | 1          | 1     | 1       |
| 160   | 160    | 161    | 1          | 1     | 1       |
| 161   | 1      | 162    | 3          | 3     | 3       |
| 162   | 1      | 163    | 3          | 3     | 3       |
| 163   | 21     | 164    | 3          | 3     | 3       |
| 164   | 21     | 165    | 3          | 3     | 3       |
| 165   | 41     | 166    | 3          | 3     | 3       |
| 166   | 41     | 167    | 3          | 3     | 3       |
| 167   | 61     | 168    | 3          | 3     | 3       |
| 168   | 61     | 169    | 3          | 3     | 3       |
| 169   | 81     | 170    | 3          | 3     | 3       |
| 170   | 81     | 171    | 3          | 3     | 3       |
| 171   | 101    | 172    | 3          | 3     | 3       |
| 172   | 101    | 173    | 3          | 3     | 3       |
| 173   | 121    | 174    | 3          | 3     | 3       |
| 174   | 121    | 175    | 3          | 3     | 3       |
| 175   | 141    | 176    | 3          | 3     | 3       |
| 176   | 141    | 177    | 3          | 3     | 3       |
| 177   | 161    | 178    | 3          | 3     | 3       |
| 178   | 161    | 179    | 3          | 3     | 3       |

# PROPIEDADES DE LAS BARRAS

=====

## MATERIAL 1

Inercia a Flexion (m4) = 11.3277998  
 Modulo de Torsion (m4) = 22.2520008  
 Area a Cortante (m2) = 0.0000000  
 Modulo de elasticidad (T/m2) = 3300000.00  
 Modulo de deformacion G (T/m2) = 1914000.00  
 Canto (m) = 3.00500  
 Vsup (m) = 1.15240  
 Vinf (m) = 1.85260

## MATERIAL 2

Inercia a Flexion (m4) = 13.5714998  
 Modulo de Torsion (m4) = 24.8073997  
 Area a Cortante (m2) = 0.0000000  
 Modulo de elasticidad (T/m2) = 3300000.00  
 Modulo de deformacion G (T/m2) = 1914000.00  
 Canto (m) = 3.00500  
 Vsup (m) = 1.31800  
 Vinf (m) = 1.68700

## MATERIAL 3

Inercia a Flexion (m4) = 2.0000000  
 Modulo de Torsion (m4) = 0.0000100  
 Area a Cortante (m2) = 0.0000000  
 Modulo de elasticidad (T/m2) = 3300000.00  
 Modulo de deformacion G (T/m2) = 1914000.00  
 Canto (m) = 3.00000  
 Vsup (m) = 1.50000  
 Vinf (m) = 1.50000

# COORDENADAS DE LOS NUDOS

=====

| Nudo | X      | Y      |
|------|--------|--------|
| 1    | 0.000  | 0.000  |
| 2    | 1.423  | 1.102  |
| 3    | 2.846  | 2.204  |
| 4    | 4.269  | 3.307  |
| 5    | 5.691  | 4.410  |
| 6    | 7.113  | 5.513  |
| 7    | 8.535  | 6.617  |
| 8    | 9.957  | 7.721  |
| 9    | 11.378 | 8.826  |
| 10   | 12.799 | 9.930  |
| 11   | 14.220 | 11.036 |
| 12   | 15.640 | 12.141 |
| 13   | 17.060 | 13.247 |
| 14   | 18.480 | 14.353 |
| 15   | 19.900 | 15.460 |
| 16   | 21.319 | 16.567 |
| 17   | 22.739 | 17.674 |
| 18   | 24.157 | 18.782 |
| 19   | 25.576 | 19.890 |
| 20   | 26.994 | 20.998 |
| 21   | 28.412 | 22.107 |
| 22   | 30.184 | 23.493 |
| 23   | 31.956 | 24.880 |
| 24   | 33.727 | 26.268 |
| 25   | 35.498 | 27.656 |
| 26   | 37.269 | 29.044 |
| 27   | 39.039 | 30.433 |
| 28   | 40.808 | 31.823 |
| 29   | 42.577 | 33.213 |
| 30   | 44.346 | 34.604 |
| 31   | 46.114 | 35.996 |
| 32   | 47.882 | 37.387 |
| 33   | 49.649 | 38.780 |
| 34   | 51.416 | 40.173 |
| 35   | 53.183 | 41.566 |
| 36   | 54.949 | 42.960 |
| 37   | 56.714 | 44.355 |
| 38   | 58.480 | 45.750 |
| 39   | 60.244 | 47.146 |
| 40   | 62.009 | 48.542 |
| 41   | 63.773 | 49.939 |
| 42   | 65.536 | 51.336 |
| 43   | 67.299 | 52.734 |
| 44   | 69.062 | 54.133 |
| 45   | 70.824 | 55.532 |
| 46   | 72.586 | 56.931 |
| 47   | 74.347 | 58.331 |
| 48   | 76.108 | 59.732 |

COORDENADAS DE LOS NUDOS  
=====

| Nudo | X       | Y       |
|------|---------|---------|
| 49   | 77.868  | 61.133  |
| 50   | 79.628  | 62.535  |
| 51   | 81.388  | 63.937  |
| 52   | 83.147  | 65.340  |
| 53   | 84.906  | 66.743  |
| 54   | 86.664  | 68.147  |
| 55   | 88.422  | 69.552  |
| 56   | 90.179  | 70.957  |
| 57   | 91.936  | 72.362  |
| 58   | 93.693  | 73.769  |
| 59   | 95.449  | 75.175  |
| 60   | 97.205  | 76.582  |
| 61   | 98.960  | 77.990  |
| 62   | 100.715 | 79.398  |
| 63   | 102.469 | 80.807  |
| 64   | 104.223 | 82.217  |
| 65   | 105.976 | 83.627  |
| 66   | 107.729 | 85.037  |
| 67   | 109.482 | 86.448  |
| 68   | 111.234 | 87.860  |
| 69   | 112.986 | 89.272  |
| 70   | 114.737 | 90.684  |
| 71   | 116.488 | 92.097  |
| 72   | 118.238 | 93.511  |
| 73   | 119.988 | 94.925  |
| 74   | 121.738 | 96.340  |
| 75   | 123.487 | 97.756  |
| 76   | 125.235 | 99.171  |
| 77   | 126.984 | 100.588 |
| 78   | 128.731 | 102.005 |
| 79   | 130.479 | 103.422 |
| 80   | 132.226 | 104.840 |
| 81   | 133.972 | 106.259 |
| 82   | 135.718 | 107.678 |
| 83   | 137.464 | 109.098 |
| 84   | 139.209 | 110.518 |
| 85   | 140.953 | 111.939 |
| 86   | 142.698 | 113.360 |
| 87   | 144.441 | 114.782 |
| 88   | 146.185 | 116.204 |
| 89   | 147.928 | 117.627 |
| 90   | 149.670 | 119.051 |
| 91   | 151.412 | 120.475 |
| 92   | 153.154 | 121.899 |
| 93   | 154.895 | 123.325 |
| 94   | 156.636 | 124.750 |
| 95   | 158.376 | 126.176 |
| 96   | 160.116 | 127.603 |

COORDENADAS DE LOS NUDOS  
=====

| Nudo | X       | Y       |
|------|---------|---------|
| 97   | 161.855 | 129.030 |
| 98   | 163.594 | 130.458 |
| 99   | 165.333 | 131.887 |
| 100  | 167.071 | 133.315 |
| 101  | 168.808 | 134.745 |
| 102  | 170.545 | 136.175 |
| 103  | 172.282 | 137.605 |
| 104  | 174.018 | 139.036 |
| 105  | 175.754 | 140.468 |
| 106  | 177.490 | 141.900 |
| 107  | 179.225 | 143.333 |
| 108  | 180.959 | 144.766 |
| 109  | 182.693 | 146.200 |
| 110  | 184.427 | 147.634 |
| 111  | 186.160 | 149.069 |
| 112  | 187.893 | 150.504 |
| 113  | 189.625 | 151.940 |
| 114  | 191.357 | 153.376 |
| 115  | 193.088 | 154.813 |
| 116  | 194.819 | 156.251 |
| 117  | 196.549 | 157.689 |
| 118  | 198.279 | 159.127 |
| 119  | 200.009 | 160.566 |
| 120  | 201.738 | 162.006 |
| 121  | 203.467 | 163.446 |
| 122  | 205.195 | 164.887 |
| 123  | 206.923 | 166.328 |
| 124  | 208.650 | 167.770 |
| 125  | 210.377 | 169.212 |
| 126  | 212.104 | 170.655 |
| 127  | 213.830 | 172.099 |
| 128  | 215.555 | 173.542 |
| 129  | 217.280 | 174.987 |
| 130  | 219.005 | 176.432 |
| 131  | 220.729 | 177.877 |
| 132  | 222.453 | 179.324 |
| 133  | 224.176 | 180.770 |
| 134  | 225.899 | 182.217 |
| 135  | 227.622 | 183.665 |
| 136  | 229.344 | 185.113 |
| 137  | 231.065 | 186.562 |
| 138  | 232.786 | 188.011 |
| 139  | 234.507 | 189.461 |
| 140  | 236.227 | 190.911 |
| 141  | 237.947 | 192.362 |
| 142  | 239.322 | 193.523 |
| 143  | 240.697 | 194.685 |
| 144  | 242.072 | 195.846 |

COORDENADAS DE LOS NUDOS  
=====

| Nudo | X       | Y       |
|------|---------|---------|
| 145  | 243.447 | 197.009 |
| 146  | 244.821 | 198.171 |
| 147  | 246.195 | 199.334 |
| 148  | 247.569 | 200.497 |
| 149  | 248.942 | 201.660 |
| 150  | 250.315 | 202.824 |
| 151  | 251.688 | 203.988 |
| 152  | 253.061 | 205.153 |
| 153  | 254.433 | 206.318 |
| 154  | 255.805 | 207.483 |
| 155  | 257.177 | 208.648 |
| 156  | 258.548 | 209.814 |
| 157  | 259.919 | 210.981 |
| 158  | 261.290 | 212.147 |
| 159  | 262.661 | 213.314 |
| 160  | 264.031 | 214.481 |
| 161  | 265.401 | 215.649 |
| 162  | 1.163   | -1.502  |
| 163  | -1.163  | 1.502   |
| 164  | 29.582  | 20.610  |
| 165  | 27.242  | 23.604  |
| 166  | 64.953  | 48.450  |
| 167  | 62.593  | 51.429  |
| 168  | 100.149 | 76.508  |
| 169  | 97.771  | 79.472  |
| 170  | 135.170 | 104.784 |
| 171  | 132.774 | 107.734 |
| 172  | 170.015 | 133.278 |
| 173  | 167.601 | 136.212 |
| 174  | 204.683 | 161.987 |
| 175  | 202.250 | 164.906 |
| 176  | 239.172 | 190.910 |
| 177  | 236.721 | 193.815 |
| 178  | 266.634 | 214.203 |
| 179  | 264.168 | 217.095 |

CONDICIONES DE VINCULACION  
=====

| Nudo | Codigo | RX    | RZ    | RY    |
|------|--------|-------|-------|-------|
| 162  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 163  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 164  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 165  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 166  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 167  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 168  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 169  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 170  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 171  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 172  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 173  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 174  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 175  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 176  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 177  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 178  | 0 1 0  | 0.000 | 0.000 | 0.000 |
| 179  | 0 1 0  | 0.000 | 0.000 | 0.000 |

Ancho de banda = 489

HIPOTESIS 1 PESO PROPIO

REACCIONES

=====

| Nudo  | Flector | Reac_vert | Torsor  |
|-------|---------|-----------|---------|
| ===== |         |           |         |
| 162   | 0.00000 | 176.97682 | 0.00000 |
| 163   | 0.00000 | 175.43536 | 0.00000 |
| 164   | 0.00000 | 595.73474 | 0.00000 |
| 165   | 0.00000 | 595.89917 | 0.00000 |
| 166   | 0.00000 | 601.45026 | 0.00000 |
| 167   | 0.00000 | 601.59424 | 0.00000 |
| 168   | 0.00000 | 598.46991 | 0.00000 |
| 169   | 0.00000 | 598.96960 | 0.00000 |
| 170   | 0.00000 | 599.40381 | 0.00000 |
| 171   | 0.00000 | 599.71863 | 0.00000 |
| 172   | 0.00000 | 598.85571 | 0.00000 |
| 173   | 0.00000 | 599.09344 | 0.00000 |
| 174   | 0.00000 | 600.44617 | 0.00000 |
| 175   | 0.00000 | 600.46014 | 0.00000 |
| 176   | 0.00000 | 602.53931 | 0.00000 |
| 177   | 0.00000 | 602.39709 | 0.00000 |
| 178   | 0.00000 | 180.96140 | 0.00000 |
| 179   | 0.00000 | 179.48868 | 0.00000 |

SUMA DE REACCIONES

=====

Suma Momentos Flectores = 0.000  
 Suma Reacciones Vertic. = 9107.895  
 Suma Momentos Torsores = 0.000

HIPOTESIS 1 PESO PROPIO

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 1     | 0.00     | 317.41    | -2.92   | -532.09  | -273.88   | 2.92    |
| 2     | 532.09   | 273.86    | -2.92   | -985.81  | -230.33   | 2.92    |
| 3     | 985.81   | 230.36    | -2.48   | -1361.35 | -186.81   | 2.49    |
| 4     | 1361.34  | 186.74    | -2.02   | -1658.27 | -143.22   | 2.01    |
| 5     | 1658.26  | 143.28    | -2.02   | -1876.93 | -99.75    | 2.00    |
| 6     | 1876.91  | 99.73     | -1.16   | -2017.27 | -56.19    | 1.17    |
| 7     | 2017.32  | 56.18     | -1.19   | -2079.27 | -12.64    | 1.18    |
| 8     | 2079.31  | 12.62     | 0.43    | -2062.81 | 30.91     | -0.47   |
| 9     | 2062.79  | -30.96    | -0.46   | -1967.89 | 74.48     | 0.46    |
| 10    | 1967.86  | -74.53    | 1.25    | -1794.44 | 118.08    | -1.28   |
| 11    | 1794.43  | -118.09   | 1.10    | -1542.79 | 161.61    | -1.07   |
| 12    | 1542.82  | -161.60   | 1.77    | -1212.76 | 205.13    | -1.78   |
| 13    | 1212.78  | -205.09   | 1.78    | -804.43  | 248.62    | -1.79   |
| 14    | 804.42   | -248.68   | 2.15    | -317.44  | 292.22    | -2.16   |
| 15    | 317.43   | -292.21   | 2.26    | 247.64   | 335.73    | -2.25   |
| 16    | -247.63  | -335.77   | 2.33    | 891.37   | 379.32    | -2.33   |
| 17    | -891.38  | -379.30   | 1.33    | 1613.10  | 422.83    | -1.33   |
| 18    | -1613.10 | -422.82   | 1.89    | 2413.51  | 466.36    | -1.89   |
| 19    | -2413.51 | -466.36   | 1.07    | 3297.17  | 515.73    | -1.07   |
| 20    | -3297.17 | -515.74   | -0.38   | 4270.04  | 565.13    | 0.38    |
| 21    | -4270.04 | 594.51    | -0.28   | 3002.03  | -532.78   | 0.28    |
| 22    | -3002.04 | 532.79    | -1.33   | 1872.59  | -471.04   | 1.33    |
| 23    | -1872.60 | 471.03    | -2.50   | 873.95   | -416.61   | 2.49    |
| 24    | -873.94  | 416.62    | -2.50   | 25.30    | -337.70   | 2.50    |
| 25    | -25.31   | 337.70    | -2.50   | -645.76  | -258.79   | 2.50    |
| 26    | 645.76   | 258.77    | -2.09   | -1166.78 | -204.35   | 2.07    |
| 27    | 1166.78  | 204.36    | -1.37   | -1565.39 | -149.95   | 1.36    |
| 28    | 1565.38  | 149.96    | -1.37   | -1841.53 | -95.54    | 1.38    |
| 29    | 1841.56  | 95.54     | -0.74   | -1995.30 | -41.11    | 0.75    |
| 30    | 1995.31  | 41.10     | 0.51    | -2026.59 | 13.32     | -0.52   |
| 31    | 2026.60  | -13.25    | -0.20   | -1935.55 | 67.66     | 0.18    |
| 32    | 1935.54  | -67.73    | 1.71    | -1721.93 | 122.14    | -1.69   |
| 33    | 1721.92  | -122.08   | 1.73    | -1385.99 | 176.49    | -1.72   |
| 34    | 1385.98  | -176.47   | 1.74    | -927.70  | 230.89    | -1.75   |
| 35    | 927.67   | -230.89   | 2.30    | -346.99  | 285.30    | -2.31   |
| 36    | 347.01   | -285.30   | 2.55    | 356.03   | 339.71    | -2.54   |
| 37    | -356.02  | -339.72   | 2.64    | 1181.80  | 394.15    | -2.63   |
| 38    | -1181.81 | -394.15   | 1.57    | 2129.66  | 448.55    | -1.57   |
| 39    | -2129.67 | -448.55   | 2.16    | 3208.54  | 510.30    | -2.16   |
| 40    | -3208.55 | -510.30   | 0.16    | 4426.29  | 572.05    | -0.16   |
| 41    | -4426.67 | 599.00    | -0.31   | 3148.70  | -537.28   | 0.32    |
| 42    | -3148.70 | 537.27    | -1.42   | 2009.28  | -475.54   | 1.42    |
| 43    | -2009.28 | 475.54    | -2.12   | 1000.27  | -421.10   | 2.12    |
| 44    | -1000.27 | 421.10    | -2.39   | 141.60   | -342.20   | 2.40    |
| 45    | -141.61  | 342.19    | -2.40   | -539.54  | -263.28   | 2.40    |
| 46    | 539.55   | 263.29    | -2.06   | -1070.68 | -208.88   | 2.05    |
| 47    | 1070.70  | 208.92    | -1.70   | -1479.60 | -154.50   | 1.70    |
| 48    | 1479.55  | 154.52    | -1.30   | -1765.94 | -100.12   | 1.29    |
| 49    | 1765.99  | 100.03    | -0.68   | -1929.87 | -45.61    | 0.70    |
| 50    | 1929.88  | 45.64     | -0.70   | -1971.38 | 8.78      | 0.70    |





### 3.2.1 ANÁLISIS MODAL



## Resultados: dinámica - Caso: 1 (Peso Propio) Modos activos: 1..10; CQC: Valores: 2

- Caso: 1 (Peso Propio) Modos activos: 1..10; CQC

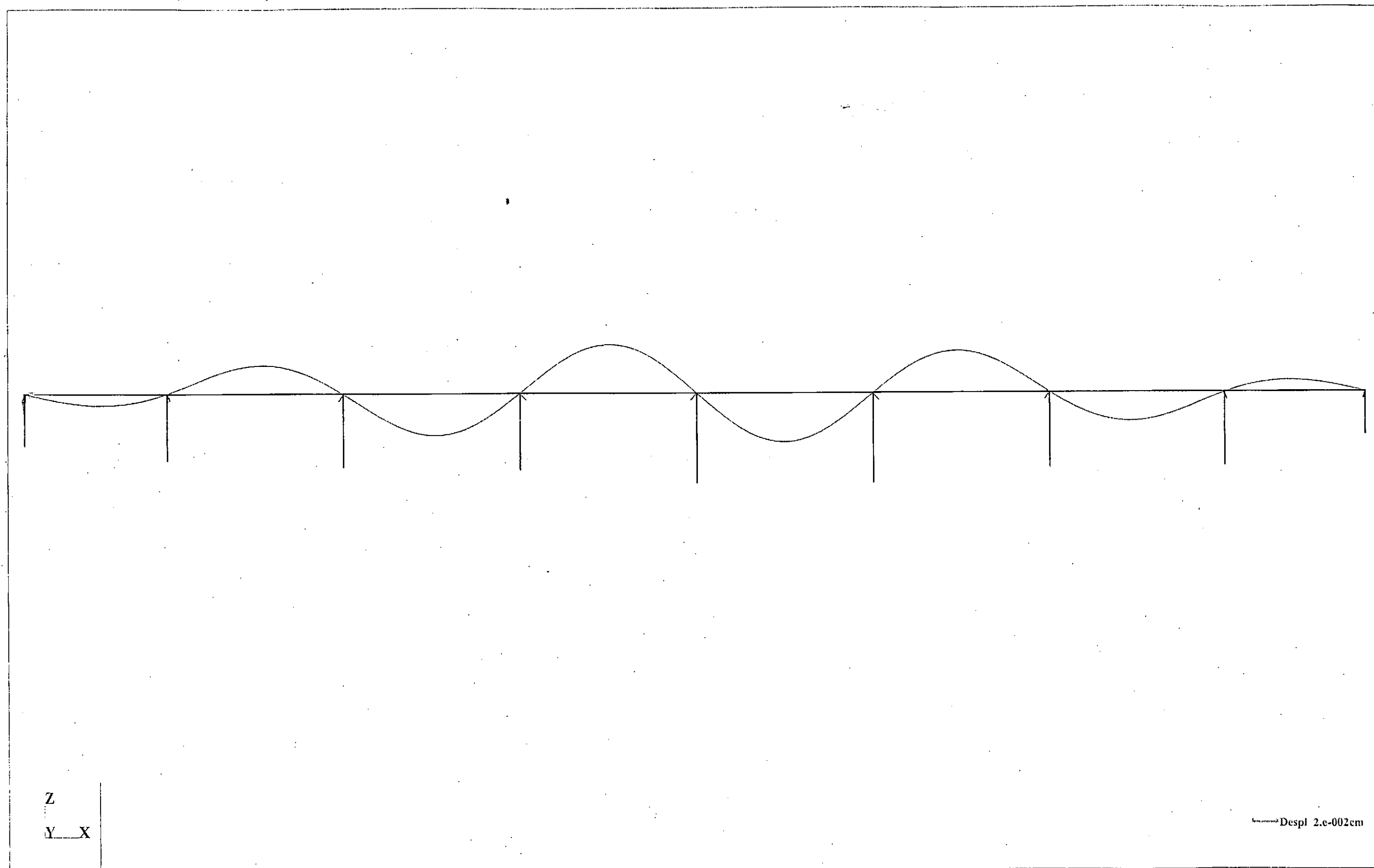
| Filtrar          | Caso | Modo     |
|------------------|------|----------|
| Lista completa   | 1    | 1A10     |
| Selección        | 1    | 1A10 CQC |
| Número total     | 1    |          |
| Número selección | 1    |          |

- Caso: 1 (Peso Propio) Modos activos: 1..10; CQC

| Caso/Modo | Valor propio | Frecuencia (Hz) | Período (sec) | Precisión | Pulsación (1/sec) |
|-----------|--------------|-----------------|---------------|-----------|-------------------|
| 1/ 1      | 16.43        | 0.65            | 1.55          | 0.00      | 4.05              |
| 1/ 2      | 28.86        | 0.86            | 1.17          | 0.00      | 5.37              |
| 1/ 3      | 53.17        | 1.16            | 0.86          | 0.00      | 7.29              |
| 1/ 4      | 92.78        | 1.53            | 0.65          | 0.00      | 9.63              |
| 1/ 5      | 163.51       | 2.04            | 0.49          | 0.00      | 12.79             |
| 1/ 6      | 177.04       | 2.12            | 0.47          | 0.00      | 13.31             |
| 1/ 7      | 202.63       | 2.27            | 0.44          | 0.00      | 14.23             |
| 1/ 8      | 269.17       | 2.61            | 0.38          | 0.00      | 16.41             |
| 1/ 9      | 273.32       | 2.63            | 0.38          | 0.00      | 16.53             |
| 1/ 10     | 273.33       | 2.63            | 0.38          | 0.00      | 16.53             |
| 1/ CQC    | No existe    | No existe       | No existe     | No existe | No existe         |

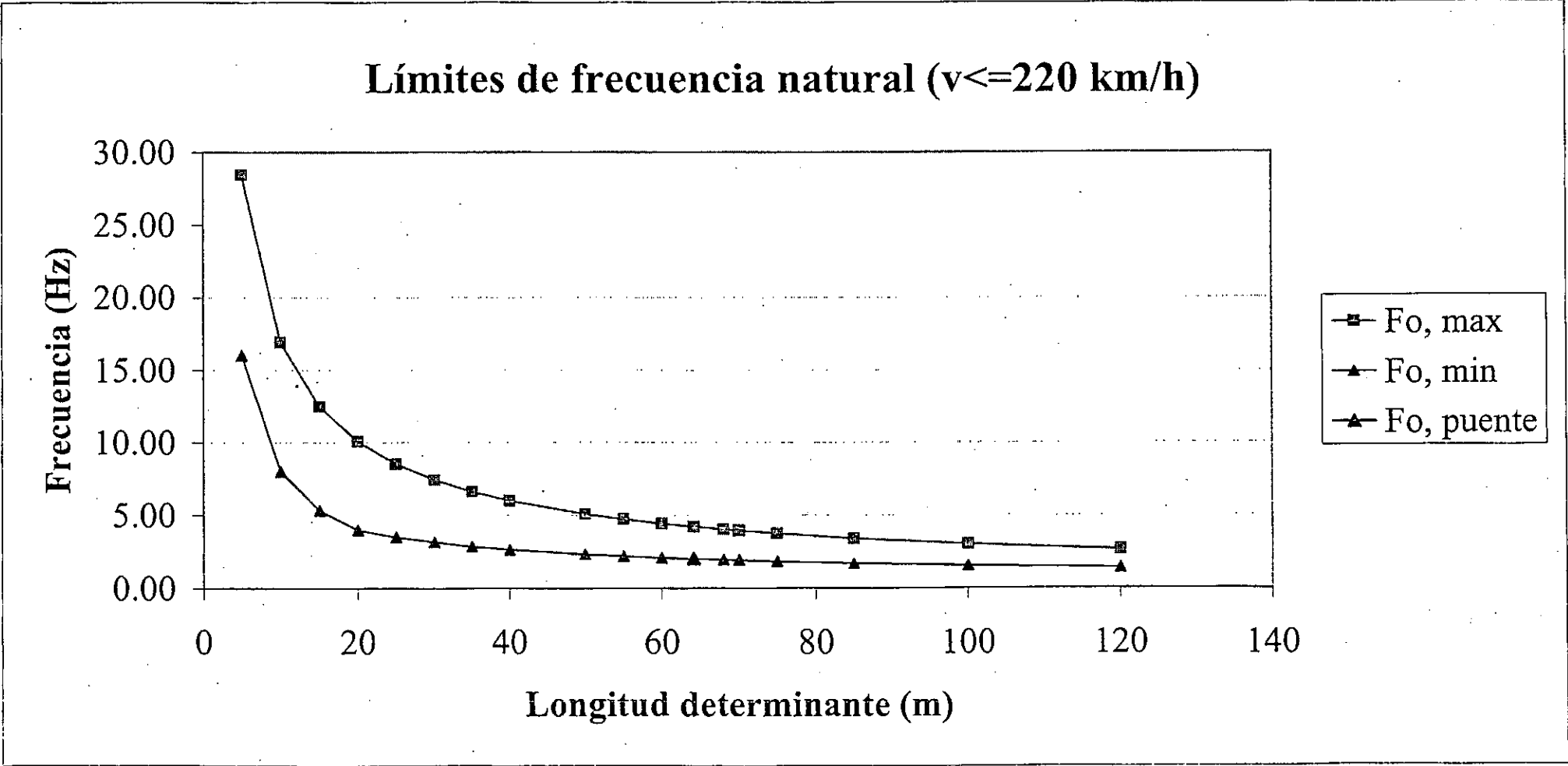


**Vista - Deformación; casos: 1 (Peso Propio) Modos: 5**



VIADUCTO ANOIA

| Lo    | Fo, max | Fo, min | Fo, puente |
|-------|---------|---------|------------|
| 5     | 28.43   | 16.00   |            |
| 10    | 16.93   | 8.00    |            |
| 15    | 12.50   | 5.33    |            |
| 20    | 10.08   | 4.00    |            |
| 25    | 8.53    | 3.51    |            |
| 30    | 7.44    | 3.15    |            |
| 35    | 6.63    | 2.87    |            |
| 40    | 6.00    | 2.66    |            |
| 50    | 5.08    | 2.33    |            |
| 55    | 4.73    | 2.20    |            |
| 60    | 4.43    | 2.09    |            |
| 64.13 | 4.22    | 2.01    | 2.04       |
| 68    | 4.04    | 1.94    |            |
| 70    | 3.95    | 1.91    |            |
| 75    | 3.75    | 1.83    |            |
| 85    | 3.42    | 1.70    |            |
| 100   | 3.02    | 1.54    |            |
| 120   | 2.64    | 1.39    |            |



### 3.2.2 CÁLCULO DEL COEFICIENTE DE IMPACTO SEGÚN IPF

PROYECTO: L.A.V. ST. SADURNÍ D'ANOIA  
O.F. : VIADUCTO ANOIA

CÁLCULO DEL COEFICIENTE DE IMPACTO

Frecuencia fundamental 2.04 Hz  
Luz del vano intermedio 45 m  
Longitud total del tablero 342 m

COEFICIENTE DE IMPACTO SEGÚN IPF-75

$v \text{ (km/h)}^* = 200$

*Para luces iguales o menores de 6 metros*

$I = 66.0$

$\phi = 1.66$

*Para luces mayores de 6 metros en tramos simplemente apoyados*

$I = 21.1$

$\phi = 1.21$

*En general para tramos apoyados continuos*

$\mu = 0.303$

$I = 24.9$

$\phi = 1.25$

\* La validez de las expresiones de la IPF-75 se limita a trenes con velocidades de circulación inferior a 200 km/h

Valores de k en función del número de vanos

|   | Número de vanos |     |     |     |     |
|---|-----------------|-----|-----|-----|-----|
|   | 1               | 2   | 3   | 4   | 5   |
| k | 1               | 1.2 | 1.3 | 1.4 | 1.5 |

COEFICIENTE DE IMPACTO SEGÚN EUROCÓDIGO 1.

DETERMINACIÓN DE  $L\phi$

Número de vanos del tablero = 8

$k = 1.5$

$Lm = 42.75$

$L\phi = 64.13$

*Vías con grado de mantenimiento bueno*

$\phi2 = 1.00$

*Vías con grado de mantenimiento normal*

$\phi3 = 1.01$

NOTA: La validez de aplicación de las fórmulas del eurocódigo se limita a trenes con velocidades de circulación inferiores a 200 km/h.

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 648.6917  | -33.6271  | -19.8396  | -561.7140  | 38.6584   | 23.0106   |
| 102   | 586.3357  | -19.8509  | -70.8210  | -518.8928  | 40.0998   | 13.5958   |
| 103   | 580.2766  | 12.0812   | -151.7394 | -584.6789  | 8.1669    | 94.5074   |
| 104   | 640.3582  | 46.4925   | -241.5357 | -756.7423  | -65.5799  | 274.1412  |
| 105   | 804.2267  | 107.2707  | -397.7472 | -1016.6217 | -81.2218  | 325.3972  |
| 106   | 1094.7028 | 129.8913  | -361.9802 | -1359.2727 | -104.4298 | 290.6739  |
| 107   | 1359.3317 | 104.4178  | -290.3481 | -1565.9014 | -79.6433  | 221.8030  |
| 108   | 1565.9493 | 79.6129   | -221.3874 | -1714.0034 | -52.5478  | 145.6823  |
| 109   | 1713.9805 | 52.5385   | -145.6884 | -1802.4396 | -25.4623  | 69.8674   |
| 110   | 1802.4763 | 25.4991   | -68.9542  | -1832.0770 | 0.0984    | -2.6891   |
| 111   | 1832.0844 | -0.1296   | 2.7092    | -1802.5345 | 25.7612   | -74.4110  |
| 112   | 1802.5195 | -25.8217  | 75.3217   | -1713.6792 | 52.9525   | -151.3209 |
| 113   | 1713.6617 | -52.9618  | 151.3298  | -1564.8389 | 80.1097   | -227.3660 |
| 114   | 1564.7476 | -80.1411  | 228.1445  | -1356.6533 | 105.7874  | -300.0328 |
| 115   | 1356.5859 | -105.7753 | 300.4154  | -1089.2687 | 131.4237  | -372.2851 |
| 116   | 1089.1672 | -131.4226 | 372.5103  | -762.8180  | 158.5538  | -448.5895 |
| 117   | 799.6683  | -104.5352 | 411.1419  | -535.0999  | 131.0471  | -484.8287 |
| 118   | 582.0969  | -89.3094  | 361.3760  | -417.6505  | 61.2061   | -305.6890 |
| 119   | 485.6861  | -6.5078   | 158.7171  | -448.2576  | 26.7592   | -215.9403 |
| 120   | 504.7933  | 25.4275   | 77.5150   | -539.2237  | -0.1310   | -131.5689 |
| 121   | 579.8038  | -26.4720  | -15.3565  | -508.8876  | 31.5176   | 18.5116   |
| 122   | 533.6133  | -12.7227  | -66.3109  | -482.2080  | 32.9727   | 9.0833    |
| 123   | 544.0059  | 19.1254   | -147.2281 | -564.2598  | 1.1233    | 90.0037   |
| 124   | 620.4861  | 53.3255   | -237.2055 | -752.2909  | -72.2546  | 269.7779  |
| 125   | 800.0702  | 113.5944  | -393.0584 | -1026.6921 | -87.5187  | 320.6802  |
| 126   | 1085.4200 | 122.9001  | -360.5931 | -1334.2352 | -97.4357  | 289.3156  |
| 127   | 1334.1987 | 97.4591   | -289.3886 | -1525.0017 | -72.6825  | 220.8335  |
| 128   | 1525.1301 | 72.6747   | -220.0032 | -1657.5275 | -45.6105  | 144.2457  |
| 129   | 1657.5242 | 45.6123   | -144.2523 | -1730.3561 | -18.5216  | 68.4811   |
| 130   | 1730.3911 | 18.5013   | -68.0885  | -1744.1919 | 7.1062    | -3.6079   |
| 131   | 1744.1692 | -7.1361   | 4.5429    | -1698.8153 | 32.7678   | -76.2709  |
| 132   | 1698.8198 | -32.7718  | 76.1911   | -1594.3263 | 59.8987   | -152.1135 |
| 133   | 1594.2577 | -59.9100  | 152.5278  | -1429.7893 | 87.0440   | -228.5795 |
| 134   | 1429.7100 | -87.0323  | 228.9638  | -1206.0267 | 112.6844  | -300.8277 |
| 135   | 1205.9655 | -112.7041 | 301.1013  | -923.1251  | 138.3533  | -372.9803 |
| 136   | 922.9503  | -138.3534 | 373.4020  | -581.0530  | 165.4910  | -449.5223 |
| 137   | 629.9077  | -110.9668 | 412.1411  | -351.1482  | 137.4738  | -485.8397 |
| 138   | 407.3571  | -83.4402  | 329.5199  | -265.1375  | 55.0450   | -273.7771 |
| 139   | 313.5902  | -12.0775  | 159.3543  | -263.6403  | 32.3243   | -216.5681 |
| 140   | 325.1008  | 20.0189   | 78.1693   | -347.3610  | 5.3148    | -132.2570 |
| 141   | 389.2105  | -5.7301   | 4.1766    | -369.7503  | 10.8114   | -1.0561   |
| 142   | 386.5344  | 4.4753    | -36.3801  | -380.0093  | 11.7266   | -9.3914   |
| 143   | 423.3149  | 31.4903   | -100.9603 | -465.4090  | -15.2940  | 55.1921   |
| 144   | 509.9417  | 63.3899   | -172.8013 | -609.5096  | -47.1816  | 126.9875  |
| 145   | 661.2138  | 104.6243  | -270.7120 | -887.8179  | -127.3645 | 300.7900  |
| 146   | 891.3828  | 129.4034  | -309.3945 | -1101.9667 | -107.2099 | 246.6527  |
| 147   | 1101.9885 | 107.2529  | -246.6487 | -1274.6888 | -85.5370  | 185.7192  |
| 148   | 1274.7516 | 85.5440   | -185.3380 | -1408.9014 | -63.7586  | 124.2947  |
| 149   | 1408.9386 | 63.7405   | -123.7972 | -1504.8784 | -41.5366  | 61.0316   |
| 150   | 1504.8966 | 41.5693   | -61.0293  | -1562.1472 | -22.3643  | 6.7223    |
| 151   | 1562.1531 | 22.3140   | -6.1931   | -1580.4470 | -0.4491   | -54.9921  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|------------|-----------|-----------|
| 152   | 1580.4241 | 0.4380    | 55.4576  | -1560.0282 | 21.7603   | -118.2331 |
| 153   | 1560.0247 | -21.7287  | 118.2396 | -1500.9547 | 43.9287   | -180.9544 |
| 154   | 1500.9644 | -43.9790  | 180.9268 | -1403.0310 | 65.9171   | -242.1659 |
| 155   | 1402.8760 | -65.9415  | 243.0167 | -1266.5618 | 85.1441   | -297.4256 |
| 156   | 1266.4521 | -85.1569  | 297.8397 | -1090.7538 | 107.3603  | -360.5730 |
| 157   | 1090.8567 | -107.3625 | 360.2139 | -876.4585  | 129.5640  | -422.9166 |
| 158   | 876.3242  | -129.5583 | 423.2058 | -623.0458  | 151.7602  | -485.9983 |
| 159   | 622.9077  | -151.7559 | 486.1785 | -330.9879  | 173.9493  | -548.9234 |
| 160   | 330.8122  | -173.9408 | 549.0322 | -0.0505    | 193.1422  | -603.2950 |



ENVOLVENTE MAXIMOS CORTANTES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 1     | 0.0458     | 195.4273  | -598.0523 | -333.3668  | -176.5507 | 545.6620 |
| 2     | 319.6981   | 177.0536  | -549.0461 | -609.6661  | -155.5387 | 489.7843 |
| 3     | 571.5631   | 157.0612  | -495.0161 | -820.5178  | -135.6136 | 435.4912 |
| 4     | 761.3327   | 138.1183  | -442.7952 | -971.3140  | -116.7832 | 383.3052 |
| 5     | 894.6285   | 120.3118  | -392.8745 | -1081.8237 | -100.0948 | 336.1757 |
| 6     | 991.3281   | 104.6178  | -347.4797 | -1133.2104 | -84.9551  | 292.9917 |
| 7     | 1032.0537  | 90.4484   | -306.7435 | -1142.5555 | -69.4032  | 248.5046 |
| 8     | 1034.3296  | 75.8046   | -263.7103 | -1116.0609 | -54.9389  | 206.0911 |
| 9     | 1003.5452  | 62.3083   | -224.3877 | -1059.3521 | -41.6223  | 167.3015 |
| 10    | 946.0342   | 49.8963   | -186.6424 | -999.1254  | -30.0104  | 131.0988 |
| 11    | 887.3972   | 39.2135   | -153.3179 | -733.2236  | -21.5183  | 77.7243  |
| 12    | 626.0259   | 31.5830   | -101.6489 | -668.2881  | -15.3839  | 55.8844  |
| 13    | 567.8126   | 26.2546   | -82.1963  | -600.4912  | -10.0555  | 36.4351  |
| 14    | 509.0108   | 21.7075   | -64.6050  | -533.5088  | -5.5029   | 18.8269  |
| 15    | 452.8291   | 17.9434   | -49.1713  | -470.5468  | -1.7459   | 3.4134   |
| 16    | 402.3081   | 14.8780   | -36.1347  | -414.5071  | 1.3267    | -9.6435  |
| 17    | 359.9963   | 12.4832   | -24.5841  | -367.8875  | 3.7128    | -21.1703 |
| 18    | 328.0388   | 10.7102   | -15.6773  | -332.7334  | 5.4929    | -30.0964 |
| 19    | 308.1236   | 9.5040    | -8.5899   | -310.6547  | 6.6920    | -37.1642 |
| 20    | 301.5585   | 8.8115    | -3.4381   | 65.0983    | -10.1299  | 18.6212  |
| 21    | -2211.8198 | 250.2494  | -614.7206 | 1588.3112  | -270.9551 | 648.3934 |
| 22    | -1599.2742 | 271.2988  | -652.3625 | 1030.6541  | -246.5957 | 584.0837 |
| 23    | -1063.0016 | 247.6534  | -590.5361 | 549.2828   | -222.8205 | 521.9523 |
| 24    | -602.8990  | 224.6939  | -530.3615 | 143.4128   | -198.2595 | 457.2588 |
| 25    | -217.0673  | 201.0394  | -468.3288 | -178.7668  | -175.1403 | 397.3831 |
| 26    | 86.8858    | 178.8965  | -411.1105 | -439.8076  | -153.8478 | 341.6273 |
| 27    | 331.7451   | 158.6667  | -357.9619 | -634.9601  | -133.6263 | 288.3659 |
| 28    | 513.3642   | 139.5397  | -307.5281 | -769.3455  | -113.0240 | 233.9864 |
| 29    | 637.7207   | 120.0917  | -255.6647 | -832.1998  | -94.3262  | 185.3169 |
| 30    | 694.0454   | 102.5787  | -209.5688 | -862.5332  | -77.7670  | 141.3849 |
| 31    | 721.4905   | 87.2224   | -168.8368 | -852.2999  | -62.5398  | 101.0602 |
| 32    | 712.6038   | 73.1934   | -130.4724 | -558.3177  | -52.4267  | 43.8703  |
| 33    | 423.5497   | 64.3004   | -76.5755  | -545.4382  | -44.0472  | 19.3692  |
| 34    | 419.5040   | 57.1049   | -54.7290  | -525.2053  | -36.8523  | -2.4677  |
| 35    | 411.6826   | 51.0614   | -35.2889  | -503.7771  | -30.8115  | -21.9029 |
| 36    | 405.8870   | 46.1358   | -18.5909  | -486.9051  | -25.8892  | -38.6055 |
| 37    | 407.4388   | 42.2757   | -4.9790   | -479.7854  | -22.0218  | -52.2480 |
| 38    | 420.9889   | 39.4148   | 6.4939    | -486.8803  | -19.1690  | -63.6924 |
| 39    | 450.4134   | 37.4781   | 14.7756   | -511.9621  | -17.2251  | -72.0017 |
| 40    | 498.6968   | 36.3752   | 20.9674   | -126.5765  | -26.9756  | -20.0972 |
| 41    | -2432.0554 | 256.6327  | -601.3759 | 1794.2444  | -277.2184 | 642.6368 |
| 42    | -1805.4993 | 277.5656  | -646.6992 | 1222.7085  | -252.8625 | 578.4114 |
| 43    | -1255.9598 | 253.9512  | -584.6958 | 727.9358   | -229.1143 | 516.0870 |
| 44    | -782.5744  | 231.0291  | -524.7099 | 308.9585   | -204.5989 | 451.6156 |
| 45    | -383.9324  | 207.4229  | -462.6978 | -25.9531   | -181.5355 | 391.7622 |
| 46    | -67.3356   | 185.3561  | -405.6078 | -299.8578  | -160.3219 | 336.1560 |
| 47    | 190.3134   | 165.1987  | -352.6063 | -508.0437  | -140.1712 | 282.9897 |
| 48    | 385.1533   | 146.1610  | -302.0983 | -655.7498  | -119.6679 | 228.5393 |
| 49    | 522.9076   | 126.7942  | -250.2792 | -732.0386  | -101.0359 | 180.0159 |
| 50    | 592.7000   | 109.3352  | -204.5682 | -776.1554  | -84.5383  | 136.3337 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 634.3407   | 94.0511   | -163.3081 | -473.6831 | -69.9564  | 66.0432  |
| 52    | 333.1291   | 80.6729   | -96.0131  | -491.8651 | -60.4243  | 38.8263  |
| 53    | 356.5842   | 72.3452   | -71.1960  | -496.5740 | -52.0969  | 14.0213  |
| 54    | 370.2837   | 65.2028   | -49.2547  | -494.2317 | -44.9491  | -7.9492  |
| 55    | 380.4639   | 59.2087   | -30.0310  | -490.8921 | -38.9629  | -27.1647 |
| 56    | 392.9085   | 54.3261   | -13.6029  | -492.3497 | -34.0783  | -43.5970 |
| 57    | 412.9009   | 50.5039   | 0.4557    | -503.7768 | -30.2453  | -57.6871 |
| 58    | 445.0600   | 47.6689   | 11.5011   | -529.5220 | -27.4241  | -68.7020 |
| 59    | 493.1322   | 45.7527   | 20.0810   | -573.2965 | -25.5015  | -77.3162 |
| 60    | 560.1129   | 44.6609   | 26.3172   | -196.9920 | -34.1914  | -25.1009 |
| 61    | -2491.5078 | 258.2983  | -600.4811 | 1849.9167 | -278.7889 | 642.0008 |
| 62    | -1861.0713 | 279.1405  | -646.5197 | 1274.7439 | -254.4388 | 578.2688 |
| 63    | -1308.0731 | 255.5248  | -584.5765 | 776.5433  | -230.6845 | 515.9720 |
| 64    | -831.2964  | 232.5994  | -524.6164 | 354.1882  | -206.1676 | 451.5298 |
| 65    | -429.2959  | 208.9859  | -462.6218 | 15.9644   | -183.1017 | 391.7054 |
| 66    | -109.4777  | 186.9133  | -405.5217 | -261.2581 | -161.8627 | 336.0400 |
| 67    | 151.6281   | 166.7487  | -352.4860 | -472.8053 | -141.7107 | 282.8806 |
| 68    | 349.7277   | 147.6950  | -302.0434 | -623.8262 | -121.1985 | 228.5109 |
| 69    | 490.8434   | 128.3512  | -250.2712 | -703.4021 | -102.6185 | 179.9851 |
| 70    | 564.1081   | 110.9350  | -204.3964 | -751.1592 | -86.1462  | 136.1231 |
| 71    | 609.3023   | 95.6751   | -163.1263 | -451.8095 | -71.6431  | 65.9319  |
| 72    | 311.2370   | 82.3626   | -95.9241  | -473.7684 | -62.1138  | 38.7304  |
| 73    | 338.4766   | 74.0374   | -71.2416  | -482.3007 | -53.7841  | 14.0483  |
| 74    | 356.0136   | 66.9024   | -49.1743  | -483.7833 | -46.6491  | -8.0301  |
| 75    | 370.0329   | 60.9074   | -30.1066  | -484.2495 | -40.6656  | -27.0715 |
| 76    | 386.3211   | 56.0310   | -13.5017  | -489.6441 | -35.7728  | -43.7267 |
| 77    | 410.1779   | 52.2078   | 0.4847    | -504.8464 | -31.9640  | -57.6739 |
| 78    | 446.1766   | 49.3771   | 11.4182   | -534.4965 | -29.1249  | -68.6399 |
| 79    | 498.1059   | 47.4581   | 20.1429   | -582.1016 | -27.2072  | -77.3830 |
| 80    | 568.9335   | 46.3664   | 26.3837   | -209.2343 | -35.8614  | -25.1061 |
| 81    | -2506.6802 | 258.3231  | -600.7902 | 1865.0217 | -278.8249 | 642.2962 |
| 82    | -1876.3195 | 279.1761  | -646.3747 | 1289.7654 | -254.4685 | 578.0680 |
| 83    | -1323.1360 | 255.5601  | -584.2966 | 791.6721  | -230.7305 | 515.7087 |
| 84    | -846.2637  | 232.6470  | -524.6300 | 369.0568  | -206.2187 | 451.5640 |
| 85    | -444.2531  | 209.0489  | -462.5210 | 30.6395   | -183.1590 | 391.5591 |
| 86    | -124.0035  | 186.9749  | -405.5152 | -246.7345 | -161.9399 | 336.1114 |
| 87    | 136.8964   | 166.8294  | -352.5765 | -458.2512 | -141.7928 | 282.9584 |
| 88    | 335.3335   | 147.7809  | -301.9887 | -609.6487 | -121.2850 | 228.3388 |
| 89    | 476.7259   | 128.4151  | -250.0324 | -689.4800 | -102.6692 | 179.7561 |
| 90    | 550.0977   | 110.9878  | -204.3479 | -737.2247 | -86.1942  | 136.2040 |
| 91    | 595.2964   | 95.7211   | -163.4597 | -437.9371 | -71.7005  | 66.2156  |
| 92    | 297.4834   | 82.4365   | -95.7638  | -460.2035 | -62.1801  | 38.5775  |
| 93    | 324.8517   | 74.1195   | -71.4358  | -468.8260 | -53.8701  | 14.2369  |
| 94    | 342.5799   | 66.9724   | -49.3264  | -470.4652 | -46.7228  | -7.8522  |
| 95    | 356.7712   | 60.9814   | -30.0852  | -471.2058 | -40.7263  | -27.1215 |
| 96    | 373.2421   | 56.0961   | -13.5491  | -476.6598 | -35.8510  | -43.6469 |
| 97    | 397.2444   | 52.2749   | 0.3310    | -492.0874 | -32.0240  | -57.5496 |
| 98    | 433.3974   | 49.4414   | 11.5535   | -521.8790 | -29.1851  | -68.7838 |
| 99    | 485.5070   | 47.5229   | 19.9364   | -569.6345 | -27.2787  | -77.1550 |
| 100   | 556.4531   | 46.4321   | 26.3397   | -196.9687 | -35.9206  | -25.0355 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== |            |           |           |           |           |          |
| 101   | -2491.3960 | 256.4172  | -600.8928 | 1854.0656 | -276.9079 | 642.3806 |
| 102   | -1865.5371 | 277.2579  | -645.8885 | 1283.4486 | -252.5543 | 577.5715 |
| 103   | -1316.6481 | 253.6476  | -584.1951 | 789.4712  | -228.8181 | 515.6279 |
| 104   | -844.1721  | 230.7326  | -524.3283 | 371.1102  | -204.2972 | 451.2247 |
| 105   | -446.2274  | 207.1249  | -462.3026 | 36.9336   | -181.2354 | 391.3564 |
| 106   | -130.3815  | 185.0664  | -405.2530 | -236.2060 | -160.0249 | 335.7976 |
| 107   | 126.4818   | 164.9005  | -352.2662 | -443.3956 | -139.8608 | 282.6656 |
| 108   | 320.4408   | 145.8457  | -301.7805 | -590.3986 | -119.3487 | 228.2409 |
| 109   | 457.3670   | 126.4967  | -250.0985 | -665.8530 | -100.7603 | 179.7891 |
| 110   | 526.5807   | 109.1016  | -204.1240 | -709.5207 | -84.3203  | 135.9007 |
| 111   | 567.6221   | 93.8265   | -163.1598 | -406.0964 | -69.8037  | 65.9147  |
| 112   | 265.6404   | 80.5351   | -95.6259  | -424.0508 | -60.2903  | 38.4484  |
| 113   | 288.8017   | 72.2233   | -71.1327  | -428.5095 | -51.9757  | 13.9467  |
| 114   | 302.3319   | 65.0908   | -49.0695  | -425.9844 | -44.8441  | -8.1088  |
| 115   | 312.3753   | 59.1103   | -29.8542  | -422.6009 | -38.8554  | -27.3553 |
| 116   | 324.7439   | 54.2396   | -13.3397  | -423.9867 | -33.9904  | -43.8546 |
| 117   | 344.6903   | 50.4212   | 0.3982    | -435.3404 | -30.1738  | -57.5988 |
| 118   | 376.7733   | 47.5938   | 11.6127   | -461.0805 | -27.3421  | -68.8428 |
| 119   | 424.7955   | 45.6795   | 20.2897   | -504.7936 | -25.4281  | -77.5132 |
| 120   | 491.7112   | 44.5904   | 26.1886   | -129.6652 | -34.0033  | -24.9932 |
| 121   | -2428.9026 | 250.0123  | -599.6761 | 1806.0881 | -270.3656 | 641.2370 |
| 122   | -1817.5789 | 270.7189  | -644.7689 | 1250.0907 | -245.9974 | 576.4505 |
| 123   | -1283.3518 | 247.0976  | -583.0576 | 770.8770  | -222.2513 | 514.4766 |
| 124   | -825.7712  | 224.1875  | -522.8962 | 367.5393  | -197.7468 | 449.7799 |
| 125   | -442.5290  | 200.6021  | -461.0199 | 47.8899   | -174.7052 | 390.0541 |
| 126   | -141.2798  | 178.5786  | -403.9802 | -210.7263 | -153.5445 | 334.5394 |
| 127   | 101.0489   | 158.4619  | -351.0152 | -403.4668 | -133.4478 | 281.4052 |
| 128   | 280.9255   | 139.4766  | -300.4876 | -536.6884 | -112.9889 | 226.9009 |
| 129   | 404.1183   | 120.1881  | -248.7788 | -598.8108 | -94.4832  | 178.4920 |
| 130   | 460.1073   | 102.8717  | -202.9714 | -629.4494 | -78.1224  | 134.6950 |
| 131   | 488.4827   | 87.7043   | -161.7605 | -316.5064 | -63.8954  | 64.6579  |
| 132   | 176.9542   | 74.7000   | -94.6962  | -322.2178 | -54.4565  | 37.5149  |
| 133   | 188.2297   | 66.4664   | -70.0853  | -314.9932 | -46.2155  | 12.8966  |
| 134   | 190.1601   | 59.3933   | -48.1866  | -301.0377 | -39.1388  | -9.0235  |
| 135   | 188.8805   | 53.4798   | -29.0064  | -286.4256 | -33.2320  | -28.1902 |
| 136   | 190.1577   | 48.6702   | -12.4546  | -276.8778 | -28.4231  | -44.7432 |
| 137   | 199.1406   | 44.9193   | 1.2604    | -277.4207 | -24.6718  | -58.4643 |
| 138   | 220.3185   | 42.1401   | 12.3956   | -292.3617 | -21.8855  | -69.6248 |
| 139   | 257.3269   | 40.2637   | 20.8656   | -325.1240 | -20.0169  | -78.0796 |
| 140   | 312.8961   | 39.2036   | 26.8388   | 22.5009   | -27.9845  | -36.1587 |
| 141   | -2165.3108 | 230.2252  | -474.2895 | 1694.0111 | -254.7706 | 521.9997 |
| 142   | -1701.5149 | 254.9932  | -525.8108 | 1271.3918 | -233.6794 | 466.6845 |
| 143   | -1293.9893 | 234.3713  | -471.2143 | 901.9150  | -212.7871 | 411.7429 |
| 144   | -938.6548  | 213.9889  | -419.4606 | 572.0349  | -191.7798 | 356.7423 |
| 145   | -623.3239  | 193.5613  | -365.7629 | 292.5755  | -174.3653 | 311.5147 |
| 146   | -357.2349  | 176.7642  | -322.8174 | 61.4014   | -154.5691 | 260.0800 |
| 147   | -138.6984  | 157.6337  | -273.2839 | -123.8987 | -135.4406 | 210.5208 |
| 148   | 35.5138    | 139.2190  | -225.8504 | -266.0676 | -117.0258 | 163.0667 |
| 149   | 168.2309   | 121.5505  | -180.4510 | -368.2282 | -99.3599  | 117.6891 |
| 150   | 262.7665   | 104.6799  | -137.1597 | -433.6026 | -85.4757  | 82.8465  |

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|----------|-----------|----------|
| ===== |           |           |           |          |           |          |
| 151   | 322.8591  | 91.6219   | -104.3727 | -12.7474 | -72.1227  | 44.8394  |
| 152   | -100.9055 | 79.1354   | -68.4895  | -26.9721 | -62.9367  | 22.7504  |
| 153   | -86.8466  | 70.8321   | -48.5141  | -26.1351 | -54.6361  | 2.4351   |
| 154   | -84.9979  | 63.4645   | -30.2619  | -14.5843 | -47.2705  | -15.1576 |
| 155   | -90.7950  | 57.0255   | -14.7378  | 2.7354   | -40.8316  | -30.9727 |
| 156   | -99.1676  | 51.5373   | -1.0760   | 20.9678  | -35.3349  | -44.6960 |
| 157   | -105.1517 | 47.0309   | 10.5616   | 35.0891  | -30.8331  | -56.3227 |
| 158   | -103.5728 | 43.4995   | 20.1324   | 39.8517  | -27.2944  | -65.8921 |
| 159   | -89.1209  | 40.9702   | 27.6012   | 29.9700  | -24.7721  | -73.3500 |
| 160   | -56.4204  | 39.4451   | 33.0096   | -0.0064  | -23.2417  | -78.7799 |



ENVOLVENTE MAXIMOS TORSORES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====     |
| 1     | 0.0006     | -1.8979   | 0.4548   | 0.6035    | 2.0026    | -1.1017   |
| 2     | 13.0604    | -2.5114   | 4.4827   | -21.6625  | 3.0327    | -6.4109   |
| 3     | 60.0094    | -4.5282   | 11.8545  | -73.8085  | 5.4640    | -14.6407  |
| 4     | 133.9919   | -7.8246   | 22.1713  | -149.2226 | 9.1714    | -25.8096  |
| 5     | 225.9152   | -12.6978  | 35.3856  | -219.6329 | 13.5227   | -37.5359  |
| 6     | 314.3215   | -17.5775  | 49.2750  | -318.6012 | 19.5311   | -54.2115  |
| 7     | 419.7667   | -25.0184  | 67.9541  | -414.1474 | 27.3666   | -73.7768  |
| 8     | 536.3858   | -32.7222  | 89.8950  | -519.1131 | 35.4646   | -96.5677  |
| 9     | 631.3563   | -42.8784  | 114.3221 | -596.8108 | 45.9910   | -121.8521 |
| 10    | 712.8091   | -54.1460  | 142.2853 | -657.7603 | 56.1266   | -146.4972 |
| 11    | 769.5082   | -65.3175  | 168.6066 | -669.2700 | 68.6881   | -177.3791 |
| 12    | 787.1755   | -78.1848  | 201.8388 | -683.1806 | 82.1763   | -211.5536 |
| 13    | 783.6521   | -93.0603  | 237.8833 | -650.0278 | 97.3910   | -248.4366 |
| 14    | 743.6510   | -108.9853 | 277.0670 | -577.6904 | 113.6199  | -288.5166 |
| 15    | 658.6099   | -126.0330 | 319.1945 | -457.9471 | 129.4507  | -327.1990 |
| 16    | 525.9285   | -142.5965 | 359.6374 | -276.6244 | 146.6606  | -370.3267 |
| 17    | 331.5439   | -160.4508 | 405.2462 | -57.0990  | 165.7661  | -418.5206 |
| 18    | 96.8200    | -180.1853 | 455.2361 | 217.6870  | 185.5311  | -468.5755 |
| 19    | -192.9636  | -200.5111 | 507.3201 | 547.3188  | 205.7861  | -520.8575 |
| 20    | -538.3727  | -221.2948 | 561.4128 | 935.6192  | 191.4455  | -498.0922 |
| 21    | -950.9233  | -6.5200   | 97.6300  | 878.5804  | -25.5143  | -28.7557  |
| 22    | -865.7407  | 24.9512   | 32.0215  | 791.7896  | -24.3707  | -33.5580  |
| 23    | -757.2901  | 22.9733   | 39.0637  | 681.7378  | -22.1384  | -41.2840  |
| 24    | -628.1207  | 20.2608   | 49.6945  | 553.2887  | -19.1531  | -52.6449  |
| 25    | -479.6374  | 16.3748   | 63.7096  | 389.3355  | -14.1793  | -69.3851  |
| 26    | -297.1109  | 10.5741   | 82.9337  | 232.4275  | -8.7428   | -87.5809  |
| 27    | -124.1568  | 3.9548    | 103.9251 | 71.9832   | -1.8260   | -109.2873 |
| 28    | 49.6002    | -4.0934   | 128.4480 | -84.9253  | 6.5204    | -134.5033 |
| 29    | 219.6186   | -13.2045  | 156.3650 | -258.9949 | 17.3909   | -166.7740 |
| 30    | 410.7816   | -24.3054  | 191.4680 | -402.3199 | 27.4498   | -199.2610 |
| 31    | 529.7599   | -37.9892  | 226.4256 | -488.2086 | 41.4027   | -234.9197 |
| 32    | 646.1250   | -50.8317  | 265.2582 | -594.4315 | 54.9070   | -275.1023 |
| 33    | 729.2078   | -66.7586  | 307.8105 | -614.3213 | 72.2540   | -322.2214 |
| 34    | 740.2718   | -85.2886  | 357.5932 | -582.1738 | 89.4856   | -368.4050 |
| 35    | 708.5413   | -103.0814 | 406.7532 | -505.0682 | 107.4496  | -417.9035 |
| 36    | 603.4925   | -122.7387 | 458.9561 | -363.4826 | 128.0616  | -471.8301 |
| 37    | 442.7354   | -144.4685 | 515.2122 | -133.9140 | 150.6520  | -531.1133 |
| 38    | 192.9519   | -168.0286 | 577.3673 | 170.6656  | 172.7855  | -589.2955 |
| 39    | -134.0987  | -191.0935 | 638.1239 | 554.6105  | 195.8867  | -650.1684 |
| 40    | -541.5982  | -215.0421 | 701.2380 | 1020.3394 | 186.2146  | -630.2426 |
| 41    | -1037.5228 | -5.3663   | 117.4303 | 953.8085  | -27.6542  | -35.4106  |
| 42    | -941.1414  | 27.1407   | 38.6757  | 858.7340  | -26.4442  | -40.1698  |
| 43    | -825.2163  | 25.3315   | 45.8438  | 741.2983  | -24.3899  | -48.0035  |
| 44    | -686.0974  | 22.3252   | 56.2734  | 604.0352  | -21.1189  | -59.1549  |
| 45    | -529.0603  | 18.2963   | 70.2374  | 431.2583  | -15.9690  | -75.8430  |
| 46    | -337.6033  | 12.2949   | 89.3926  | 267.3431  | -10.3865  | -94.0025  |
| 47    | -157.6407  | 5.5379    | 110.3941 | 100.5383  | -3.3414   | -115.7179 |
| 48    | -22.3931   | -2.6382   | 134.8617 | -62.0570  | 5.1241    | -140.8945 |
| 49    | 198.0522   | -11.8699  | 162.7690 | -241.6352 | 16.1315   | -173.1023 |
| 50    | 380.9671   | -24.4546  | 197.6590 | -372.7220 | 27.6421   | -205.4403 |

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====     |
| 51    | 531.3448   | -35.8291  | 232.8699 | -495.0212 | 39.2813   | -241.3639 |
| 52    | 635.5752   | -50.0094  | 271.3323 | -586.0915 | 54.1356   | -281.1016 |
| 53    | 722.9683   | -65.9596  | 314.0454 | -610.0069 | 71.4729   | -328.5585 |
| 54    | 747.3035   | -84.0134  | 364.1230 | -592.0951 | 88.2263   | -374.9447 |
| 55    | 706.3256   | -102.4649 | 413.1766 | -504.3344 | 106.8448  | -424.2510 |
| 56    | 602.3188   | -122.2186 | 465.0212 | -363.4404 | 127.5449  | -477.8796 |
| 57    | 442.6793   | -143.9505 | 521.5308 | -134.9608 | 150.1315  | -537.4787 |
| 58    | 193.7048   | -167.5646 | 583.6294 | 168.8149  | 172.3164  | -595.5118 |
| 59    | -132.4116  | -190.6393 | 644.2578 | 551.8464  | 195.4244  | -656.2862 |
| 60    | -539.0167  | -214.5912 | 707.3592 | 1016.5441 | 185.7041  | -636.1019 |
| 61    | -1040.3784 | -4.7536   | 118.1132 | 954.9389  | -28.3057  | -35.7957  |
| 62    | -938.2441  | 27.2587   | 38.8713  | 855.4292  | -26.5590  | -40.3342  |
| 63    | -821.0883  | 25.3034   | 46.0104  | 737.0898  | -24.3584  | -48.1712  |
| 64    | -682.2401  | 22.4510   | 56.4498  | 599.7567  | -21.2415  | -59.3351  |
| 65    | -524.6539  | 18.4215   | 70.4234  | 426.3665  | -16.0887  | -76.0450  |
| 66    | -332.7672  | 12.2716   | 89.6831  | 262.4397  | -10.3586  | -94.2919  |
| 67    | -152.0846  | 5.6440    | 110.6266 | 94.6504   | -3.4402   | -115.9496 |
| 68    | 28.4295    | -2.5504   | 135.1181 | -68.3580  | 5.0413    | -141.1321 |
| 69    | 203.1006   | -11.9665  | 162.9956 | -246.5330 | 16.2359   | -173.3355 |
| 70    | 399.3442   | -23.2701  | 197.9371 | -393.7919 | 26.4610   | -205.7476 |
| 71    | 547.6104   | -36.9328  | 233.2216 | -508.8407 | 40.3789   | -241.7264 |
| 72    | 649.4196   | -51.1155  | 271.7177 | -597.4512 | 55.2388   | -281.4651 |
| 73    | 734.6621   | -67.4014  | 314.2905 | -618.3830 | 72.9202   | -328.7900 |
| 74    | 753.5120   | -85.7011  | 364.4968 | -594.5017 | 89.9132   | -375.3279 |
| 75    | 708.2737   | -104.1774 | 413.4153 | -502.4898 | 108.5584  | -424.4773 |
| 76    | 600.5630   | -123.9061 | 465.4010 | -357.7067 | 129.2352  | -478.2904 |
| 77    | 437.0109   | -145.6703 | 521.9437 | -125.6680 | 151.8508  | -537.8808 |
| 78    | 184.4547   | -169.2610 | 583.9758 | 181.9900  | 174.0087  | -595.8486 |
| 79    | -145.3355  | -192.2379 | 644.5727 | 568.3518  | 197.0186  | -656.6000 |
| 80    | -553.6044  | -215.9318 | 707.6654 | 1034.1079 | 187.0213  | -636.3694 |
| 81    | -1059.2139 | -4.1717   | 118.0352 | 972.3748  | -28.9073  | -35.7127  |
| 82    | -958.7596  | 28.2660   | 38.9769  | 873.6468  | -27.5640  | -40.4766  |
| 83    | -840.0293  | 26.4434   | 46.1864  | 753.4864  | -25.4970  | -48.3233  |
| 84    | -698.2046  | 23.4657   | 56.3955  | 613.4434  | -22.2543  | -59.2713  |
| 85    | -538.4341  | 19.4255   | 70.4918  | 437.8899  | -17.0907  | -76.1082  |
| 86    | -343.9471  | 13.2536   | 89.5698  | 271.4155  | -11.3391  | -94.1819  |
| 87    | -161.8644  | 6.4673    | 110.7033 | 102.5779  | -4.2651   | -116.0193 |
| 88    | 30.2176    | -1.8856   | 135.1046 | -71.6439  | 4.3786    | -141.1608 |
| 89    | 212.4631   | -10.6116  | 163.0761 | -258.9513 | 14.8841   | -173.4417 |
| 90    | 400.0378   | -23.3236  | 198.0411 | -394.3859 | 26.5191   | -205.7804 |
| 91    | 534.8642   | -35.9374  | 233.0403 | -498.2947 | 39.3855   | -241.5601 |
| 92    | 657.9194   | -51.9594  | 271.9186 | -604.0346 | 56.0763   | -281.7125 |
| 93    | 738.2033   | -67.8437  | 314.2697 | -621.0008 | 73.3591   | -328.6911 |
| 94    | 747.9879   | -86.6173  | 364.3582 | -586.9561 | 90.8277   | -375.2143 |
| 95    | 700.5583   | -105.0745 | 413.4654 | -492.5978 | 109.4533  | -424.5663 |
| 96    | 590.4746   | -124.8255 | 465.4711 | -345.7620 | 130.1532  | -478.3416 |
| 97    | 425.0490   | -146.5689 | 521.8915 | -111.5486 | 152.7474  | -537.8151 |
| 98    | 170.0770   | -170.1613 | 583.9886 | 198.4820  | 174.9094  | -595.8981 |
| 99    | -162.0850  | -193.2576 | 644.7285 | 587.2458  | 198.0405  | -656.7396 |
| 100   | -572.0538  | -216.8609 | 707.6304 | 1054.6826 | 187.9556  | -636.3044 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====     |
| 101   | -1071.5341 | -3.2642   | 117.9600 | 982.6643  | -29.8098  | -35.6758  |
| 102   | -971.1935  | 29.4551   | 39.1951  | 883.4409  | -28.7532  | -40.6943  |
| 103   | -849.9527  | 27.6566   | 46.1629  | 760.6837  | -26.7086  | -48.2940  |
| 104   | -705.8074  | 24.7940   | 56.5152  | 618.0340  | -23.5846  | -59.3908  |
| 105   | -542.9187  | 20.7519   | 70.4777  | 439.3918  | -18.4138  | -76.0884  |
| 106   | -345.3945  | 14.5698   | 89.6407  | 269.8942  | -12.6563  | -94.2519  |
| 107   | -157.3284  | 7.6425    | 110.6655 | 95.4030   | -5.4388   | -115.9921 |
| 108   | 38.4800    | -1.1029   | 135.1292 | -81.6699  | 3.5963    | -141.1530 |
| 109   | 214.6830   | -10.7344  | 163.0025 | -260.8643 | 15.0050   | -173.3450 |
| 110   | 400.3891   | -23.3510  | 198.0167 | -394.6600 | 26.5413   | -205.8101 |
| 111   | 536.5521   | -36.0747  | 233.0815 | -499.6826 | 39.5273   | -241.5681 |
| 112   | 656.2282   | -51.8184  | 271.7880 | -602.6364 | 55.9518   | -281.5740 |
| 113   | 737.8782   | -67.8900  | 314.2581 | -620.5321 | 73.4165   | -328.7191 |
| 114   | 748.4728   | -86.8654  | 364.4005 | -586.8575 | 91.0809   | -375.2592 |
| 115   | 700.3782   | -105.3383 | 413.5215 | -491.7904 | 109.7185  | -424.6220 |
| 116   | 589.5377   | -125.1005 | 465.5278 | -344.1500 | 130.4268  | -478.3846 |
| 117   | 423.4354   | -146.8402 | 521.8414 | -109.4113 | 153.0204  | -537.7520 |
| 118   | 167.8196   | -170.4496 | 583.9026 | 201.3587  | 175.1973  | -595.7910 |
| 119   | -164.5887  | -193.3803 | 644.5100 | 590.1359  | 198.1615  | -656.5854 |
| 120   | -577.0592  | -217.3253 | 707.9083 | 1060.7344 | 188.3661  | -636.5952 |
| 121   | -1076.1671 | -2.9821   | 117.9320 | 986.5503  | -30.1412  | -35.5904  |
| 122   | -975.0566  | 29.7899   | 39.1004  | 886.5087  | -29.0833  | -40.6010  |
| 123   | -852.9918  | 27.9790   | 46.0767  | 762.9554  | -27.0209  | -48.2333  |
| 124   | -708.0644  | 25.0885   | 56.6560  | 619.6404  | -23.8637  | -59.5330  |
| 125   | -544.4561  | 20.9999   | 70.4573  | 440.3996  | -18.6429  | -76.0570  |
| 126   | -346.2651  | 14.7602   | 89.6217  | 270.3956  | -12.8295  | -94.2408  |
| 127   | -160.9943  | 7.9070    | 110.7293 | 98.5849   | -5.6865   | -116.0560 |
| 128   | 38.6015    | -1.1060   | 135.1580 | -81.6093  | 3.6180    | -141.1975 |
| 129   | 214.1931   | -10.8144  | 163.0770 | -259.8787 | 15.1176   | -173.4092 |
| 130   | 398.6949   | -23.5085  | 198.0163 | -392.3200 | 26.7234   | -205.8347 |
| 131   | 550.2242   | -37.6759  | 233.3162 | -509.3976 | 41.1514   | -241.8228 |
| 132   | 648.9525   | -51.9571  | 271.8164 | -594.5131 | 56.1155   | -281.5579 |
| 133   | 731.3636   | -68.4886  | 314.3832 | -612.2507 | 74.0304   | -328.8614 |
| 134   | 737.0784   | -87.2229  | 364.4136 | -574.1618 | 91.4556   | -375.2420 |
| 135   | 686.2445   | -105.8090 | 413.4790 | -476.1880 | 110.2148  | -424.5908 |
| 136   | 572.4375   | -125.8121 | 465.6212 | -324.8486 | 131.1611  | -478.5109 |
| 137   | 402.5909   | -147.6582 | 521.9958 | -86.3969  | 153.8537  | -537.9166 |
| 138   | 143.8542   | -171.1642 | 584.0871 | 227.1192  | 175.9154  | -595.9839 |
| 139   | -192.1870  | -194.2820 | 644.7625 | 619.6964  | 199.0640  | -656.8224 |
| 140   | -606.0819  | -218.0477 | 707.9952 | 1091.2539 | 188.9630  | -637.4357 |
| 141   | -1108.9077 | -3.0617   | 124.0832 | 1041.1227 | -30.4484  | -42.0518  |
| 142   | -1033.4657 | 30.2243   | 44.8963  | 960.0281  | -29.6365  | -46.4328  |
| 143   | -937.5605  | 28.9431   | 51.7677  | 860.0092  | -28.1130  | -54.0406  |
| 144   | -822.7924  | 26.8978   | 60.4567  | 742.7905  | -25.7990  | -63.5362  |
| 145   | -691.6914  | 24.0291   | 72.6296  | 630.8351  | -23.3777  | -74.4945  |
| 146   | -565.8704  | 20.9721   | 85.4169  | 489.7643  | -19.4493  | -89.7920  |
| 147   | -412.4649  | 16.3666   | 102.9934 | 340.3522  | -14.5445  | -108.2102 |
| 148   | -251.0501  | 10.7326   | 123.3913 | 185.6590  | -8.6018   | -129.4512 |
| 149   | -72.0329   | 3.3461    | 146.7618 | 17.4547   | -0.8969   | -153.6762 |
| 150   | 88.0207    | -4.4177   | 173.1421 | -104.3148 | 5.7635    | -176.9247 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| ===== | =====    | =====     | =====    | =====     | =====     | =====     |
| 151   | 215.1534 | -11.9239  | 198.5197 | -241.2806 | 14.8624   | -206.7321 |
| 152   | 370.0078 | -22.7987  | 230.4715 | -375.9911 | 26.0605   | -239.5070 |
| 153   | 489.8527 | -33.9660  | 265.2742 | -473.9688 | 37.5573   | -275.1147 |
| 154   | 582.9611 | -46.2043  | 302.9341 | -542.0055 | 50.1155   | -313.6747 |
| 155   | 658.0765 | -60.8731  | 343.9157 | -567.1063 | 62.9508   | -349.6882 |
| 156   | 664.7865 | -73.8277  | 381.9315 | -563.3981 | 78.2055   | -393.8848 |
| 157   | 646.6302 | -89.7412  | 427.8429 | -510.4064 | 94.4209   | -440.5995 |
| 158   | 579.5536 | -107.2436 | 476.9427 | -404.3397 | 112.2141  | -490.2272 |
| 159   | 453.4566 | -125.8871 | 528.6177 | -236.3199 | 131.1375  | -542.2119 |
| 160   | 262.5754 | -145.8083 | 582.6158 | -0.0491   | 148.5325  | -589.5146 |

ENVOLVENTE MINIMOS FLECTORES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0006     | 4.4932    | -2.4836   | -8.0868   | -4.4932   | 2.4836    |
| 2     | -55.7634   | -30.9844  | -28.2682  | 111.5262  | 30.9844   | 28.2694   |
| 3     | -111.5122  | -30.9844  | -28.3197  | 167.3035  | 30.9844   | 28.3203   |
| 4     | -167.2888  | -30.9752  | -28.3776  | 223.0301  | 30.9752   | 28.3770   |
| 5     | -223.0360  | -30.9740  | -28.3818  | 278.7832  | 30.9740   | 28.3814   |
| 6     | -278.7709  | -30.9860  | -28.5056  | 334.5555  | 30.9860   | 28.5059   |
| 7     | -334.5584  | -30.9846  | -28.5029  | 390.3433  | 30.9846   | 28.5030   |
| 8     | -390.3236  | -30.9551  | -28.8045  | 446.0475  | 30.9551   | 28.8038   |
| 9     | -446.0570  | -30.9423  | -28.6092  | 515.5918  | 40.1935   | 40.4281   |
| 10    | -515.5653  | -40.1709  | -40.8639  | 588.8898  | 41.6719   | 36.6338   |
| 11    | -588.9024  | -41.6807  | -36.5884  | 665.5933  | 43.1812   | 32.3597   |
| 12    | -665.5798  | -43.1923  | -32.6273  | 745.5137  | 45.1899   | 26.9917   |
| 13    | -745.5114  | -45.1913  | -26.9987  | 828.6565  | 47.1911   | 21.3738   |
| 14    | -828.6488  | -47.1662  | -21.6869  | 914.9665  | 49.1665   | 16.0833   |
| 15    | -914.9478  | -49.1698  | -16.3558  | 1004.4462 | 50.6702   | 12.1128   |
| 16    | -1004.4576 | -50.6711  | -11.8209  | 1097.3923 | 52.1711   | 7.6688    |
| 17    | -1097.5535 | -54.1992  | 0.2378    | 1197.2969 | 56.1998   | -5.8131   |
| 18    | -1249.1060 | -113.6735 | 149.8212  | 1455.5553 | 115.6744  | -155.4626 |
| 19    | -1497.8351 | -163.7932 | 273.0527  | 1794.0040 | 165.7930  | -278.5800 |
| 20    | -1828.6653 | -209.0153 | 388.1408  | 2205.9041 | 167.5153  | -295.6562 |
| 21    | -2230.9038 | 246.9774  | -607.6023 | 1608.8379 | -263.2420 | 631.1071  |
| 22    | -1632.0308 | 244.3961  | -583.7348 | 1137.0723 | -200.3613 | 443.4533  |
| 23    | -1193.1904 | 148.0168  | -305.5937 | 860.1299  | -148.0182 | 305.6573  |
| 24    | -908.3928  | 105.0673  | -191.1763 | 671.9776  | -105.0667 | 191.1745  |
| 25    | -737.2769  | 51.0594   | -34.7295  | 622.3889  | -51.0587  | 34.7795   |
| 26    | -696.1366  | -3.4288   | 2.2834    | 703.8492  | 3.4288    | -2.1866   |
| 27    | -703.8526  | -3.4317   | 1.8383    | 711.5733  | 3.4309    | -1.7933   |
| 28    | -711.5677  | -3.4340   | 1.7988    | 719.2863  | 3.4334    | -1.7797   |
| 29    | -719.2824  | -3.4348   | 1.5747    | 727.0123  | 3.4345    | -1.5237   |
| 30    | -727.0003  | -3.4337   | 1.1274    | 734.7294  | 3.4340    | -1.1126   |
| 31    | -734.7226  | -3.4377   | 1.3308    | 742.4633  | 3.4379    | -1.3086   |
| 32    | -742.4587  | -3.4227   | 0.6490    | 750.1594  | 3.4236    | -0.6131   |
| 33    | -750.1673  | -3.4469   | 0.6079    | 775.5997  | 23.2584   | -10.3727  |
| 34    | -775.6084  | -23.2913  | 10.3612   | 830.0295  | 25.2935   | -15.9829  |
| 35    | -830.0228  | -25.2983  | 15.5217   | 889.4596  | 27.2988   | -21.1030  |
| 36    | -889.4684  | -27.3111  | 20.6152   | 953.9125  | 29.8106   | -27.6614  |
| 37    | -974.9225  | -65.1287  | 68.5142   | 1124.1318 | 67.6279   | -75.5040  |
| 38    | -1169.5068 | -108.9485 | 198.2220  | 1416.6042 | 110.9478  | -203.8119 |
| 39    | -1482.7914 | -165.3875 | 351.3790  | 1857.4801 | 167.3863  | -356.9663 |
| 40    | -1913.1649 | -219.4813 | 494.4140  | 2410.0620 | 179.1012  | -397.2072 |
| 41    | -2450.5977 | 253.3538  | -594.3207 | 1814.6893 | -269.5035 | 625.3553  |
| 42    | -1839.0160 | 250.6887  | -578.1009 | 1366.7245 | -207.8392 | 437.7110  |
| 43    | -1427.4890 | 155.6445  | -299.6786 | 1077.1929 | -155.6450 | 299.7518  |
| 44    | -1132.0159 | 100.9492  | -152.7596 | 904.8936  | -100.9504 | 152.7894  |
| 45    | -951.6503  | 59.2071   | -29.1689  | 818.4495  | -59.2045  | 29.2284   |
| 46    | -902.9675  | 5.1914    | 7.7252    | 891.2988  | -5.1890   | -7.6419   |
| 47    | -891.2863  | 5.1801    | 7.4055    | 879.6281  | -5.1780   | -7.3542   |
| 48    | -879.6143  | 5.1650    | 7.1596    | 867.9988  | -5.1652   | -7.1178   |
| 49    | -868.0078  | 5.1869    | 6.8629    | 856.3320  | -5.1890   | -6.8400   |
| 50    | -856.3132  | 5.2067    | 6.8452    | 844.5902  | -5.2098   | -6.8108   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -844.5915  | 5.2297    | 6.3551    | 832.8225  | -5.2335   | -6.3239   |
| 52    | -832.8235  | 5.2538    | 6.3108    | 820.9961  | -5.2551   | -6.2928   |
| 53    | -820.9862  | 5.2634    | 5.8285    | 821.0116  | 15.5208   | -15.5089  |
| 54    | -820.9938  | -15.5231  | 15.2441   | 857.9320  | 17.5229   | -20.8740  |
| 55    | -857.9327  | -17.5154  | 20.6642   | 899.8344  | 19.5137   | -26.3019  |
| 56    | -899.8363  | -19.4999  | 26.2947   | 946.7144  | 22.0001   | -33.2996  |
| 57    | -978.2253  | -70.6542  | 69.8267   | 1139.9033 | 73.1554   | -76.8371  |
| 58    | -1186.2178 | -114.8442 | 200.4961  | 1446.5647 | 116.8433  | -206.1053 |
| 59    | -1513.9568 | -171.5022 | 352.9170  | 1902.3866 | 173.5011  | -358.4200 |
| 60    | -1958.6868 | -225.6776 | 495.8190  | 2469.4766 | 185.3898  | -398.3684 |
| 61    | -2509.9905 | 255.0214  | -593.4229 | 1870.3497 | -271.0739 | 624.7214  |
| 62    | -1894.6622 | 252.2663  | -577.9320 | 1420.9636 | -209.4702 | 437.6091  |
| 63    | -1482.1749 | 157.2829  | -299.6319 | 1128.2152 | -157.2843 | 299.7056  |
| 64    | -1183.8265 | 102.6028  | -152.7440 | 953.0021  | -102.6068 | 152.7732  |
| 65    | -1000.5120 | 60.8939   | -29.1601  | 863.5123  | -60.8979  | 29.1928   |
| 66    | -948.6334  | 7.2881    | 7.8571    | 932.2348  | -7.2892   | -7.7698   |
| 67    | -932.2535  | 7.2939    | 7.2781    | 915.8383  | -7.2944   | -7.2227   |
| 68    | -915.8358  | 7.3059    | 7.2273    | 899.4009  | -7.3061   | -7.2121   |
| 69    | -899.4020  | 7.2939    | 7.0081    | 883.0017  | -7.2939   | -6.9729   |
| 70    | -882.9955  | 7.2990    | 6.7080    | 866.5715  | -7.2989   | -6.6500   |
| 71    | -866.5910  | 7.2990    | 6.1593    | 850.1743  | -7.2989   | -6.1325   |
| 72    | -850.1814  | 7.3099    | 6.1278    | 833.7334  | -7.3099   | -6.1171   |
| 73    | -833.7295  | 7.3141    | 5.8633    | 828.8729  | 13.5152   | -15.5413  |
| 74    | -828.8547  | -13.5289  | 15.0635   | 861.2931  | 15.5295   | -20.6993  |
| 75    | -861.3018  | -15.5434  | 20.7420   | 898.7641  | 17.5436   | -26.3677  |
| 76    | -898.7615  | -17.5401  | 26.0440   | 941.2567  | 20.0410   | -33.0338  |
| 77    | -976.0579  | -72.5703  | 69.9779   | 1141.9253 | 75.0699   | -77.0241  |
| 78    | -1188.3379 | -116.7764 | 200.9269  | 1453.1174 | 118.7742  | -206.5222 |
| 79    | -1520.7065 | -173.4364 | 352.9930  | 1913.4802 | 175.4369  | -358.4582 |
| 80    | -1969.8647 | -227.6184 | 495.8721  | 2484.9712 | 187.3230  | -398.4051 |
| 81    | -2525.1562 | 255.0451  | -593.7373 | 1885.4529 | -271.1085 | 625.0148  |
| 82    | -1909.9131 | 252.2958  | -577.7656 | 1436.0786 | -209.5203 | 437.3855  |
| 83    | -1497.3275 | 157.3441  | -299.3109 | 1143.3440 | -157.3445 | 299.4138  |
| 84    | -1198.8383 | 102.6798  | -152.8070 | 967.8480  | -102.6796 | 152.8504  |
| 85    | -1015.3511 | 60.9653   | -29.0362  | 878.1583  | -60.9661  | 29.0909   |
| 86    | -961.6562  | 8.4455    | 7.5269    | 942.6509  | -8.4473   | -7.4628   |
| 87    | -942.6546  | 8.4389    | 7.6786    | 923.6761  | -8.4365   | -7.6543   |
| 88    | -923.6969  | 8.4310    | 7.1645    | 904.7262  | -8.4328   | -7.0757   |
| 89    | -904.7306  | 8.4572    | 6.5847    | 885.6945  | -8.4631   | -6.5393   |
| 90    | -885.7009  | 8.4807    | 6.5360    | 866.6154  | -8.4835   | -6.5372   |
| 91    | -866.5993  | 8.5284    | 6.5324    | 847.4113  | -8.5268   | -6.4944   |
| 92    | -847.4268  | 8.4877    | 5.7584    | 828.3282  | -8.4853   | -5.7262   |
| 93    | -828.3320  | 8.4610    | 5.9916    | 820.8394  | 12.3687   | -15.7125  |
| 94    | -820.8396  | -12.3744  | 15.2396   | 850.6829  | 14.3757   | -20.8562  |
| 95    | -850.6837  | -14.3934  | 20.5899   | 885.5893  | 16.3941   | -26.2066  |
| 96    | -885.5893  | -16.3974  | 25.9862   | 925.4886  | 18.8972   | -33.0046  |
| 97    | -961.2121  | -72.5074  | 70.2289   | 1127.0068 | 75.0079   | -77.2290  |
| 98    | -1173.5367 | -116.7073 | 200.5352  | 1438.2322 | 118.7064  | -206.1574 |
| 99    | -1505.7178 | -173.3680 | 353.5102  | 1898.2186 | 175.3674  | -359.0129 |
| 100   | -1954.6958 | -227.5466 | 495.8958  | 2469.6477 | 187.2607  | -398.3551 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -2509.8503 | 253.1377  | -593.8415 | 1874.4810 | -269.1893 | 625.0935  |
| 102   | -1899.1058 | 250.3807  | -577.2782 | 1429.7430 | -207.6172 | 436.8500  |
| 103   | -1490.8380 | 155.4385  | -299.1674 | 1141.1423 | -155.4380 | 299.2832  |
| 104   | -1196.6827 | 100.7753  | -152.3942 | 969.8887  | -100.7774 | 152.4333  |
| 105   | -1017.3730 | 59.0822   | -28.8214  | 884.4165  | -59.0824  | 28.8840   |
| 106   | -962.3169  | 10.4168   | 7.7977    | 938.8805  | -10.4166  | -7.7145   |
| 107   | -938.8695  | 10.4212   | 7.4975    | 915.4270  | -10.4249  | -7.4480   |
| 108   | -915.4155  | 10.4503   | 7.1989    | 891.8985  | -10.4543  | -7.1764   |
| 109   | -891.8885  | 10.4673   | 7.1768    | 868.3488  | -10.4664  | -7.1398   |
| 110   | -868.3601  | 10.4482   | 6.6644    | 844.8591  | -10.4462  | -6.6295   |
| 111   | -844.8735  | 10.4504   | 6.6226    | 821.3632  | -10.4542  | -6.5966   |
| 112   | -821.3697  | 10.5031   | 6.1266    | 797.7370  | -10.5071  | -6.1003   |
| 113   | -797.7319  | 10.5136   | 6.0912    | 784.4879  | 10.2610   | -15.8025  |
| 114   | -784.4930  | -10.2455  | 15.3503   | 809.5508  | 12.2460   | -20.9653  |
| 115   | -809.5553  | -12.2512  | 20.7061   | 839.6270  | 14.2514   | -26.3248  |
| 116   | -839.6167  | -14.2499  | 26.1355   | 874.6708  | 16.7505   | -33.1771  |
| 117   | -911.5278  | -70.7602  | 70.6269   | 1073.3459 | 73.2598   | -77.6529  |
| 118   | -1120.4834 | -115.0035 | 200.9677  | 1381.2889 | 117.0033  | -206.4967 |
| 119   | -1449.6112 | -171.7010 | 353.0031  | 1838.4779 | 173.7015  | -358.5723 |
| 120   | -1895.0156 | -225.8875 | 496.9914  | 2406.2773 | 185.7457  | -399.5252 |
| 121   | -2446.9197 | 246.7170  | -592.6145 | 1826.4189 | -220.1651 | 483.5077  |
| 122   | -1851.1418 | 201.3696  | -435.7189 | 1398.0627 | -201.3704 | 435.7977  |
| 123   | -1459.5806 | 149.2704  | -298.1158 | 1123.7401 | -149.2717 | 298.1925  |
| 124   | -1179.9684 | 94.8236   | -150.9896 | 966.6329  | -94.8231  | 151.0251  |
| 125   | -1014.2979 | 53.4801   | -27.7771  | 893.9484  | -53.4783  | 27.8716   |
| 126   | -952.4922  | 18.1148   | 12.1318   | 911.7283  | -18.1101  | -12.0773  |
| 127   | -911.7258  | 18.0838   | 12.1277   | 871.0569  | -18.0807  | -12.0851  |
| 128   | -871.0605  | 18.0827   | 11.5962   | 830.3629  | -18.0836  | -11.5467  |
| 129   | -830.3509  | 18.0852   | 11.5526   | 789.6565  | -18.0877  | -11.5365  |
| 130   | -789.6671  | 18.1059   | 11.3421   | 748.9423  | -18.1080  | -11.2914  |
| 131   | -748.9330  | 18.1239   | 10.8498   | 708.1303  | -18.1255  | -10.8213  |
| 132   | -708.1345  | 18.1303   | 10.8573   | 667.3435  | -18.1310  | -10.8469  |
| 133   | -667.3276  | 18.1401   | 10.6470   | 626.5125  | -18.1393  | -10.6286  |
| 134   | -626.5074  | 18.1313   | 10.4256   | 612.3525  | 3.1404    | -26.3756  |
| 135   | -612.3609  | -3.1275   | 26.2077   | 621.9079  | 5.1268    | -31.8241  |
| 136   | -621.9117  | -5.1335   | 31.5064   | 636.4686  | 7.6329    | -38.5419  |
| 137   | -685.3161  | -62.1546  | 75.9194   | 827.7805  | 64.6552   | -82.9565  |
| 138   | -884.1245  | -118.6860 | 239.1506  | 1153.2308 | 120.6869  | -244.7406 |
| 139   | -1201.8154 | -163.6538 | 358.9547  | 1572.4885 | 165.6534  | -364.5298 |
| 140   | -1634.1257 | -217.9951 | 502.5486  | 2127.6587 | 178.2303  | -411.7979 |
| 141   | -2169.3577 | 228.6821  | -470.3574 | 1747.0674 | -205.0036 | 378.7485  |
| 142   | -1763.6843 | 189.7164  | -341.8168 | 1422.1512 | -189.7180 | 341.8212  |
| 143   | -1465.6007 | 146.5007  | -231.1028 | 1201.9619 | -146.4997 | 231.1516  |
| 144   | -1246.2418 | 98.3953   | -114.0189 | 1069.0441 | -98.3943  | 114.1125  |
| 145   | -1120.7635 | 40.9518   | 29.6296   | 1047.0654 | -40.9519  | -29.5934  |
| 146   | -1050.5380 | 38.9173   | 38.1665   | 980.4818  | -38.9111  | -38.1231  |
| 147   | -980.4915  | 38.8808   | 38.1198   | 910.5076  | -38.8786  | -38.0842  |
| 148   | -910.5183  | 38.8772   | 37.8222   | 840.5669  | -38.8842  | -37.7491  |
| 149   | -840.5725  | 38.8923   | 37.4646   | 770.5681  | -38.8886  | -37.4311  |
| 150   | -770.5703  | 38.8749   | 37.4276   | 700.6058  | -38.8681  | -37.3994  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|---------|----------|-----------|----------|
| 151   | -700.6210 | 38.8895   | 37.1685 | 630.5894 | -38.8946  | -37.1127 |
| 152   | -630.5933 | 38.9043   | 36.9238 | 560.5563 | -38.9045  | -36.8986 |
| 153   | -560.5559 | 38.8849   | 36.8970 | 490.5673 | -38.8851  | -36.8997 |
| 154   | -490.5664 | 38.9160   | 36.9099 | 420.5086 | -38.9238  | -36.8766 |
| 155   | -420.5282 | 38.9389   | 36.6177 | 350.4453 | -38.9430  | -36.5700 |
| 156   | -350.4504 | 38.9399   | 36.4564 | 280.3435 | -38.9414  | -36.4523 |
| 157   | -280.3236 | 38.9467   | 36.5468 | 210.2352 | -38.9469  | -36.5487 |
| 158   | -210.2468 | 38.9417   | 36.4783 | 140.1460 | -38.9404  | -36.4623 |
| 159   | -140.1530 | 38.9397   | 36.4205 | 70.0816  | -38.9386  | -36.4128 |
| 160   | -70.0913  | 38.9354   | 36.3896 | -0.0018  | -29.2009  | -28.8663 |

ENVOLVENTE MINIMOS CORTANTES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | 0.0060     | -15.2984  | -70.6485 | 39.2894   | 31.6015   | 24.2424   |
| 2     | -12.8655   | -16.9192  | -64.5766 | 44.7684   | 33.6389   | 16.8889   |
| 3     | 4.4931     | -19.9614  | -55.1948 | 24.0866   | 37.1011   | 6.6333    |
| 4     | 44.3835    | -24.4217  | -42.8354 | -15.1739  | 41.9653   | -6.5598   |
| 5     | 99.3258    | -30.2826  | -27.5650 | -46.8187  | 47.3042   | -20.3401  |
| 6     | 143.2748   | -36.5964  | -11.6988 | -98.7283  | 54.7522   | -39.0091  |
| 7     | 204.1322   | -44.9923  | 9.0462   | -147.9677 | 63.5427   | -60.6401  |
| 8     | 259.0891   | -54.7128  | 32.8497  | -187.6442 | 73.6558   | -85.2905  |
| 9     | 301.4752   | -65.7614  | 59.4948  | -211.1790 | 85.0692   | -112.7748 |
| 10    | 324.8066   | -78.0550  | 89.1790  | -212.1140 | 96.2418   | -139.1714 |
| 11    | 322.8779   | -90.1027  | 117.6179 | -163.4801 | 109.6669  | -172.1399 |
| 12    | 268.9013   | -104.3429 | 152.6907 | -103.2494 | 124.5335  | -208.1656 |
| 13    | 201.1955   | -120.0142 | 190.7935 | -4.4786   | 140.5440  | -247.1061 |
| 14    | 92.8925    | -136.7620 | 231.7525 | 137.6596  | 157.6012  | -288.9794 |
| 15    | -60.4369   | -154.5369 | 275.6986 | 326.9816  | 174.1521  | -329.4610 |
| 16    | -262.0898  | -171.7541 | 318.4705 | 578.4745  | 192.0229  | -374.9394 |
| 17    | -527.5694  | -190.2512 | 365.1874 | 870.2182  | 211.7625  | -424.2152 |
| 18    | -833.0934  | -210.5540 | 417.5380 | 1216.8578 | 232.1029  | -476.6506 |
| 19    | -1194.5547 | -231.4133 | 471.2325 | 1619.0988 | 252.8843  | -530.5239 |
| 20    | -1611.6064 | -252.6609 | 526.6989 | 2079.9072 | 239.0131  | -509.1469 |
| 21    | 62.8193    | -36.7528  | -0.8001  | -251.0095 | 31.2316   | 20.3483   |
| 22    | 263.2475   | -12.0437  | -71.6013 | -213.3608 | 32.2962   | 14.3878   |
| 23    | 248.4234   | -13.9174  | -63.0541 | -194.3215 | 34.1684   | 5.8447    |
| 24    | 251.4403   | -16.6954  | -51.9906 | -191.0910 | 36.9464   | -5.2182   |
| 25    | 268.8452   | -20.4566  | -38.2756 | -200.0347 | 40.7076   | -18.9328  |
| 26    | 296.3070   | -25.2683  | -21.7201 | -225.0023 | 45.8016   | -60.3859  |
| 27    | 337.1040   | -31.4695  | 22.4808  | -286.8014 | 53.8462   | -85.0441  |
| 28    | 411.6128   | -40.6731  | 49.6632  | -341.8670 | 63.3481   | -112.9191 |
| 29    | 475.8809   | -51.3452  | 80.3230  | -406.6438 | 75.7851   | -147.9480 |
| 30    | 546.0674   | -64.9795  | 118.1870 | -423.2860 | 88.3759   | -183.1935 |
| 31    | 564.3432   | -78.7794  | 155.8007 | -408.2518 | 102.4393  | -221.4863 |
| 32    | 546.7844   | -94.0708  | 197.2062 | -375.0210 | 118.3966  | -264.2601 |
| 33    | 507.5523   | -111.1919 | 242.4199 | -269.9037 | 136.9378  | -314.0372 |
| 34    | 392.6514   | -130.8850 | 294.8591 | -109.1706 | 155.3324  | -362.8794 |
| 35    | 218.6179   | -150.4025 | 346.3854 | 114.1068  | 175.0197  | -414.7368 |
| 36    | -20.7310   | -171.1610 | 400.8510 | 392.4540  | 196.7314  | -470.9222 |
| 37    | -317.2077  | -193.8708 | 459.9580 | 760.0021  | 220.3089  | -533.0776 |
| 38    | -705.4705  | -218.3743 | 523.9686 | 1205.1150 | 243.3772  | -593.0928 |
| 39    | -1171.4327 | -242.2711 | 587.5116 | 1729.8964 | 267.3173  | -656.7728 |
| 40    | -1718.7106 | -266.9673 | 652.2716 | 2337.0747 | 258.3914  | -638.4862 |
| 41    | 221.3393   | -42.4160  | 14.0263  | -493.7117 | 38.5786   | 19.6432   |
| 42    | 506.7901   | -19.4165  | -70.8088 | -440.3227 | 39.6669   | 13.5812   |
| 43    | 476.5893   | -21.3269  | -62.2523 | -405.7967 | 41.5824   | 5.0123    |
| 44    | 464.3540   | -24.1600  | -51.0376 | -387.2217 | 44.4088   | -6.1719   |
| 45    | 466.5130   | -27.9780  | -37.2998 | -380.7897 | 48.2263   | -19.9171  |
| 46    | 478.6031   | -32.8502  | -20.6255 | -381.9252 | 53.0966   | -36.5939  |
| 47    | 495.5443   | -38.8222  | -1.3524  | -396.0307 | 59.4141   | -86.6933  |
| 48    | 522.1835   | -46.2938  | 51.4353  | -440.8713 | 69.0254   | -114.6640 |
| 49    | 576.0934   | -57.0929  | 82.1266  | -495.1344 | 81.6059   | -149.6703 |
| 50    | 635.6621   | -70.8770  | 119.6786 | -500.1708 | 94.3159   | -184.6672 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 641.9922   | -84.7871  | 157.6344 | -472.7301 | 108.4893  | -223.3309 |
| 52    | 612.1019   | -100.1683 | 198.7562 | -426.9788 | 124.5444  | -265.7332 |
| 53    | 559.8622   | -117.3996 | 244.0407 | -308.3877 | 143.1616  | -315.7562 |
| 54    | 431.3836   | -137.1746 | 296.6622 | -133.7482 | 161.6416  | -364.7020 |
| 55    | 243.4571   | -156.7614 | 348.2528 | 103.4550  | 181.3885  | -416.5234 |
| 56    | -9.8231    | -177.5679 | 402.7487 | 395.9945  | 203.1413  | -472.8056 |
| 57    | -321.0959  | -200.2967 | 461.3849 | 778.4438  | 226.7361  | -534.5604 |
| 58    | -723.5782  | -224.8232 | 526.1972 | 1237.6726 | 249.8208  | -595.2734 |
| 59    | -1204.3267 | -248.7298 | 588.9719 | 1777.2531 | 273.7663  | -658.2116 |
| 60    | -1766.0996 | -273.4175 | 653.6801 | 2398.7681 | 264.7804  | -639.6297 |
| 61    | 289.7141   | -44.2978  | 14.2737  | -568.9177 | 40.7443   | 19.7020   |
| 62    | 582.0875   | -21.5855  | -70.7022 | -510.7455 | 41.8341   | 13.4658   |
| 63    | 547.1315   | -23.4967  | -62.1059 | -471.4631 | 43.7511   | 4.8674    |
| 64    | 530.1612   | -26.3335  | -50.8622 | -448.1414 | 46.5818   | -6.3453   |
| 65    | 527.5856   | -30.1554  | -37.1129 | -436.9675 | 50.4043   | -20.0956  |
| 66    | 534.9651   | -35.0303  | -20.5569 | -433.3471 | 55.2840   | -36.6855  |
| 67    | 547.0947   | -41.0265  | -1.1152  | -436.9086 | 61.3223   | -86.9298  |
| 68    | 563.2376   | -48.2142  | 51.5462  | -477.6322 | 70.9566   | -114.7727 |
| 69    | 612.9048   | -59.0269  | 82.2077  | -527.7115 | 83.5407   | -149.7384 |
| 70    | 668.2452   | -72.8218  | 119.9020 | -528.4166 | 96.2629   | -184.9190 |
| 71    | 670.2645   | -86.7373  | 157.9368 | -496.6532 | 110.4322  | -223.6413 |
| 72    | 636.0390   | -102.1234 | 199.0928 | -446.5344 | 126.4955  | -266.0387 |
| 73    | 579.5169   | -119.3472 | 244.2686 | -323.5398 | 145.1204  | -315.9863 |
| 74    | 446.4383   | -139.1258 | 296.9535 | -144.4163 | 163.5910  | -364.9983 |
| 75    | 254.1603   | -158.7118 | 348.5625 | 97.0289   | 183.3332  | -416.8036 |
| 76    | -3.4890    | -179.5068 | 402.9459 | 394.2993  | 205.0947  | -473.0655 |
| 77    | -319.4255  | -202.2655 | 461.7283 | 780.8469  | 228.6908  | -534.8580 |
| 78    | -725.8900  | -226.7706 | 526.6583 | 1244.5278 | 251.7701  | -595.7414 |
| 79    | -1211.3231 | -250.6805 | 589.1043 | 1788.6199 | 275.7116  | -658.3379 |
| 80    | -1777.4781 | -275.3619 | 653.8036 | 2414.4668 | 266.7006  | -639.7121 |
| 81    | 301.8168   | -44.2344  | 14.3542  | -581.7474 | 40.6842   | 19.6215   |
| 82    | 594.9160   | -21.5203  | -70.7736 | -523.6914 | 41.7750   | 13.5315   |
| 83    | 560.0734   | -23.4460  | -62.1928 | -484.5502 | 43.6939   | 4.9637    |
| 84    | 543.2504   | -26.2784  | -50.7949 | -461.3597 | 46.5246   | -6.4127   |
| 85    | 540.8166   | -30.0938  | -37.1858 | -450.3059 | 50.3480   | -20.0457  |
| 86    | 548.2642   | -34.9864  | -20.3089 | -446.7900 | 55.2316   | -36.9011  |
| 87    | 560.5662   | -40.9647  | -1.3230  | -450.2668 | 61.2484   | -86.7124  |
| 88    | 576.5612   | -48.1395  | 51.6016  | -491.1220 | 70.8834   | -114.8637 |
| 89    | 626.4098   | -58.9628  | 82.5048  | -541.3363 | 83.4850   | -150.0732 |
| 90    | 681.9115   | -72.7605  | 120.1265 | -542.2533 | 96.2057   | -185.0755 |
| 91    | 684.1671   | -86.7025  | 157.7914 | -510.6029 | 110.4004  | -223.5159 |
| 92    | 649.8355   | -102.0736 | 199.3354 | -460.3809 | 126.4445  | -266.3474 |
| 93    | 593.4291   | -119.2846 | 244.3954 | -337.7131 | 145.0484  | -316.0180 |
| 94    | 460.5728   | -139.0608 | 296.9676 | -158.7834 | 163.5184  | -365.0249 |
| 95    | 268.4618   | -158.6312 | 348.5813 | 82.8116   | 183.2627  | -416.8964 |
| 96    | 10.7002    | -179.4417 | 403.0840 | 379.6489  | 205.0153  | -473.1483 |
| 97    | -304.6712  | -202.1744 | 461.9064 | 766.0797  | 228.6044  | -535.0425 |
| 98    | -711.3712  | -226.6847 | 526.3524 | 1229.9536 | 251.6902  | -595.4881 |
| 99    | -1196.4531 | -250.6035 | 589.6661 | 1773.3766 | 275.6312  | -658.8701 |
| 100   | -1762.4053 | -275.2831 | 653.7945 | 2399.2498 | 266.6269  | -639.6729 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | 289.4639   | -42.5510  | 14.4733  | -573.1820 | 39.0087   | 19.4950   |
| 102   | 586.3357   | -19.8509  | -70.8210 | -518.8928 | 40.0998   | 13.5958   |
| 103   | 555.2758   | -21.7698  | -62.1006 | -483.5206 | 42.0179   | 4.8678    |
| 104   | 542.2275   | -24.5975  | -50.8480 | -464.0838 | 44.8509   | -6.3809   |
| 105   | 543.5419   | -28.4198  | -37.1022 | -456.7960 | 48.6734   | -20.1294  |
| 106   | 554.7813   | -33.3049  | -20.3686 | -457.0493 | 53.5569   | -36.8674  |
| 107   | 570.7706   | -39.3032  | -1.0629  | -464.2509 | 59.5815   | -86.9656  |
| 108   | 590.5473   | -46.4772  | 51.7466  | -508.8556 | 69.2217   | -114.9792 |
| 109   | 644.1751   | -57.2961  | 82.2804  | -562.7973 | 81.8180   | -149.8320 |
| 110   | 703.2745   | -71.0871  | 120.1519 | -567.3531 | 94.5274   | -185.1529 |
| 111   | 709.2448   | -85.0210  | 157.8817 | -539.4637 | 108.7236  | -223.5741 |
| 112   | 678.6996   | -100.4190 | 199.2779 | -492.9823 | 124.8012  | -266.2620 |
| 113   | 625.9144   | -117.6693 | 244.4019 | -373.7947 | 143.4447  | -316.0680 |
| 114   | 496.6104   | -137.4794 | 297.0567 | -198.3458 | 161.9426  | -365.1154 |
| 115   | 307.9493   | -157.0624 | 348.6953 | 39.8253   | 181.6960  | -417.0129 |
| 116   | 53.5648    | -177.8805 | 403.2125 | 333.3317  | 203.4532  | -473.2635 |
| 117   | -258.3611  | -200.6159 | 462.1755 | 716.1378  | 227.0427  | -535.2817 |
| 118   | -661.5236  | -225.1355 | 526.6045 | 1176.5449 | 250.1354  | -595.7041 |
| 119   | -1143.4060 | -249.0461 | 589.1151 | 1716.9933 | 274.0784  | -658.4008 |
| 120   | -1705.5496 | -273.7278 | 654.8770 | 2338.9143 | 265.0196  | -640.7731 |
| 121   | 219.6509   | -35.3712  | 18.9953  | -520.3815 | 31.8713   | 14.9944   |
| 122   | 533.6133   | -12.7227  | -66.3109 | -482.2080 | 32.9727   | 9.0833    |
| 123   | 518.6839   | -14.6611  | -57.6051 | -462.9217 | 34.9098   | 0.3811    |
| 124   | 521.6824   | -17.5187  | -46.5145 | -459.4897 | 37.7675   | -10.6983  |
| 125   | 538.9645   | -21.3725  | -32.6300 | -468.0744 | 41.6267   | -24.6155  |
| 126   | 565.9961   | -26.2913  | -15.8621 | -484.0431 | 46.5431   | -41.3695  |
| 127   | 597.5530   | -32.3348  | 3.2813   | -506.7187 | 52.6017   | -91.3041  |
| 128   | 632.6670   | -39.5466  | 56.2764  | -566.3895 | 62.3109   | -119.5287 |
| 129   | 701.2187   | -50.4438  | 86.8563  | -634.9445 | 74.9993   | -154.3996 |
| 130   | 774.7666   | -64.3449  | 124.5791 | -653.7624 | 87.8051   | -189.5912 |
| 131   | 794.7340   | -78.3631  | 162.7070 | -639.5302 | 102.0956  | -228.4410 |
| 132   | 777.7735   | -93.8488  | 203.8775 | -606.3375 | 118.2514  | -270.8097 |
| 133   | 737.9901   | -111.1991 | 249.1064 | -499.9956 | 136.9910  | -320.7913 |
| 134   | 621.5556   | -131.0649 | 301.7577 | -337.1761 | 155.5534  | -369.8069 |
| 135   | 445.3422   | -150.7530 | 353.4203 | -111.3865 | 175.4079  | -421.7359 |
| 136   | 203.2574   | -171.6554 | 407.9984 | 170.2463  | 197.2523  | -478.0859 |
| 137   | -96.6036   | -194.4791 | 467.0155 | 540.9130  | 220.9225  | -540.1376 |
| 138   | -487.4429  | -219.0409 | 531.5501 | 988.9491  | 244.0458  | -600.6632 |
| 139   | -956.4724  | -242.9819 | 594.5218 | 1516.3149 | 268.0107  | -663.7790 |
| 140   | -1505.3522 | -267.6714 | 659.8183 | 2124.9768 | 258.8393  | -646.4736 |
| 141   | 22.3742    | -18.6978  | 50.3909  | -377.4236 | 11.0352   | -4.2339   |
| 142   | 386.5344   | 4.4753    | -36.3801 | -380.0093 | 11.7266   | -9.3914   |
| 143   | 404.6203   | 3.2622    | -29.5346 | -395.9169 | 12.9341   | -16.2336  |
| 144   | 435.7874   | 1.4923    | -20.2127 | -423.8821 | 14.7160   | -25.6020  |
| 145   | 478.3917   | -0.9191   | -9.0642  | -462.1643 | 17.1143   | -36.6983  |
| 146   | 530.3858   | -3.9785   | 4.2948   | -508.6424 | 20.1782   | -50.0764  |
| 147   | 589.3187   | -7.7373   | 19.5749  | -560.8088 | 23.9366   | -65.3525  |
| 148   | 652.2686   | -12.2655  | 37.1407  | -615.6277 | 28.4598   | -82.9056  |
| 149   | 716.0576   | -17.5911  | 56.8551  | -698.5281 | 35.2364   | -143.7275 |
| 150   | 805.8107   | -25.1607  | 119.4979 | -770.1840 | 42.7065   | -169.0442 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 151   | 881.8483  | -33.5406  | 147.2112 | -854.4677 | 52.6850   | -201.2055 |
| 152   | 967.8611  | -44.3887  | 181.4722 | -920.4102 | 63.8494   | -236.2707 |
| 153   | 1032.8171 | -56.4407  | 218.3417 | -961.9020 | 76.2310   | -273.9455 |
| 154   | 1070.2786 | -69.8243  | 258.0576 | -972.2283 | 89.9345   | -314.5609 |
| 155   | 1073.1774 | -84.4597  | 301.4382 | -925.1852 | 102.7354  | -352.9704 |
| 156   | 1015.7130 | -98.2330  | 341.6569 | -855.7983 | 118.8147  | -399.3882 |
| 157   | 932.6215  | -115.2920 | 389.5084 | -735.8424 | 136.1697  | -448.0246 |
| 158   | 795.0007  | -133.6359 | 440.7613 | -557.6877 | 154.8102  | -499.8227 |
| 159   | 595.8263  | -153.2860 | 494.5504 | -314.8093 | 174.7334  | -553.9003 |
| 160   | 328.3031  | -174.2152 | 550.6233 | -0.0505   | 193.1422  | -603.2950 |



ENVOLVENTE MINIMOS TORSORES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 1     | 0.0448     | 150.6556  | -584.3967 | -267.3668 | -147.9774 | 577.7677 |
| 2     | 240.9410   | 133.2952  | -537.4330 | -466.7336 | -127.9787 | 523.9326 |
| 3     | 417.6499   | 114.3020  | -485.5094 | -604.2024 | -109.0583 | 471.7610 |
| 4     | 534.9474   | 96.2049   | -435.4403 | -684.0772 | -91.0666  | 421.7061 |
| 5     | 599.9215   | 79.3887   | -387.5834 | -728.0390 | -75.3684  | 376.6389 |
| 6     | 628.2577   | 64.2672   | -344.4002 | -712.0840 | -60.8067  | 335.6839 |
| 7     | 606.7133   | 51.0586   | -305.7245 | -660.8842 | -46.2156  | 293.2573 |
| 8     | 534.5186   | 36.1651   | -265.1504 | -559.4790 | -31.5000  | 253.2979 |
| 9     | 445.8529   | 23.6213   | -227.6574 | -446.6153 | -19.1305  | 216.3225 |
| 10    | 332.4714   | 12.0799   | -192.5011 | -311.7623 | -8.2733   | 183.0931 |
| 11    | 201.2001   | 2.1404    | -161.5585 | -182.0055 | 0.4292    | 154.9512 |
| 12    | 62.1401    | -6.4779   | -135.5064 | -4.9216   | 10.4845   | 125.5472 |
| 13    | -93.0234   | -15.0199  | -108.1715 | 164.0181  | 18.8201   | 98.7698  |
| 14    | -253.3373  | -22.6246  | -83.5958  | 343.4055  | 13.6229   | 79.3700  |
| 15    | -420.8659  | -16.6872  | -66.3126  | 450.9049  | 16.6872   | 66.3120  |
| 16    | -515.5241  | -19.0806  | -55.0076  | 549.8730  | 19.0806   | 55.0059  |
| 17    | -601.3151  | -20.8603  | -46.6082  | 638.8587  | 20.8603   | 46.6089  |
| 18    | -675.8984  | -22.0742  | -39.4119  | 715.6381  | 22.0742   | 39.4122  |
| 19    | -738.0538  | -22.7719  | -34.6365  | 779.0374  | 22.7719   | 34.6356  |
| 20    | -786.6851  | -22.9924  | -31.7969  | 1196.0189 | 5.4725    | 92.7500  |
| 21    | -1176.4506 | 180.2145  | -605.7444 | 687.7219  | -221.1672 | 696.6143 |
| 22    | -702.6840  | 202.3583  | -645.4304 | 266.4142  | -197.9077 | 634.3643 |
| 23    | -302.0695  | 179.6878  | -585.6489 | -81.5036  | -175.1059 | 574.2747 |
| 24    | 24.3815    | 157.6319  | -528.1267 | -355.7520 | -151.4485 | 512.2334 |
| 25    | 277.9965   | 134.9573  | -468.7414 | -547.9220 | -129.3092 | 455.0048 |
| 26    | 451.8572   | 113.8639  | -413.9567 | -681.2438 | -109.0647 | 401.6773 |
| 27    | 568.7746   | 94.5839   | -363.3235 | -750.5902 | -89.7914  | 350.9284 |
| 28    | 625.7923   | 76.6117   | -315.5493 | -762.9664 | -70.3440  | 299.2092 |
| 29    | 627.3701   | 58.1336   | -266.3439 | -705.2158 | -52.6216  | 253.2101 |
| 30    | 550.1697   | 40.2856   | -223.0025 | -601.2652 | -35.7259  | 212.0304 |
| 31    | 474.9505   | 27.3234   | -184.8536 | -493.7886 | -22.8872  | 174.2727 |
| 32    | 336.9986   | 13.2625   | -149.5187 | -302.1678 | -7.3920   | 135.9287 |
| 33    | 169.6457   | 0.1923    | -114.0875 | 9.2870    | 1.1772    | 104.0460 |
| 34    | -132.5399  | -7.2498   | -84.8657  | 148.8617  | 7.2498    | 84.8659  |
| 35    | -273.0968  | -12.8584  | -68.5211  | 302.0333  | 12.8584   | 68.5223  |
| 36    | -395.8579  | -16.7373  | -54.9869  | 433.5122  | 16.7373   | 54.9874  |
| 37    | -508.5819  | -19.5882  | -43.7631  | 552.6692  | 19.5882   | 43.7639  |
| 38    | -607.6132  | -21.5257  | -35.8672  | 656.0357  | 21.5257   | 35.8665  |
| 39    | -689.6101  | -22.6275  | -29.7874  | 740.5266  | 22.6275   | 29.7853  |
| 40    | -752.0059  | -22.9780  | -26.7294  | 1169.1908 | 5.4062    | 79.0489  |
| 41    | -1152.3296 | 179.8169  | -597.4254 | 664.5423  | -220.6472 | 695.8785 |
| 42    | -678.6879  | 201.6501  | -644.7109 | 243.9265  | -197.1971 | 633.6300 |
| 43    | -280.8181  | 179.0082  | -584.8685 | -101.3287 | -174.4269 | 573.4814 |
| 44    | 42.8948    | 157.0039  | -527.3237 | -372.7431 | -150.8224 | 511.4337 |
| 45    | 293.4495   | 134.3840  | -467.9626 | -561.7891 | -128.7453 | 454.2261 |
| 46    | 464.1886   | 113.3779  | -413.1987 | -692.2260 | -108.5910 | 400.9463 |
| 47    | 578.1561   | 94.1782   | -362.7123 | -758.8560 | -89.4035  | 350.3115 |
| 48    | 632.7612   | 76.2955   | -314.8098 | -768.9682 | -70.0481  | 298.4448 |
| 49    | 632.2410   | 57.9095   | -265.6075 | -709.1617 | -52.4026  | 252.5547 |
| 50    | 568.6288   | 41.6581   | -222.5605 | -622.5841 | -37.1126  | 211.5360 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 461.4784   | 26.0574   | -184.0701 | -477.2834 | -21.6341  | 173.4997 |
| 52    | 337.9199   | 13.3029   | -148.9251 | -302.9303 | -7.4569   | 135.3579 |
| 53    | 162.6819   | -0.1118   | -113.4575 | 16.7366   | 1.5296    | 104.0279 |
| 54    | -145.0114  | -7.7923   | -84.9121  | 162.5467  | 7.7923    | 84.9127  |
| 55    | -272.6849  | -12.6899  | -68.5281  | 301.2292  | 12.6899   | 68.5278  |
| 56    | -394.8616  | -16.5109  | -54.7537  | 432.0060  | 16.5109   | 54.7545  |
| 57    | -507.3969  | -19.3606  | -43.9818  | 550.9756  | 19.3606   | 43.9832  |
| 58    | -605.8187  | -21.2758  | -35.5253  | 653.6765  | 21.2758   | 35.5255  |
| 59    | -687.1616  | -22.3649  | -29.8534  | 737.4786  | 22.3649   | 29.8529  |
| 60    | -748.9605  | -22.7112  | -26.8005  | 1164.1508 | 5.0845    | 78.7558  |
| 61    | -1143.3455 | 179.2595  | -596.9352 | 656.8100  | -220.0001 | 695.6606 |
| 62    | -673.9870  | 201.4208  | -644.6118 | 239.7382  | -196.9677 | 633.5621 |
| 63    | -275.9462  | 178.6292  | -584.8076 | -105.3225 | -174.0431 | 573.4197 |
| 64    | 46.7426    | 156.6155  | -527.2752 | -375.6827 | -150.4308 | 511.3872 |
| 65    | 296.2362   | 133.9863  | -467.9297 | -563.6122 | -128.3494 | 454.2113 |
| 66    | 465.7303   | 112.9617  | -413.2753 | -692.8386 | -108.1640 | 401.0062 |
| 67    | 578.6636   | 93.7429   | -362.6348 | -758.3538 | -88.9564  | 350.2353 |
| 68    | 632.0194   | 75.8388   | -314.8475 | -767.2128 | -69.5938  | 298.5243 |
| 69    | 630.3620   | 57.4783   | -265.7117 | -706.2728 | -51.9900  | 252.6138 |
| 70    | 556.8967   | 40.4124   | -222.4906 | -608.0498 | -35.8738  | 211.4261 |
| 71    | 448.3910   | 26.7954   | -183.9907 | -465.8458 | -22.3797  | 173.4288 |
| 72    | 326.4634   | 14.0516   | -148.8800 | -293.1636 | -8.2037   | 135.3522 |
| 73    | 154.6310   | 0.9197    | -113.4603 | 24.8630   | 0.0842    | 104.0640 |
| 74    | -152.1357  | -6.1118   | -84.9794  | 165.9609  | 6.0907    | 84.9804  |
| 75    | -275.6957  | -10.9712  | -68.5247  | 300.3988  | 10.9507   | 68.5248  |
| 76    | -394.1854  | -14.6668  | -54.8888  | 427.1947  | 14.6668   | 54.8912  |
| 77    | -502.4229  | -17.6065  | -44.0734  | 542.0290  | 17.6065   | 44.0734  |
| 78    | -596.5491  | -19.4183  | -35.4923  | 640.3521  | 19.4388   | 35.4924  |
| 79    | -674.3949  | -20.6340  | -30.0064  | 721.3196  | 20.6998   | 30.0055  |
| 80    | -735.6808  | -21.4407  | -26.9448  | 1151.4968 | 4.1672    | 78.9355  |
| 81    | -1125.2327 | 178.5270  | -597.0940 | 640.3290  | -219.2779 | 695.8031 |
| 82    | -655.2859  | 200.3698  | -644.6119 | 223.2965  | -195.9171 | 633.5249 |
| 83    | -260.1560  | 177.7089  | -584.7601 | -118.9393 | -173.1271 | 573.3719 |
| 84    | 60.4563    | 155.7074  | -527.1865 | -387.3522 | -149.5257 | 511.3148 |
| 85    | 307.8523   | 133.0916  | -467.9182 | -573.3257 | -127.4552 | 454.1735 |
| 86    | 472.1818   | 112.2232  | -413.0447 | -697.5350 | -107.4334 | 400.8349 |
| 87    | 586.5619   | 93.0561   | -362.8751 | -764.6923 | -88.2718  | 350.4705 |
| 88    | 629.5077   | 75.4721   | -314.7607 | -763.9043 | -69.2271  | 298.3219 |
| 89    | 619.9566   | 56.2162   | -265.3829 | -693.0540 | -50.7200  | 252.3121 |
| 90    | 552.4806   | 39.9897   | -222.3603 | -602.6516 | -35.4458  | 211.4209 |
| 91    | 460.7234   | 25.9259   | -184.1314 | -476.2177 | -21.5114  | 173.5204 |
| 92    | 319.2899   | 14.8909   | -148.7987 | -287.8918 | -9.0500   | 135.2497 |
| 93    | 155.0480   | 1.8860    | -113.4156 | 23.0660   | -1.0186   | 104.0418 |
| 94    | -147.0417  | -4.8009   | -84.9288  | 157.8428  | 4.8009    | 84.9305  |
| 95    | -267.5837  | -9.6861   | -68.5492  | 289.4133  | 9.6676    | 68.5503  |
| 96    | -382.9809  | -13.4938  | -54.8853  | 413.3549  | 13.5125   | 54.8853  |
| 97    | -488.4304  | -16.3448  | -43.9495  | 525.2101  | 16.3448   | 43.9473  |
| 98    | -580.0391  | -18.2674  | -35.7186  | 621.1585  | 18.2674   | 35.7183  |
| 99    | -654.6399  | -19.3517  | -29.7850  | 698.3234  | 19.3720   | 29.7820  |
| 100   | -713.8928  | -20.2671  | -26.9524  | 1128.5785 | 3.1621    | 78.9829  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | -1109.3300 | 177.3322  | -597.0026 | 627.1555  | -218.0720 | 695.6954 |
| 102   | -640.3149  | 198.9167  | -644.3708 | 211.7003  | -194.4622 | 633.2575 |
| 103   | -247.9528  | 176.1452  | -584.5197 | -127.6394 | -171.5637 | 573.1550 |
| 104   | 69.0287    | 154.1370  | -526.9743 | -392.5082 | -147.9553 | 511.0877 |
| 105   | 313.0523   | 131.5204  | -467.6021 | -574.9961 | -125.8845 | 453.8715 |
| 106   | 476.6350   | 110.5446  | -412.8318 | -698.3127 | -105.7556 | 400.5876 |
| 107   | 581.3265   | 91.6510   | -362.3846 | -756.2351 | -86.8568  | 349.9793 |
| 108   | 621.9128   | 74.1562   | -314.4493 | -753.3449 | -67.9103  | 298.1215 |
| 109   | 618.0178   | 55.9822   | -265.4261 | -690.6165 | -50.4971  | 252.3263 |
| 110   | 548.5541   | 39.9010   | -222.1074 | -598.5744 | -35.3697  | 211.0919 |
| 111   | 456.6751   | 25.8365   | -183.8066 | -472.0011 | -21.4137  | 173.2339 |
| 112   | 316.7696   | 14.6326   | -148.5650 | -284.8616 | -8.7917   | 135.0066 |
| 113   | 151.9113   | 1.6594    | -113.1467 | 26.6451   | -0.7801   | 103.7579 |
| 114   | -150.6514  | -5.0122   | -84.6526  | 162.0087  | 4.9918    | 84.6535  |
| 115   | -272.2216  | -9.7165   | -68.2859  | 294.0826  | 9.7165    | 68.2865  |
| 116   | -387.5455  | -13.5290  | -54.6251  | 417.9819  | 13.5290   | 54.6283  |
| 117   | -492.9549  | -16.3659  | -43.5363  | 529.7761  | 16.3660   | 43.5367  |
| 118   | -584.5125  | -18.2760  | -35.2998  | 625.6417  | 18.2759   | 35.3000  |
| 119   | -660.8419  | -19.7071  | -29.8079  | 705.5105  | 19.7498   | 29.8061  |
| 120   | -716.9524  | -20.0974  | -26.2928  | 1129.2993 | 3.0396    | 78.2151  |
| 121   | -1112.1776 | 177.8329  | -591.2346 | 628.9852  | -218.4362 | 690.0006 |
| 122   | -642.2147  | 199.2843  | -638.6832 | 212.6649  | -194.8128 | 627.5701 |
| 123   | -249.1520  | 176.5119  | -578.8428 | -127.2927 | -171.9143 | 567.4629 |
| 124   | 68.5316    | 154.5208  | -521.3304 | -392.8011 | -148.3289 | 505.4175 |
| 125   | 313.1936   | 131.9424  | -461.8384 | -576.1071 | -126.3000 | 448.0905 |
| 126   | 477.3304   | 111.0301  | -407.0704 | -700.1144 | -106.2494 | 394.8482 |
| 127   | 586.5744   | 92.0514   | -356.8178 | -762.3992 | -87.2780  | 344.3897 |
| 128   | 625.4393   | 74.7989   | -308.6988 | -758.4477 | -68.5635  | 292.3253 |
| 129   | 623.6222   | 56.7004   | -259.6559 | -698.2346 | -51.2478  | 246.5818 |
| 130   | 556.2877   | 40.7317   | -216.4926 | -608.6156 | -36.2277  | 205.4087 |
| 131   | 450.9997   | 28.1025   | -177.9537 | -472.1593 | -23.7361  | 167.3610 |
| 132   | 333.9143   | 15.4920   | -142.8404 | -305.4994 | -9.7411   | 129.2602 |
| 133   | 172.0579   | 2.8997    | -107.3829 | 3.3991    | -2.0325   | 98.1966  |
| 134   | -125.9642  | -3.7209   | -79.0625  | 134.3405  | 3.7208    | 79.0624  |
| 135   | -242.6455  | -8.5009   | -62.6716  | 261.7721  | 8.5008    | 62.6711  |
| 136   | -353.7939  | -12.2619  | -49.1110  | 381.3606  | 12.2412   | 49.1120  |
| 137   | -454.9940  | -15.0086  | -38.0511  | 488.8313  | 15.0294   | 38.0501  |
| 138   | -542.4995  | -16.9329  | -29.8158  | 580.6044  | 16.9329   | 29.8144  |
| 139   | -613.2016  | -17.9998  | -24.1098  | 654.0594  | 18.0459   | 24.1084  |
| 140   | -668.1607  | -18.7649  | -20.8396  | 1036.2887 | 2.2500    | 62.2402  |
| 141   | -1020.7354 | 182.6360  | -462.8282 | 620.5155  | -223.3777 | 556.2925 |
| 142   | -629.7035  | 207.8753  | -515.7211 | 269.8165  | -202.7637 | 502.3663 |
| 143   | -294.3408  | 187.7680  | -463.5120 | -28.4394  | -182.3802 | 449.7954 |
| 144   | -11.5462   | 167.9550  | -413.0005 | -286.7630 | -161.9540 | 396.0721 |
| 145   | 232.2321   | 148.1522  | -361.4435 | -495.8393 | -145.1515 | 352.9486 |
| 146   | 427.2936   | 132.0385  | -320.2276 | -657.1953 | -126.0445 | 303.2576 |
| 147   | 576.4586   | 113.6505  | -272.7521 | -774.4651 | -107.6584 | 255.7576 |
| 148   | 681.0319   | 96.0815   | -227.1589 | -848.5380 | -90.0826  | 210.1221 |
| 149   | 736.4413   | 79.7370   | -183.5719 | -875.7524 | -73.7465  | 166.5746 |
| 150   | 768.4881   | 63.7035   | -142.3427 | -880.1457 | -60.6993  | 133.7966 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 765.7131 | 51.6371   | -111.4358 | -526.3829 | -40.4400  | 105.6128 |
| 152   | 406.3586 | 32.5403   | -85.4155  | -464.9301 | -32.5405  | 85.4139  |
| 153   | 351.0623 | 25.2642   | -67.4785  | -396.5950 | -25.2595  | 67.4768  |
| 154   | 291.3751 | 18.5533   | -51.6162  | -324.7506 | -18.5546  | 51.6150  |
| 155   | 207.8847 | 14.5149   | -37.6541  | -229.7707 | -14.9864  | 37.6569  |
| 156   | 137.5338 | 10.6491   | -25.9370  | -156.5578 | -10.6696  | 25.9375  |
| 157   | 81.1174  | 6.9671    | -16.4106  | -93.6575  | -6.9670   | 16.4109  |
| 158   | 33.4146  | 4.6144    | -8.8629   | -41.7977  | -4.5937   | 8.8638   |
| 159   | 3.5145   | 3.0757    | -3.4143   | -9.0125   | -3.0963   | 3.4150   |
| 160   | -4.6572  | 2.5865    | -0.0303   | 0.0000    | -2.5865   | 0.0305   |



ENVOLVENTE MAXIMOS FLECTORES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0439    | 146.5481  | -575.5584 | -249.4153  | -129.9021 | 527.6247  |
| 2     | 313.2620  | 165.3768  | -501.8413 | -590.9445  | -144.6254 | 444.1045  |
| 3     | 591.1020  | 144.6284  | -443.8896 | -833.2487  | -123.8492 | 386.0362  |
| 4     | 833.3466  | 123.8262  | -385.8062 | -1039.5754 | -104.4274 | 332.7031  |
| 5     | 1039.5826 | 104.4297  | -332.6960 | -1210.3412 | -85.1093  | 278.8831  |
| 6     | 1210.4380 | 85.1226   | -278.4416 | -1344.7405 | -65.7898  | 224.5369  |
| 7     | 1344.7493 | 65.7959   | -224.5462 | -1443.0355 | -44.9366  | 166.2826  |
| 8     | 1443.1475 | 44.8791   | -165.3666 | -1505.2444 | -24.0101  | 107.0925  |
| 9     | 1505.2002 | 23.9815   | -107.6359 | -1531.1393 | -3.1093   | 49.2912   |
| 10    | 1531.1648 | 3.0646    | -48.1965  | -1520.9335 | 16.3205   | -6.0744   |
| 11    | 1520.9529 | -16.3083  | 5.9647    | -1474.1782 | 34.3617   | -55.9954  |
| 12    | 1474.1565 | -34.3351  | 56.5283   | -1391.5957 | 55.2127   | -115.1687 |
| 13    | 1391.5912 | -55.2260  | 115.1864  | -1273.0168 | 76.1127   | -173.8859 |
| 14    | 1272.9729 | -76.1479  | 174.3393  | -1118.3044 | 97.0399   | -233.1610 |
| 15    | 1118.2317 | -97.0251  | 233.4887  | -927.8254  | 116.3941  | -288.0494 |
| 16    | 927.9029  | -116.3956 | 287.7731  | -701.5295  | 134.4286  | -338.6180 |
| 17    | 701.4056  | -132.4024 | 330.3802  | -443.2510  | 153.2465  | -389.3682 |
| 18    | 495.1546  | -95.7698  | 245.5541  | -309.2365  | 81.8375   | -219.5050 |
| 19    | 351.3944  | -33.7181  | 101.6227  | -276.1459  | 49.9141   | -147.3766 |
| 20    | 310.6394  | -6.6934   | 37.2988   | -284.0097  | 22.8943   | -82.8593  |
| 21    | 309.3673  | -30.8920  | -23.6336  | -239.8715  | 30.8913   | 23.8427   |
| 22    | 263.2475  | -12.0437  | -71.6013  | -213.3608  | 32.2962   | 14.3878   |
| 23    | 269.7665  | 20.0469   | -152.6961 | -304.3935  | -24.5436  | 150.1611  |
| 24    | 352.6553  | 67.4919   | -264.6405 | -479.1029  | -45.6162  | 203.0490  |
| 25    | 544.4001  | 99.6236   | -359.4974 | -743.0007  | -77.3573  | 297.2746  |
| 26    | 816.9328  | 131.8426  | -334.2293 | -1087.9377 | -109.0578 | 270.4944  |
| 27    | 1088.0963 | 109.0694  | -269.9170 | -1306.9915 | -86.1390  | 205.9832  |
| 28    | 1306.9786 | 86.1345   | -205.9902 | -1472.8718 | -61.5819  | 137.5909  |
| 29    | 1472.9053 | 61.5829   | -137.1597 | -1584.2817 | -36.9034  | 68.4280   |
| 30    | 1584.3140 | 36.9082   | -67.5874  | -1641.2295 | -13.6441  | 2.9455    |
| 31    | 1641.2220 | 13.6570   | -3.4153   | -1643.3835 | 11.1388   | -66.1255  |
| 32    | 1643.3286 | -11.1721  | 67.4852   | -1590.5370 | 36.0575   | -136.8153 |
| 33    | 1590.5541 | -36.0206  | 136.8225  | -1481.6013 | 60.9548   | -206.2535 |
| 34    | 1481.6274 | -60.9067  | 206.2721  | -1317.4199 | 85.7700   | -276.1125 |
| 35    | 1317.2828 | -85.7586  | 276.7951  | -1097.8821 | 109.2483  | -342.4609 |
| 36    | 1097.7285 | -109.2372 | 343.0529  | -822.9700  | 134.2365  | -413.0578 |
| 37    | 844.0742  | -98.9194  | 372.2339  | -592.7223  | 123.9227  | -442.3996 |
| 38    | 637.7426  | -82.6049  | 319.3256  | -435.8693  | 70.9639   | -298.5694 |
| 39    | 502.1789  | -16.5209  | 151.2072  | -442.2104  | 36.7739   | -208.4298 |
| 40    | 497.5734  | 15.3167   | 70.2767   | -509.2549  | 8.0096    | -125.6534 |
| 41    | 549.6367  | -34.6254  | -21.3794  | -464.8347  | 37.7003   | 23.2170   |
| 42    | 489.3418  | -18.8872  | -70.8689  | -424.0655  | 39.1373   | 13.6474   |
| 43    | 484.9883  | 13.0575   | -151.9398 | -491.5812  | 7.1981    | 94.7044   |
| 44    | 546.5160  | 47.4977   | -241.8069 | -660.0697  | -51.7453  | 234.3460  |
| 45    | 706.8261  | 93.4855   | -357.9667 | -892.0176  | -71.2101  | 295.7505  |
| 46    | 976.7174  | 125.2255  | -332.6097 | -1232.9979 | -102.4347 | 268.9030  |
| 47    | 1233.0724 | 102.4520  | -268.5522 | -1437.2352 | -79.5173  | 204.6043  |
| 48    | 1437.2706 | 79.5415   | -204.2701 | -1588.3711 | -54.9830  | 135.8514  |
| 49    | 1588.4189 | 54.9526   | -135.3793 | -1684.8900 | -30.2743  | 66.7289   |
| 50    | 1684.8657 | 30.2369   | -66.7307  | -1726.7495 | -6.9636   | 2.0436    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 51    | 1726.7610 | 6.9417    | -1.1437   | -1713.8180 | 17.8558   | -68.4108  |
| 52    | 1713.8231 | -17.8870  | 68.4231   | -1645.8958 | 42.7711   | -137.7063 |
| 53    | 1645.8037 | -42.7800  | 138.5617  | -1521.6040 | 67.7178   | -208.1165 |
| 54    | 1521.5195 | -67.7213  | 208.5577  | -1341.9409 | 92.5865   | -278.4019 |
| 55    | 1341.8848 | -92.5955  | 278.7053  | -1107.1597 | 116.0784  | -344.2726 |
| 56    | 1107.1616 | -116.0977 | 344.2808  | -816.9550  | 141.0863  | -414.2999 |
| 57    | 848.2341  | -92.4202  | 377.7040  | -611.4978  | 117.4126  | -447.9056 |
| 58    | 657.8368  | -75.7297  | 324.2761  | -473.8003  | 63.6352   | -303.5494 |
| 59    | 541.0344  | -8.9756   | 156.4856  | -498.0525  | 29.2266   | -213.7119 |
| 60    | 554.0289  | 22.9480   | 75.6105   | -582.8788  | 0.6830    | -130.6545 |
| 61    | 623.3805  | -36.3050  | -21.1074  | -534.0873  | 39.6862   | 23.2667   |
| 62    | 558.7169  | -20.8770  | -70.7534  | -488.9682  | 41.1258   | 13.5282   |
| 63    | 550.3399  | 11.0582   | -151.7637 | -552.4388  | 9.1963    | 94.5304   |
| 64    | 608.1577  | 45.4840   | -241.6000 | -714.5202  | -49.8344  | 234.1369  |
| 65    | 762.0267  | 91.5374   | -357.7522 | -942.8537  | -69.2590  | 295.5551  |
| 66    | 1028.0756 | 122.8592  | -332.5523 | -1279.0820 | -100.0573 | 268.8222  |
| 67    | 1279.2499 | 100.0565  | -268.1009 | -1478.0292 | -77.1157  | 204.1588  |
| 68    | 1478.0250 | 77.0963   | -204.1585 | -1623.6566 | -52.5358  | 135.7655  |
| 69    | 1623.6881 | 52.5615   | -135.3861 | -1714.7424 | -27.8939  | 66.7237   |
| 70    | 1714.7506 | 27.8784   | -66.2202  | -1751.3292 | -4.6091   | 1.4887    |
| 71    | 1751.3472 | 4.6155    | -0.5360   | -1733.1704 | 20.1734   | -69.0125  |
| 72    | 1733.1821 | -20.2026  | 69.0169   | -1660.0540 | 45.0866   | -138.2540 |
| 73    | 1660.0140 | -45.0879  | 138.7258  | -1530.5548 | 70.0325   | -208.2894 |
| 74    | 1530.4187 | -70.0084  | 209.0836  | -1345.6957 | 94.8679   | -278.9249 |
| 75    | 1345.7201 | -94.8576  | 278.8675  | -1105.9899 | 118.3298  | -344.4133 |
| 76    | 1105.8795 | -118.3299 | 344.8014  | -810.4645  | 143.3328  | -414.8768 |
| 77    | 845.0709  | -90.8031  | 377.8785  | -612.1588  | 115.7845  | -448.0244 |
| 78    | 658.6808  | -74.0773  | 324.2319  | -478.4916  | 61.9621   | -303.5034 |
| 79    | 545.7936  | -7.3006   | 156.5708  | -506.5818  | 27.5508   | -213.8000 |
| 80    | 562.6417  | 24.6301   | 75.6822   | -595.2753  | -1.0003   | -130.7166 |
| 81    | 635.8145  | -36.2380  | -21.0144  | -546.6782  | 39.6179   | 23.1882   |
| 82    | 571.3147  | -20.8043  | -70.8251  | -501.7016  | 41.0587   | 13.5901   |
| 83    | 563.0827  | 11.1167   | -151.8723 | -565.3175  | 9.1312    | 94.6527   |
| 84    | 621.0648  | 45.5336   | -241.5070 | -727.3768  | -49.8904  | 234.0490  |
| 85    | 774.7841  | 91.6030   | -357.8324 | -955.8116  | -69.3177  | 295.5956  |
| 86    | 1039.5714 | 121.8271  | -332.0736 | -1288.1791 | -99.0373  | 268.4033  |
| 87    | 1288.1295 | 99.0598   | -268.7230 | -1484.6599 | -76.1211  | 204.7844  |
| 88    | 1484.8014 | 76.1234   | -203.9676 | -1628.2548 | -51.5586  | 135.4644  |
| 89    | 1628.3243 | 51.5198   | -134.5725 | -1717.0713 | -26.8409  | 65.8977   |
| 90    | 1717.0823 | 26.8167   | -65.8881  | -1751.2588 | -3.5436   | 1.2889    |
| 91    | 1751.2316 | 3.4879    | -1.2793   | -1730.4891 | 21.3030   | -68.3149  |
| 92    | 1730.4484 | -21.2537  | 69.7266   | -1654.9366 | 46.1358   | -139.0222 |
| 93    | 1654.9698 | -46.0909  | 138.5473  | -1523.3330 | 71.0197   | -207.9982 |
| 94    | 1523.2142 | -71.0194  | 208.7913  | -1336.2639 | 95.8759   | -278.6644 |
| 95    | 1336.1877 | -95.8513  | 279.0564  | -1094.0413 | 119.3352  | -344.6754 |
| 96    | 1093.9697 | -119.3357 | 344.9392  | -796.5054  | 144.3263  | -414.9501 |
| 97    | 832.1159  | -90.7077  | 377.6897  | -599.3199  | 115.6925  | -447.8609 |
| 98    | 645.7087  | -73.9928  | 324.4128  | -465.6961  | 61.8910   | -303.6899 |
| 99    | 533.2037  | -7.2334   | 156.3841  | -494.1643  | 27.4773   | -213.5937 |
| 100   | 550.1409  | 24.6999   | 75.6255   | -582.9335  | -1.0664   | -130.6693 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 623.4687  | -34.5576  | -20.8800  | -538.1031  | 37.9419   | 23.0595   |
| 102   | 562.7248  | -19.1344  | -70.8699  | -496.8941  | 39.3834   | 13.6517   |
| 103   | 558.2779  | 12.7976   | -151.7953 | -564.2918  | 7.4503    | 94.5737   |
| 104   | 619.9711  | 47.2091   | -241.6020 | -730.0594  | -51.5571  | 234.1158  |
| 105   | 777.5438  | 93.2479   | -357.7218 | -962.2813  | -70.9639  | 295.4942  |
| 106   | 1040.3624 | 119.6334  | -332.0772 | -1284.1243 | -96.8315  | 268.3632  |
| 107   | 1284.1833 | 96.8195   | -268.0374 | -1475.6256 | -73.8895  | 204.1106  |
| 108   | 1475.6736 | 73.8591   | -203.6950 | -1614.0142 | -49.2864  | 135.2923  |
| 109   | 1613.9912 | 49.2771   | -135.2984 | -1697.6781 | -24.6048  | 66.6156   |
| 110   | 1697.7148 | 24.6416   | -65.7024  | -1727.0051 | -1.3741   | 1.0203    |
| 111   | 1727.0125 | 1.3429    | -1.0002   | -1701.4619 | 23.4526   | -68.5509  |
| 112   | 1701.4469 | -23.5131  | 69.4616   | -1620.8403 | 48.4009   | -138.7376 |
| 113   | 1620.8229 | -48.4102  | 138.7465  | -1483.9371 | 73.3486   | -208.2519 |
| 114   | 1483.8459 | -73.3800  | 209.0304  | -1291.5756 | 98.2353   | -278.9031 |
| 115   | 1291.5082 | -98.2232  | 279.2857  | -1044.0140 | 121.7154  | -344.9050 |
| 116   | 1043.9126 | -121.7143 | 345.1302  | -741.1110  | 146.6990  | -415.1255 |
| 117   | 777.9613  | -92.6804  | 377.6779  | -540.8315  | 117.6587  | -447.8198 |
| 118   | 587.8285  | -75.9210  | 324.3671  | -403.9683  | 63.7872   | -303.6695 |
| 119   | 472.0039  | -9.0889   | 156.6976  | -428.7684  | 29.3398   | -213.9160 |
| 120   | 485.3041  | 22.8469   | 75.4907   | -513.9284  | 0.7975    | -130.5309 |
| 121   | 554.5085  | -27.4005  | -16.3945  | -485.2205  | 30.7940   | 18.5633   |
| 122   | 509.9462  | -11.9991  | -66.3626  | -460.1686  | 32.2492   | 9.1418    |
| 123   | 521.9665  | 19.8489   | -147.2866 | -543.8477  | 0.3998    | 90.0693   |
| 124   | 600.0740  | 54.0490   | -237.2711 | -725.5323  | -58.3489  | 229.7821  |
| 125   | 773.3116  | 99.6887   | -353.0626 | -972.5242  | -77.3813  | 290.8130  |
| 126   | 1031.2521 | 112.7627  | -330.7259 | -1259.4932 | -89.9483  | 267.0244  |
| 127   | 1259.4567 | 89.9717   | -267.0974 | -1435.3735 | -67.0354  | 203.1654  |
| 128   | 1435.5020 | 67.0276   | -202.3351 | -1558.3688 | -42.4454  | 133.8889  |
| 129   | 1558.3655 | 42.4472   | -133.8955 | -1626.5847 | -17.7582  | 65.2472   |
| 130   | 1626.6198 | 17.7379   | -64.8546  | -1640.2452 | 5.5432    | 0.1311    |
| 131   | 1640.2224 | -5.5731   | 0.8039    | -1599.0505 | 30.3763   | -70.3750  |
| 132   | 1599.0551 | -30.3803  | 70.2952   | -1502.9270 | 55.2636   | -139.5183 |
| 133   | 1502.8584 | -55.2749  | 139.9326  | -1350.4646 | 80.2144   | -209.4524 |
| 134   | 1350.3853 | -80.2027  | 209.8367  | -1142.6794 | 105.0693  | -279.6947 |
| 135   | 1142.6182 | -105.0890 | 279.9683  | -879.7727  | 128.5694  | -345.5972 |
| 136   | 879.5979  | -128.5695 | 346.0189  | -561.4906  | 153.5572  | -416.0505 |
| 137   | 610.3453  | -99.0330  | 378.6693  | -359.1882  | 124.0029  | -448.8173 |
| 138   | 415.3971  | -69.9693  | 292.4975  | -250.7764  | 57.6476   | -271.7547 |
| 139   | 299.2291  | -14.6801  | 157.3319  | -243.4251  | 34.9271   | -214.5401 |
| 140   | 304.8856  | 17.4161   | 76.1413   | -321.2879  | 6.2540    | -131.2063 |
| 141   | 363.1374  | -6.6693   | 3.1259    | -344.9815  | 10.0867   | -0.9808   |
| 142   | 361.7656  | 5.2000    | -36.4554  | -356.5444  | 11.0023   | -9.3160   |
| 143   | 399.8500  | 32.2146   | -101.0357 | -443.2475  | -16.0182  | 55.2722   |
| 144   | 487.7802  | 64.1141   | -172.8814 | -588.6524  | -47.9060  | 127.0763  |
| 145   | 640.3566  | 105.3487  | -270.8008 | -849.0258  | -116.5785 | 275.2097  |
| 146   | 852.5907  | 118.6174  | -283.8142 | -1045.5566 | -99.8020  | 230.4896  |
| 147   | 1045.5786 | 99.8450   | -230.4856 | -1205.4248 | -79.2555  | 172.3324  |
| 148   | 1205.4875 | 79.2625   | -171.9512 | -1330.8761 | -60.1349  | 118.1670  |
| 149   | 1330.9133 | 60.1168   | -117.6695 | -1421.4664 | -39.3800  | 59.3028   |
| 150   | 1421.4846 | 39.4127   | -59.3005  | -1476.4968 | -21.6186  | 9.3186    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|------------|-----------|-----------|
| 151   | 1476.5027 | 21.5683   | -8.7894  | -1494.9315 | -0.7180   | -49.7969  |
| 152   | 1494.9086 | 0.7069    | 50.2624  | -1477.1366 | 20.1771   | -108.8555 |
| 153   | 1477.1331 | -20.1455  | 108.8620 | -1422.9886 | 41.0838   | -167.4874 |
| 154   | 1422.9983 | -41.1341  | 167.4598 | -1332.0063 | 62.1265   | -226.2465 |
| 155   | 1331.8514 | -62.1509  | 227.0973 | -1203.8540 | 80.1863   | -277.5148 |
| 156   | 1203.7445 | -80.1991  | 277.9289 | -1037.8811 | 101.2743  | -336.7830 |
| 157   | 1037.9840 | -101.2765 | 336.4239 | -834.7126  | 122.3946  | -395.3159 |
| 158   | 834.5783  | -122.3889 | 395.6051 | -594.2219  | 144.5917  | -458.3835 |
| 159   | 594.0838  | -144.5874 | 458.5637 | -316.2059  | 165.7455  | -517.5600 |
| 160   | 316.0302  | -165.7370 | 517.6688 | -0.0452    | 184.9384  | -571.9292 |

ENVOLVENTE MAXIMOS CORTANTES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 1     | 0.0416     | 183.1135  | -551.0021 | -313.2670  | -165.3830 | 501.8379 |
| 2     | 299.5983   | 165.8859  | -505.2220 | -577.3325  | -146.5614 | 452.4104 |
| 3     | 539.2295   | 148.0839  | -457.6422 | -783.0133  | -128.6788 | 404.4908 |
| 4     | 723.8282   | 131.1835  | -411.7948 | -934.8525  | -111.7223 | 358.3975 |
| 5     | 858.1670   | 115.2509  | -367.9668 | -1038.2351 | -96.2466  | 315.6694 |
| 6     | 947.7395   | 100.7696  | -326.9734 | -1105.6699 | -82.3989  | 275.6776 |
| 7     | 1004.5133  | 87.8922   | -289.4294 | -1128.9042 | -68.3301  | 235.2206 |
| 8     | 1020.6782  | 74.7315   | -250.4263 | -1119.1355 | -55.1557  | 195.9984 |
| 9     | 1006.6198  | 62.5251   | -214.2950 | -1081.0558 | -42.9619  | 159.5730 |
| 10    | 967.7379   | 51.2359   | -178.9139 | -1020.1963 | -32.1821  | 125.2680 |
| 11    | 908.4681   | 41.3852   | -147.4871 | -953.5927  | -23.0330  | 95.6182  |
| 12    | 846.3950   | 33.0977   | -119.5428 | -668.2881  | -15.3839  | 55.8844  |
| 13    | 567.8126   | 26.2546   | -82.1963  | -600.4912  | -10.0555  | 36.4351  |
| 14    | 509.0108   | 21.7075   | -64.6050  | -533.5088  | -5.5029   | 18.8269  |
| 15    | 452.8291   | 17.9434   | -49.1713  | -470.5468  | -1.7459   | 3.4134   |
| 16    | 402.3081   | 14.8780   | -36.1347  | -414.5071  | 1.3267    | -9.6435  |
| 17    | 359.9963   | 12.4832   | -24.5841  | -367.8875  | 3.7128    | -21.1703 |
| 18    | 328.0388   | 10.7102   | -15.6773  | -332.7334  | 5.4929    | -30.0964 |
| 19    | 308.1236   | 9.5040    | -8.5899   | -310.6547  | 6.6920    | -37.1642 |
| 20    | 301.5585   | 8.8115    | -3.4381   | -98.2792   | -1.3671   | -14.3835 |
| 21    | -2048.4424 | 241.4866  | -581.7159 | 1479.1094  | -251.2352 | 591.1778 |
| 22    | -1490.0724 | 251.5789  | -595.1469 | 967.3986   | -229.1986 | 532.1513 |
| 23    | -999.7461  | 230.2563  | -538.6037 | 523.5447   | -207.7033 | 475.3290 |
| 24    | -577.1609  | 209.5767  | -483.7382 | 153.7773   | -186.0781 | 418.3592 |
| 25    | -227.4318  | 188.8580  | -429.4292 | -157.9673  | -165.4223 | 364.0845 |
| 26    | 66.0863    | 169.1785  | -377.8119 | -407.4885  | -146.1227 | 313.6044 |
| 27    | 299.4260   | 150.9416  | -329.9390 | -598.3503  | -127.7719 | 265.5285 |
| 28    | 476.7544   | 133.6853  | -284.6907 | -726.8882  | -109.3785 | 217.6735 |
| 29    | 595.2634   | 116.4462  | -239.3518 | -813.7036  | -92.5504  | 172.8514 |
| 30    | 675.5492   | 100.8029  | -197.1033 | -857.4021  | -77.3575  | 131.8691 |
| 31    | 716.3594   | 86.8129   | -159.3210 | -864.0837  | -63.3381  | 93.8109  |
| 32    | 724.3876   | 73.9917   | -123.2231 | -574.0126  | -50.5179  | 45.8839  |
| 33    | 439.2446   | 62.3916   | -78.5891  | -556.8408  | -42.1387  | 21.3820  |
| 34    | 430.9066   | 55.1964   | -56.7418  | -532.3134  | -34.9453  | -0.4572  |
| 35    | 418.7907   | 49.1544   | -37.2994  | -506.5967  | -28.9045  | -19.8954 |
| 36    | 408.7066   | 44.2288   | -20.5984  | -485.4341  | -23.9814  | -36.5988 |
| 37    | 405.9678   | 40.3679   | -6.9857   | -474.0223  | -20.1144  | -50.2390 |
| 38    | 415.2258   | 37.5074   | 4.4849    | -476.8266  | -17.2613  | -61.6822 |
| 39    | 440.3597   | 35.5704   | 12.7654   | -497.6159  | -15.3174  | -69.9884 |
| 40    | 484.3506   | 34.4675   | 18.9541   | -285.2113  | -18.2772  | -52.8096 |
| 41    | -2273.4207 | 247.9343  | -568.6635 | 1689.2104  | -257.6175 | 585.4201 |
| 42    | -1700.4653 | 257.9647  | -589.4825 | 1163.0356  | -235.5726 | 526.4872 |
| 43    | -1196.2870 | 236.6613  | -532.7716 | 705.2177   | -214.0945 | 469.4757 |
| 44    | -759.8563  | 216.0093  | -478.0986 | 321.6969   | -192.4985 | 412.7275 |
| 45    | -396.6708  | 195.3225  | -423.8097 | -3.3648    | -171.8884 | 358.4759 |
| 46    | -89.9239   | 175.7090  | -372.3215 | -266.2127  | -152.6566 | 308.1400 |
| 47    | 156.6683   | 157.5334  | -324.5903 | -470.5040  | -134.3581 | 260.1654 |
| 48    | 347.6136   | 140.3479  | -279.2740 | -612.6586  | -116.0407 | 212.2346 |
| 49    | 479.8164   | 123.1670  | -233.9745 | -713.3110  | -99.2824  | 167.5563 |
| 50    | 573.9724   | 107.5817  | -192.1086 | -770.9877  | -84.1325  | 126.8234 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 629.1730   | 93.6453   | -153.7978 | -792.2117 | -70.1737  | 88.2818  |
| 52    | 651.6577   | 80.8902   | -118.2517 | -512.8369 | -57.8729  | 40.8582  |
| 53    | 377.5560   | 69.7938   | -73.2279  | -511.8084 | -49.5453  | 16.0431  |
| 54    | 385.5181   | 62.6512   | -51.2765  | -503.7206 | -42.3968  | -5.9312  |
| 55    | 389.9528   | 56.6564   | -32.0490  | -494.6398 | -36.4095  | -25.1479 |
| 56    | 396.6562   | 51.7727   | -15.6197  | -490.3555 | -31.5260  | -41.5796 |
| 57    | 410.9067   | 47.9516   | -1.5617   | -496.0394 | -27.6934  | -55.6685 |
| 58    | 437.3226   | 45.1170   | 9.4825    | -516.0427 | -24.8713  | -66.6814 |
| 59    | 479.6529   | 43.1999   | 18.0604   | -554.0743 | -22.9489  | -75.2870 |
| 60    | 540.8907   | 42.1083   | 24.2880   | -355.2024 | -25.4750  | -57.8029 |
| 61    | -2333.2976 | 249.5819  | -567.7791 | 1745.2898 | -259.1965 | 584.8005 |
| 62    | -1756.4443 | 259.5481  | -589.3194 | 1215.4310 | -237.1568 | 526.3465 |
| 63    | -1248.7603 | 238.2428  | -532.6542 | 754.1331  | -215.6741 | 469.3627 |
| 64    | -808.8862  | 217.5890  | -478.0071 | 367.1664  | -194.0773 | 412.6442 |
| 65    | -442.2741  | 196.8956  | -423.7362 | 38.7228   | -173.4578 | 358.4159 |
| 66    | -132.2361  | 177.2694  | -372.2322 | -227.4942 | -154.2026 | 308.0271 |
| 67    | 117.8642   | 159.0886  | -324.4731 | -435.1952 | -135.9166 | 260.0586 |
| 68    | 312.1176   | 141.9009  | -279.2214 | -580.7064 | -117.5867 | 212.1998 |
| 69    | 447.7236   | 124.7394  | -233.9601 | -684.6711 | -100.8659 | 167.5234 |
| 70    | 545.3771   | 109.1824  | -191.9347 | -745.9887 | -85.7434  | 126.6138 |
| 71    | 604.1318   | 95.2723   | -153.6170 | -770.8180 | -71.8020  | 88.1089  |
| 72    | 630.2455   | 82.5215   | -118.1011 | -494.9409 | -59.5387  | 40.7585  |
| 73    | 359.6491   | 71.4623   | -73.2697  | -497.6720 | -51.2076  | 16.0683  |
| 74    | 371.3849   | 64.3259   | -51.1943  | -493.3556 | -44.0715  | -6.0151  |
| 75    | 379.6052   | 58.3298   | -32.1216  | -488.0270 | -38.0882  | -25.0572 |
| 76    | 390.0986   | 53.4536   | -15.5160  | -487.6219 | -33.1955  | -41.7123 |
| 77    | 408.1557   | 49.6305   | -1.5297   | -497.0272 | -29.3859  | -55.6607 |
| 78    | 438.3574   | 46.7990   | 9.4050    | -520.8790 | -26.5474  | -66.6230 |
| 79    | 484.4884   | 44.8806   | 18.1260   | -562.6869 | -24.6304  | -75.3554 |
| 80    | 549.5188   | 43.7896   | 24.3561   | -367.3973 | -27.1496  | -57.8339 |
| 81    | -2348.5171 | 249.6113  | -568.0624 | 1760.4180 | -259.2401 | 585.0926 |
| 82    | -1771.7156 | 259.5913  | -589.1711 | 1230.4651 | -237.1934 | 526.1600 |
| 83    | -1263.8357 | 238.2850  | -532.3886 | 769.2568  | -215.7231 | 469.1087 |
| 84    | -823.8484  | 217.6396  | -478.0300 | 382.0243  | -194.1292 | 412.6803 |
| 85    | -457.2206  | 196.9594  | -423.6373 | 53.3998   | -173.5184 | 358.2773 |
| 86    | -146.7638  | 177.3343  | -372.2334 | -212.9775 | -154.2800 | 308.0909 |
| 87    | 103.1394   | 159.1695  | -324.5560 | -420.6508 | -135.9942 | 260.1320 |
| 88    | 297.7331   | 141.9823  | -279.1623 | -566.5263 | -117.6685 | 212.0445 |
| 89    | 433.6035   | 124.7986  | -233.7381 | -670.7433 | -100.9125 | 167.3004 |
| 90    | 531.3610   | 109.2311  | -191.8922 | -732.0572 | -85.7875  | 126.6900 |
| 91    | 590.1289   | 95.3144   | -153.9457 | -756.8939 | -71.8412  | 88.3891  |
| 92    | 616.4402   | 82.5772   | -117.9373 | -481.3763 | -59.6013  | 40.5970  |
| 93    | 346.0245   | 71.5407   | -73.4553  | -484.1947 | -51.2902  | 16.2561  |
| 94    | 357.9486   | 64.3925   | -51.3456  | -480.0349 | -44.1442  | -5.8396  |
| 95    | 366.3409   | 58.4028   | -32.0978  | -474.9781 | -38.1500  | -25.1105 |
| 96    | 377.0144   | 53.5198   | -15.5601  | -474.6347 | -33.2741  | -41.6364 |
| 97    | 395.2193   | 49.6980   | -1.6795   | -484.2611 | -29.4458  | -55.5370 |
| 98    | 425.5711   | 46.8632   | 9.5409    | -508.2530 | -26.6066  | -66.7709 |
| 99    | 471.8810   | 44.9444   | 17.9235   | -550.2099 | -24.7005  | -75.1327 |
| 100   | 537.0285   | 43.8539   | 24.3174   | -355.0719 | -27.2106  | -57.7831 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | -2333.2927 | 247.7072  | -568.1452 | 1749.5049 | -257.3299 | 585.1653 |
| 102   | -1760.9763 | 257.6799  | -588.6732 | 1224.1654 | -235.2871 | 525.6583 |
| 103   | -1257.3649 | 236.3804  | -532.2819 | 767.0631  | -213.8173 | 469.0185 |
| 104   | -821.7640  | 215.7318  | -477.7189 | 384.0861  | -192.2150 | 412.3379 |
| 105   | -459.2033  | 195.0427  | -423.4158 | 59.6844   | -171.6014 | 358.0676 |
| 106   | -153.1323  | 175.4324  | -371.9642 | -202.4619 | -152.3685 | 307.7783 |
| 107   | 92.7377    | 157.2441  | -324.2469 | -405.8148 | -134.0746 | 259.8443 |
| 108   | 282.8600   | 140.0595  | -278.9592 | -547.3049 | -115.7428 | 211.9313 |
| 109   | 414.2733   | 122.8908  | -233.7889 | -647.1338 | -99.0028  | 167.3303 |
| 110   | 507.8615   | 107.3441  | -191.6652 | -704.3285 | -83.9117  | 126.3922 |
| 111   | 562.4299   | 93.4179   | -153.6513 | -724.9480 | -69.9322  | 88.1376  |
| 112   | 584.4920   | 80.6636   | -117.8488 | -445.2118 | -57.7088  | 40.4761  |
| 113   | 309.9627   | 69.6418   | -73.1604  | -443.8612 | -49.3916  | 15.9679  |
| 114   | 317.6836   | 62.5067   | -51.0907  | -435.5290 | -42.2598  | -6.0936  |
| 115   | 321.9199   | 56.5260   | -31.8694  | -426.3374 | -36.2725  | -25.3423 |
| 116   | 328.4804   | 51.6567   | -15.3527  | -421.9164 | -31.4095  | -41.8417 |
| 117   | 342.6200   | 47.8403   | -1.6147   | -427.4655 | -27.5932  | -55.5850 |
| 118   | 368.8984   | 45.0132   | 9.5989    | -447.3983 | -24.7610  | -66.8233 |
| 119   | 411.1133   | 43.0984   | 18.2702   | -485.3044 | -22.8475  | -75.4889 |
| 120   | 472.2220   | 42.0098   | 24.1643   | -286.3127 | -25.3460  | -57.6827 |
| 121   | -2272.2549 | 241.3550  | -566.9866 | 1702.6849 | -250.9415 | 584.0517 |
| 122   | -1714.1757 | 251.2948  | -587.5836 | 1191.6288 | -228.8840 | 524.5684 |
| 123   | -1224.8899 | 229.9842  | -531.1755 | 748.9256  | -207.4056 | 467.9061 |
| 124   | -803.8198  | 209.3418  | -476.3257 | 380.6065  | -185.8043 | 410.9366 |
| 125   | -455.5962  | 188.6596  | -422.1766 | 70.4355   | -165.2070 | 356.8142 |
| 126   | -163.8254  | 169.0804  | -370.7403 | -177.4286 | -146.0020 | 306.5624 |
| 127   | 67.7512    | 150.9194  | -323.0382 | -366.4660 | -127.7466 | 258.6257 |
| 128   | 243.9247   | 133.7754  | -277.7081 | -494.1461 | -109.4479 | 210.6432 |
| 129   | 361.5760   | 116.6471  | -232.5211 | -580.3369 | -92.7543  | 166.1021 |
| 130   | 441.6334   | 101.1428  | -190.5815 | -624.0635 | -77.7003  | 125.2734 |
| 131   | 483.0968   | 87.2822   | -152.3389 | -631.8784 | -63.8000  | 86.8047  |
| 132   | 492.3262   | 74.6046   | -116.8430 | -342.9942 | -51.8543  | 39.5460  |
| 133   | 209.0061   | 63.8642   | -72.1164  | -329.9176 | -43.6150  | 14.9214  |
| 134   | 205.0845   | 56.7928   | -50.2114  | -310.1034 | -36.5372  | -7.0024  |
| 135   | 197.9462   | 50.8782   | -31.0275  | -289.6357 | -30.6306  | -26.1712 |
| 136   | 193.3678   | 46.0688   | -14.4736  | -274.2342 | -25.8206  | -42.7257 |
| 137   | 196.4970   | 42.3168   | -0.7571   | -268.9172 | -22.0682  | -56.4457 |
| 138   | 211.8150   | 39.5365   | 10.3770   | -278.0006 | -19.2829  | -67.6024 |
| 139   | 242.9658   | 37.6611   | 18.8432   | -304.9088 | -17.4141  | -76.0516 |
| 140   | 292.6809   | 36.6008   | 24.8108   | -99.0590  | -19.8963  | -61.5355 |
| 141   | -2043.7509 | 222.1370  | -448.9127 | 1611.8972 | -236.5784 | 476.6949 |
| 142   | -1619.4010 | 236.8010  | -480.5060 | 1226.7249 | -218.4105 | 427.8223 |
| 143   | -1249.3223 | 219.1024  | -432.3521 | 885.9621  | -200.4992 | 379.3377 |
| 144   | -922.7018  | 201.7010  | -387.0554 | 588.5850  | -182.8722 | 333.7395 |
| 145   | -639.8740  | 184.6537  | -342.7601 | 329.6750  | -167.0664 | 293.1119 |
| 146   | -394.3344  | 169.4653  | -304.4146 | 119.9616  | -150.3458 | 250.6602 |
| 147   | -197.2586  | 153.4104  | -263.8641 | -47.6330  | -134.0774 | 209.7963 |
| 148   | -40.7519   | 137.8558  | -225.1259 | -174.6653 | -118.3266 | 170.7611 |
| 149   | 76.8286    | 122.8513  | -188.1454 | -263.0932 | -103.1339 | 133.5030 |
| 150   | 157.6315   | 108.4539  | -152.9736 | -326.2132 | -90.4241  | 102.6293 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 215.4697 | 96.5703   | -124.1555 | -346.2283 | -76.5606  | 69.0192  |
| 152   | 232.5754 | 83.5733   | -92.6693  | -349.8919 | -62.4125  | 33.6504  |
| 153   | 236.0732 | 70.3079   | -59.4141  | -58.9110  | -52.0321  | 5.2170   |
| 154   | -52.2220 | 60.8605   | -33.0438  | -42.7449  | -44.6668  | -12.6975 |
| 155   | -62.6344 | 54.4218   | -17.1979  | -20.7293  | -38.2230  | -28.5289 |
| 156   | -75.7029 | 48.9287   | -3.5198   | 2.1986    | -32.7245  | -42.2528 |
| 157   | -86.3825 | 44.4205   | 8.1184    | 21.0116   | -28.2247  | -53.8779 |
| 158   | -89.4953 | 40.8911   | 17.6876   | 30.4675   | -24.6866  | -63.4532 |
| 159   | -79.7367 | 38.3624   | 25.1623   | 25.2776   | -22.1652  | -70.9138 |
| 160   | -51.7280 | 36.8382   | 30.5734   | -0.0069   | -20.6356  | -76.3438 |

ENVOLVENTE MAXIMOS TORSORES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 1     | 0.0006    | -1.8979   | 0.4548   | 0.6035    | 2.0026    | -1.1017   |
| 2     | 13.0604   | -2.5114   | 4.4827   | -21.6625  | 3.0327    | -6.4109   |
| 3     | 60.0094   | -4.5282   | 11.8545  | -73.8085  | 5.4640    | -14.6407  |
| 4     | 133.9919  | -7.8246   | 22.1713  | -149.2226 | 9.1714    | -25.8096  |
| 5     | 225.9152  | -12.6978  | 35.3856  | -219.6329 | 13.5227   | -37.5359  |
| 6     | 314.3215  | -17.5775  | 49.2750  | -318.6012 | 19.5311   | -54.2115  |
| 7     | 419.7667  | -25.0184  | 67.9541  | -414.1474 | 27.3666   | -73.7768  |
| 8     | 536.3858  | -32.7222  | 89.8950  | -519.1131 | 35.4646   | -96.5677  |
| 9     | 631.3563  | -42.8784  | 114.3221 | -595.9499 | 45.9226   | -121.1277 |
| 10    | 711.9482  | -54.0776  | 141.5609 | -633.6017 | 55.6358   | -145.1392 |
| 11    | 745.3496  | -64.8267  | 167.2486 | -663.0484 | 67.9881   | -174.4904 |
| 12    | 780.9539  | -77.4848  | 198.9501 | -672.6514 | 80.7198   | -206.4998 |
| 13    | 773.1229  | -91.6038  | 232.8295 | -636.3204 | 94.8967   | -240.6470 |
| 14    | 729.9436  | -106.4910 | 269.2774 | -563.2939 | 109.8212  | -277.4085 |
| 15    | 644.2134  | -122.2343 | 308.0864 | -435.0197 | 123.9129  | -312.2383 |
| 16    | 503.0011  | -137.0587 | 344.6767 | -274.3598 | 140.4174  | -353.1762 |
| 17    | 329.2793  | -154.2076 | 388.0957 | -67.7352  | 157.5731  | -396.9144 |
| 18    | 107.4562  | -171.9923 | 433.6299 | 187.8968  | 175.3477  | -442.6681 |
| 19    | -163.1734 | -190.3277 | 481.4127 | 492.5505  | 193.6538  | -490.6676 |
| 20    | -483.6044 | -209.1625 | 531.2229 | 854.5485  | 186.0511  | -481.1788 |
| 21    | -869.8526 | -1.1256   | 80.7166  | 792.8663  | -22.9133  | -26.9801  |
| 22    | -780.0266 | 22.3502   | 30.2459  | 708.2216  | -21.6506  | -31.6356  |
| 23    | -673.7220 | 20.2532   | 37.1413  | 602.9041  | -19.3683  | -39.2057  |
| 24    | -549.2869 | 17.4907   | 47.6162  | 481.5019  | -16.4142  | -50.3854  |
| 25    | -407.8506 | 13.6359   | 61.4501  | 328.8266  | -11.6543  | -66.8772  |
| 26    | -236.6020 | 8.0491    | 80.4258  | 183.3461  | -6.4834   | -84.9300  |
| 27    | -75.0754  | 1.6954    | 101.2742 | 35.1685   | 0.0638    | -106.4730 |
| 28    | 86.4149   | -5.9832   | 125.6337 | -109.2557 | 7.9279    | -131.2162 |
| 29    | 243.9490  | -14.6120  | 153.0779 | -266.2420 | 17.8726   | -162.0220 |
| 30    | 418.0287  | -24.7871  | 186.7160 | -398.7345 | 27.1679   | -192.9796 |
| 31    | 526.1745  | -37.7073  | 220.1442 | -475.9047 | 40.2442   | -226.6550 |
| 32    | 633.8211  | -49.6732  | 256.9935 | -554.1731 | 52.3549   | -263.8038 |
| 33    | 688.9494  | -64.2065  | 296.5120 | -589.6657 | 68.4570   | -307.0251 |
| 34    | 715.6162  | -81.4916  | 342.3969 | -559.9921 | 84.4589   | -349.7457 |
| 35    | 686.3596  | -98.0547  | 388.0939 | -490.0561 | 101.1149  | -395.7251 |
| 36    | 588.4804  | -116.4040 | 436.7777 | -347.4981 | 119.5453  | -444.5806 |
| 37    | 426.7509  | -135.9522 | 487.9627 | -148.5373 | 140.7620  | -500.0546 |
| 38    | 207.5752  | -158.1386 | 546.3086 | 131.7127  | 161.3812  | -554.6859 |
| 39    | -95.1458  | -179.6892 | 603.5143 | 485.7102  | 182.9417  | -612.0264 |
| 40    | -472.6979 | -202.0971 | 663.0960 | 915.9353  | 180.4444  | -608.4448 |
| 41    | -933.1188 | 0.4039    | 95.6325  | 850.1755  | -24.5108  | -33.2617  |
| 42    | -837.5084 | 23.9973   | 36.5268  | 760.7495  | -23.2557  | -37.9034  |
| 43    | -727.2318 | 22.1430   | 43.5774  | 651.0940  | -21.2211  | -45.6172  |
| 44    | -595.8931 | 19.1564   | 53.8871  | 523.4937  | -18.0478  | -56.6331  |
| 45    | -448.5188 | 15.2252   | 67.7156  | 364.9125  | -13.2025  | -73.1252  |
| 46    | -271.2575 | 9.5284    | 86.6748  | 214.1425  | -7.9403   | -91.1699  |
| 47    | -104.4401 | 3.0917    | 107.5615 | 60.9779   | -1.3152   | -112.7556 |
| 48    | 61.9535   | -4.6644   | 131.8994 | -88.0755  | 6.6306    | -137.4947 |
| 49    | 224.0707  | -13.3764  | 159.3692 | -249.5106 | 16.6541   | -168.2691 |
| 50    | 388.8425  | -24.9772  | 192.8258 | -369.2678 | 27.3741   | -199.1010 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 51    | 527.8906  | -35.5611  | 226.5306 | -482.5396 | 38.1095   | -233.0605 |
| 52    | 623.0936  | -48.8376  | 263.0289 | -545.4107 | 51.5277   | -269.7905 |
| 53    | 682.2875  | -63.3517  | 302.7343 | -584.9540 | 67.6098   | -313.3377 |
| 54    | 722.2506  | -80.1503  | 348.9022 | -569.6029 | 83.1260   | -356.2613 |
| 55    | 683.8334  | -97.3646  | 394.4932 | -489.1595 | 100.4267  | -402.0613 |
| 56    | 587.1439  | -115.8005 | 442.8315 | -347.5098 | 118.9329  | -450.6285 |
| 57    | 426.7487  | -135.3385 | 494.2797 | -149.8832 | 140.1364  | -506.4087 |
| 58    | 208.6272  | -157.5695 | 552.5594 | 129.3271  | 160.8049  | -560.8978 |
| 59    | -92.9238  | -179.1278 | 609.6438 | 482.1661  | 182.3717  | -618.1520 |
| 60    | -469.3364 | -201.5385 | 669.2250 | 911.1624  | 179.8945  | -614.2981 |
| 61    | -934.9968 | 1.0560    | 96.3094  | 850.4623  | -25.1399  | -33.6415  |
| 62    | -833.7675 | 24.0929   | 36.7171  | 756.7089  | -23.3489  | -38.0765  |
| 63    | -722.3680 | 22.0933   | 43.7527  | 646.2607  | -21.1703  | -45.7952  |
| 64    | -591.4109 | 19.2629   | 54.0738  | 518.6994  | -18.1528  | -56.8234  |
| 65    | -443.5966 | 15.3328   | 67.9117  | 359.6470  | -13.3065  | -73.3276  |
| 66    | -266.0477 | 9.4894    | 86.9657  | 208.9665  | -7.8976   | -91.4600  |
| 67    | -98.6114  | 3.1830    | 107.7947 | 54.9064   | -1.4001   | -112.9894 |
| 68    | 68.1735   | -4.5905   | 132.1579 | -94.4823  | 6.5563    | -137.7293 |
| 69    | 229.2249  | -13.4815  | 159.5928 | -254.4422 | 16.7629   | -168.5006 |
| 70    | 407.2534  | -23.7971  | 193.1022 | -390.3420 | 26.1903   | -199.4063 |
| 71    | 544.1605  | -36.6621  | 226.8803 | -496.3480 | 39.2074   | -233.4195 |
| 72    | 636.9269  | -49.9440  | 263.4108 | -556.7473 | 52.6342   | -270.1532 |
| 73    | 693.9582  | -64.7968  | 302.9786 | -593.3117 | 69.0559   | -313.5710 |
| 74    | 728.4407  | -81.8368  | 349.2778 | -572.0064 | 84.8065   | -356.6397 |
| 75    | 685.7784  | -99.0707  | 394.7271 | -487.3228 | 102.1341  | -402.2821 |
| 76    | 585.3960  | -117.4818 | 443.2058 | -341.8124 | 120.6156  | -451.0304 |
| 77    | 421.1166  | -137.0507 | 494.6837 | -140.6275 | 141.8456  | -506.7992 |
| 78    | 199.4142  | -159.2558 | 552.8942 | 142.4440  | 162.4903  | -561.2249 |
| 79    | -105.7895 | -180.7195 | 609.9490 | 498.6033  | 183.9629  | -618.4625 |
| 80    | -483.8559 | -202.8761 | 669.5279 | 928.6588  | 181.2137  | -614.5724 |
| 81    | -953.7648 | 1.6359    | 96.2382  | 867.8549  | -25.7365  | -33.5608  |
| 82    | -854.2397 | 25.0952   | 36.8250  | 774.9036  | -24.3509  | -38.2049  |
| 83    | -741.2861 | 23.2303   | 43.9147  | 662.6418  | -22.3062  | -45.9448  |
| 84    | -607.3600 | 20.2749   | 54.0170  | 532.3812  | -19.1629  | -56.7611  |
| 85    | -457.3719 | 16.3341   | 67.9816  | 371.1706  | -14.3072  | -73.4003  |
| 86    | -277.2278 | 10.4701   | 86.8619  | 217.9455  | -8.8785   | -91.3502  |
| 87    | -108.3944 | 4.0067    | 107.8716 | 62.8362   | -2.2255   | -113.0513 |
| 88    | 69.9593   | -3.9252   | 132.1366 | -97.7708  | 5.8895    | -137.7641 |
| 89    | 238.5900  | -12.1225  | 159.6794 | -266.8614 | 15.4076   | -168.6128 |
| 90    | 407.9479  | -23.8471  | 193.2122 | -390.9338 | 26.2455   | -199.4387 |
| 91    | 531.4121  | -35.6638  | 226.6986 | -485.8096 | 38.2085   | -233.2467 |
| 92    | 645.4343  | -50.7824  | 263.6052 | -563.3392 | 53.4619   | -270.3875 |
| 93    | 697.5079  | -65.2293  | 302.9447 | -595.9377 | 69.4886   | -313.4707 |
| 94    | 722.9248  | -82.7468  | 349.1378 | -564.4752 | 85.7207   | -356.5250 |
| 95    | 678.0774  | -99.9675  | 394.7761 | -477.4524 | 103.0246  | -402.3639 |
| 96    | 575.3292  | -118.3968 | 443.2687 | -329.8720 | 121.5350  | -451.0734 |
| 97    | 409.1590  | -137.9507 | 494.6233 | -126.5209 | 142.7462  | -506.7360 |
| 98    | 185.0493  | -160.1601 | 552.9095 | 158.9212  | 163.3954  | -561.2676 |
| 99    | -122.5242 | -181.7436 | 610.0980 | 517.5019  | 184.9860  | -618.5941 |
| 100   | -502.3099 | -203.8064 | 669.4849 | 949.2335  | 182.1492  | -614.5139 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 101   | -966.0850 | 2.5422    | 96.1695  | 878.1451  | -26.6388  | -33.5131  |
| 102   | -866.6743 | 26.2841   | 37.0324  | 784.6958  | -25.5390  | -38.4119  |
| 103   | -751.2076 | 24.4424   | 43.8805  | 669.8393  | -23.5179  | -45.9072  |
| 104   | -614.9630 | 21.6033   | 54.1284  | 536.9762  | -20.4914  | -56.8735  |
| 105   | -461.8609 | 17.6587   | 67.9604  | 372.6787  | -15.6313  | -73.3747  |
| 106   | -278.6814 | 11.7873   | 86.9270  | 216.4286  | -10.1955  | -91.4221  |
| 107   | -103.8628 | 5.1817    | 107.8357 | 55.6652   | -3.3996   | -113.0315 |
| 108   | 78.2178   | -3.1421   | 132.1686 | -107.7862 | 5.1108    | -137.7503 |
| 109   | 240.7993  | -12.2489  | 159.5998 | -268.7720 | 15.5303   | -168.5126 |
| 110   | 408.2968  | -23.8763  | 193.1843 | -391.2085 | 26.2712   | -199.4698 |
| 111   | 533.1006  | -35.8046  | 226.7412 | -487.1920 | 38.3584   | -233.2606 |
| 112   | 643.7376  | -50.6495  | 263.4805 | -561.9561 | 53.3424   | -270.2547 |
| 113   | 697.1979  | -65.2806  | 302.9388 | -595.4940 | 69.5450   | -313.4960 |
| 114   | 723.4347  | -82.9939  | 349.1774 | -564.4173 | 85.9664   | -356.5707 |
| 115   | 677.9380  | -100.2238 | 394.8330 | -476.7151 | 103.2870  | -402.4237 |
| 116   | 574.4624  | -118.6690 | 443.3295 | -328.3911 | 121.8000  | -451.1234 |
| 117   | 407.6765  | -138.2134 | 494.5802 | -124.5381 | 143.0052  | -506.6751 |
| 118   | 182.9464  | -160.4344 | 552.8257 | 161.5932  | 163.6703  | -561.1767 |
| 119   | -124.8232 | -181.8533 | 609.8957 | 520.1383  | 185.0960  | -618.4370 |
| 120   | -507.0616 | -204.2598 | 669.7599 | 954.9893  | 182.5660  | -614.7894 |
| 121   | -970.4221 | 2.8180    | 96.1262  | 881.7750  | -26.9386  | -33.4394  |
| 122   | -870.2813 | 26.5873   | 36.9494  | 787.5752  | -25.8365  | -38.3291  |
| 123   | -754.0583 | 24.7322   | 43.8048  | 672.0009  | -23.7979  | -45.8426  |
| 124   | -617.1099 | 21.8655   | 54.2653  | 538.5414  | -20.7427  | -57.0092  |
| 125   | -463.3571 | 17.8789   | 67.9335  | 373.7107  | -15.8338  | -73.3500  |
| 126   | -279.5762 | 11.9511   | 86.9147  | 217.0041  | -10.3469  | -91.4077  |
| 127   | -107.6028 | 5.4244    | 107.8962 | 58.9464   | -3.6288   | -113.0930 |
| 128   | 78.2400   | -3.1637   | 132.1950 | -107.6251 | 5.1450    | -137.7974 |
| 129   | 240.2089  | -12.3414  | 159.6769 | -267.7450 | 15.6450   | -168.5751 |
| 130   | 406.5612  | -24.0359  | 193.1822 | -388.9048 | 26.4488   | -199.4942 |
| 131   | 546.8090  | -37.4013  | 226.9757 | -497.0629 | 39.9647   | -233.5140 |
| 132   | 636.6178  | -50.7704  | 263.5076 | -554.3466 | 53.4735   | -270.2408 |
| 133   | 691.1971  | -65.8466  | 303.0661 | -587.8347 | 70.1304   | -313.6411 |
| 134   | 712.6624  | -83.3229  | 349.1933 | -552.6076 | 86.3061   | -356.5580 |
| 135   | 664.6903  | -100.6595 | 394.7950 | -462.3125 | 103.7331  | -402.3948 |
| 136   | 558.5620  | -119.3304 | 443.4252 | -310.8095 | 122.4702  | -451.2438 |
| 137   | 388.5518  | -138.9673 | 494.7287 | -103.5728 | 143.7676  | -506.8340 |
| 138   | 161.0301  | -161.0781 | 553.0045 | 184.9149  | 164.3093  | -561.3621 |
| 139   | -149.9827 | -182.6759 | 610.1407 | 546.8628  | 185.9132  | -618.6706 |
| 140   | -533.2483 | -204.8969 | 669.8434 | 982.2887  | 183.1202  | -615.4483 |
| 141   | -999.9425 | 2.7811    | 102.0958 | 933.0664  | -27.2879  | -39.5957  |
| 142   | -925.4094 | 27.0638   | 42.4402  | 855.1924  | -26.4006  | -43.7925  |
| 143   | -832.7248 | 25.7072   | 49.1274  | 760.6476  | -24.8639  | -51.2384  |
| 144   | -723.4308 | 23.6487   | 57.6545  | 651.0398  | -22.6147  | -60.5920  |
| 145   | -599.9407 | 20.8448   | 69.6854  | 546.4493  | -20.2525  | -71.4758  |
| 146   | -481.4846 | 17.8469   | 82.3982  | 415.6677  | -16.5104  | -86.6117  |
| 147   | -338.3683 | 13.4277   | 99.8131  | 278.0345  | -11.8836  | -104.8651 |
| 148   | -188.7324 | 8.0717    | 120.0462 | 136.2294  | -6.3155   | -125.9525 |
| 149   | -22.6033  | 1.0598    | 143.2631 | -18.3970  | 0.9144    | -149.8899 |
| 150   | 123.8724  | -6.2290   | 169.3558 | -131.8922 | 7.2952    | -172.8107 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| 151   | 242.7308 | -13.4556  | 194.4057 | -255.7425 | 15.7573   | -201.5858 |
| 152   | 384.4697 | -23.6936  | 225.3252 | -378.0377 | 26.2048   | -232.7805 |
| 153   | 491.8993 | -34.1103  | 258.5477 | -464.8643 | 36.8353   | -266.2603 |
| 154   | 573.8566 | -45.4823  | 294.0797 | -523.6378 | 48.4195   | -302.1391 |
| 155   | 639.7088 | -59.1771  | 332.3801 | -547.0308 | 60.7227   | -336.5940 |
| 156   | 644.7110 | -71.5996  | 368.8373 | -539.0897 | 74.8361   | -377.2772 |
| 157   | 622.3218 | -86.3718  | 411.2353 | -485.4009 | 89.7921   | -419.9364 |
| 158   | 554.5481 | -102.6148 | 456.2796 | -382.7804 | 106.2292  | -465.3138 |
| 159   | 431.8973 | -119.9022 | 503.7043 | -222.9160 | 123.6960  | -512.9984 |
| 160   | 249.1715 | -138.3668 | 553.4023 | -0.0438   | 140.3287  | -558.1488 |



ENVOLVENTE MINIMOS FLECTORES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0006     | 4.4932    | -2.4836   | -8.0868   | -4.4932   | 2.4836    |
| 2     | -55.7634   | -30.9844  | -28.2682  | 111.5262  | 30.9844   | 28.2694   |
| 3     | -111.5122  | -30.9844  | -28.3197  | 167.3035  | 30.9844   | 28.3203   |
| 4     | -167.2888  | -30.9752  | -28.3776  | 223.0301  | 30.9752   | 28.3770   |
| 5     | -223.0360  | -30.9740  | -28.3818  | 278.7832  | 30.9740   | 28.3814   |
| 6     | -278.7709  | -30.9860  | -28.5056  | 334.5555  | 30.9860   | 28.5059   |
| 7     | -334.5584  | -30.9846  | -28.5029  | 390.3433  | 30.9846   | 28.5030   |
| 8     | -390.3236  | -30.9551  | -28.8045  | 446.0475  | 30.9551   | 28.8038   |
| 9     | -446.0570  | -30.9423  | -28.6092  | 501.7376  | 30.9423   | 28.6098   |
| 10    | -501.7111  | -30.9197  | -29.0456  | 557.3845  | 30.9197   | 29.0479   |
| 11    | -557.3971  | -30.9285  | -29.0025  | 613.0437  | 30.9285   | 29.0009   |
| 12    | -613.0302  | -30.9396  | -29.2685  | 684.6218  | 42.3738   | 24.1775   |
| 13    | -684.6195  | -42.3752  | -24.1845  | 762.6951  | 44.3751   | 18.5450   |
| 14    | -762.6874  | -44.3502  | -18.8581  | 843.9382  | 46.3502   | 13.2284   |
| 15    | -843.9195  | -46.3535  | -13.5009  | 928.3487  | 47.8533   | 9.2579    |
| 16    | -928.3601  | -47.8542  | -8.9660   | 1016.2279 | 49.3540   | 4.7813    |
| 17    | -1016.3891 | -51.3821  | 3.1253    | 1111.0673 | 53.3823   | -8.7311   |
| 18    | -1162.8763 | -110.8560 | 152.7392  | 1364.2538 | 112.8571  | -158.3819 |
| 19    | -1406.5336 | -160.9759 | 275.9720  | 1697.6364 | 162.9760  | -281.5354 |
| 20    | -1732.2976 | -206.1983 | 391.0962  | 2104.4741 | 175.8991  | -324.3821 |
| 21    | -2129.4741 | 238.5936  | -578.8764 | 1547.2253 | -246.6249 | 583.7796  |
| 22    | -1570.4183 | 227.7790  | -536.4073 | 1078.4296 | -198.4531 | 445.5802  |
| 23    | -1134.5477 | 146.1086  | -307.7206 | 805.7824  | -146.1090 | 307.7651  |
| 24    | -854.0453  | 103.1581  | -193.2841 | 621.9266  | -103.1591 | 193.2834  |
| 25    | -687.2259  | 49.1518   | -36.8384  | 576.6303  | -49.1520  | 36.8746   |
| 26    | -650.3780  | -5.3355   | 0.1883    | 662.3868  | 5.3362    | -0.1194   |
| 27    | -662.3902  | -5.3391   | -0.2289   | 674.4022  | 5.3390    | 0.2611    |
| 28    | -674.3966  | -5.3421   | -0.2556   | 686.4124  | 5.3423    | 0.2694    |
| 29    | -686.4084  | -5.3437   | -0.4744   | 698.4335  | 5.3452    | 0.5101    |
| 30    | -698.4215  | -5.3444   | -0.9064   | 710.4466  | 5.3450    | 0.9166    |
| 31    | -710.4398  | -5.3487   | -0.6984   | 722.4744  | 5.3471    | 0.7154    |
| 32    | -722.4698  | -5.3319   | -1.3750   | 734.4645  | 5.3324    | 1.4005    |
| 33    | -734.4724  | -5.3557   | -1.4057   | 746.5260  | 5.3581    | 1.4053    |
| 34    | -746.5347  | -5.3910   | -1.4168   | 769.5761  | 22.4759   | -18.3100  |
| 35    | -769.5694  | -22.4807  | 17.8488   | 822.6683  | 24.4810   | -23.4705  |
| 36    | -822.6771  | -24.4933  | 22.9827   | 880.7824  | 26.9930   | -30.0402  |
| 37    | -901.7924  | -62.3111  | 70.8930   | 1044.6653 | 64.8103   | -77.9074  |
| 38    | -1090.0404 | -106.1309 | 200.6254  | 1330.8007 | 108.1309  | -206.2399 |
| 39    | -1396.9878 | -162.5706 | 353.8070  | 1765.3411 | 164.5706  | -359.4112 |
| 40    | -1821.0259 | -216.6656 | 496.8589  | 2311.5884 | 187.4458  | -425.6768 |
| 41    | -2352.1243 | 245.0092  | -565.8511 | 1755.7727 | -252.9648 | 578.0365  |
| 42    | -1780.0994 | 234.1500  | -530.7821 | 1288.3845 | -205.2892 | 439.8880  |
| 43    | -1349.1490 | 153.0945  | -301.8556 | 1004.5882 | -153.0947 | 301.9052  |
| 44    | -1059.4111 | 98.3989   | -154.9130 | 838.0276  | -98.3984  | 154.9314  |
| 45    | -884.7843  | 56.6551   | -31.3109  | 757.3225  | -56.6538  | 31.3518   |
| 46    | -841.8405  | 2.6407    | 5.6018    | 835.9054  | -2.6395   | -5.5446   |
| 47    | -835.8929  | 2.6306    | 5.3082    | 829.9689  | -2.6289   | -5.2751   |
| 48    | -829.9550  | 2.6159    | 5.0805    | 824.0699  | -2.6166   | -5.0520   |
| 49    | -824.0789  | 2.6383    | 4.7971    | 818.1393  | -2.6405   | -4.7819   |
| 50    | -818.1205  | 2.6582    | 4.7871    | 812.1388  | -2.6604   | -4.7628   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -812.1401  | 2.6803    | 4.3071    | 806.1057  | -2.6826   | -4.2867   |
| 52    | -806.1067  | 2.7029    | 4.2736    | 800.0243  | -2.7037   | -4.2609   |
| 53    | -800.0144  | 2.7120    | 3.7966    | 793.9084  | -2.7122   | -3.7775   |
| 54    | -793.8906  | 2.7099    | 3.5127    | 797.3624  | 14.7328   | -23.2133  |
| 55    | -797.3631  | -14.7253  | 23.0035   | 832.9887  | 16.7249   | -28.6512  |
| 56    | -832.9907  | -16.7111  | 28.6440   | 873.5977  | 19.2115   | -35.6728  |
| 57    | -905.1085  | -67.8656  | 72.1999   | 1060.5065 | 70.3662   | -79.2331  |
| 58    | -1106.8208 | -112.0550 | 202.8921  | 1360.8948 | 114.0543  | -208.5139 |
| 59    | -1428.2870 | -168.7132 | 355.3256  | 1810.4440 | 170.7125  | -360.8716 |
| 60    | -1866.7441 | -222.8890 | 498.2706  | 2371.2600 | 193.7456  | -426.8290 |
| 61    | -2411.7739 | 246.6656  | -564.9623 | 1811.6929 | -254.5398 | 577.4174  |
| 62    | -1836.0054 | 235.7322  | -530.6280 | 1341.8354 | -206.8963 | 439.7768  |
| 63    | -1403.0466 | 154.7090  | -301.7996 | 1054.8792 | -154.7102 | 301.8504  |
| 64    | -1110.4905 | 100.0287  | -154.8888 | 885.4544  | -100.0314 | 154.9079  |
| 65    | -932.9643  | 58.3185   | -31.2948  | 801.7638  | -58.3215  | 31.3167   |
| 66    | -886.8849  | 4.7117    | 5.7332    | 876.2765  | -4.7129   | -5.6747   |
| 67    | -876.2952  | 4.7176    | 5.1830    | 865.6825  | -4.7182   | -5.1471   |
| 68    | -865.6800  | 4.7297    | 5.1517    | 855.0403  | -4.7294   | -5.1398   |
| 69    | -855.0414  | 4.7172    | 4.9358    | 844.4377  | -4.7161   | -4.9141   |
| 70    | -844.4315  | 4.7212    | 4.6492    | 833.8059  | -4.7222   | -4.6097   |
| 71    | -833.8254  | 4.7223    | 4.1190    | 823.2046  | -4.7236   | -4.1003   |
| 72    | -823.2117  | 4.7346    | 4.0956    | 812.5609  | -4.7348   | -4.0890   |
| 73    | -812.5570  | 4.7390    | 3.8352    | 801.8930  | -4.7387   | -3.8190   |
| 74    | -801.8748  | 4.7250    | 3.3412    | 800.7384  | 12.7407   | -23.0426  |
| 75    | -800.7471  | -12.7546  | 23.0853   | 831.9373  | 14.7546   | -28.7239  |
| 76    | -831.9347  | -14.7511  | 28.4002   | 868.1537  | 17.2513   | -35.4231  |
| 77    | -902.9548  | -69.7806  | 72.3672   | 1062.5494 | 72.2809   | -79.4230  |
| 78    | -1108.9620 | -113.9874 | 203.3258  | 1367.4673 | 115.9871  | -208.9370 |
| 79    | -1435.0564 | -170.6493 | 355.4078  | 1821.5593 | 172.6490  | -360.9291 |
| 80    | -1877.9438 | -224.8305 | 498.3430  | 2386.7842 | 195.6755  | -426.8852 |
| 81    | -2426.9692 | 246.6926  | -565.2572 | 1826.8119 | -254.5792 | 577.7020  |
| 82    | -1851.2721 | 235.7665  | -530.4528 | 1356.9136 | -206.9438 | 439.5673  |
| 83    | -1418.1625 | 154.7676  | -301.4927 | 1069.9730 | -154.7672 | 301.5606  |
| 84    | -1125.4673 | 100.1025  | -154.9538 | 900.2756  | -100.1025 | 154.9838  |
| 85    | -947.7787  | 58.3882   | -31.1696  | 816.3828  | -58.3884  | 31.2067   |
| 86    | -899.8807  | 5.8678    | 5.4111    | 886.6717  | -5.8673   | -5.3679   |
| 87    | -886.6754  | 5.8589    | 5.5837    | 873.4976  | -5.8580   | -5.5685   |
| 88    | -873.5184  | 5.8525    | 5.0787    | 860.3436  | -5.8559   | -5.0186   |
| 89    | -860.3480  | 5.8803    | 4.5276    | 847.1101  | -5.8825   | -4.4974   |
| 90    | -847.1165  | 5.9001    | 4.4941    | 833.8378  | -5.9014   | -4.4941   |
| 91    | -833.8217  | 5.9463    | 4.4893    | 820.4381  | -5.9479   | -4.4625   |
| 92    | -820.4536  | 5.9088    | 3.7265    | 807.1554  | -5.9065   | -3.7067   |
| 93    | -807.1592  | 5.8822    | 3.9721    | 793.9261  | -5.8801   | -3.9702   |
| 94    | -793.9264  | 5.8744    | 3.4973    | 790.1659  | 11.5878   | -23.1974  |
| 95    | -790.1667  | -11.6055  | 22.9311   | 818.7952  | 13.6060   | -28.5679  |
| 96    | -818.7952  | -13.6093  | 28.3475   | 852.4234  | 16.1090   | -35.3879  |
| 97    | -888.1469  | -69.7192  | 72.6122   | 1047.6661 | 72.2192   | -79.6378  |
| 98    | -1094.1960 | -113.9186 | 202.9440  | 1352.6161 | 115.9187  | -208.5771 |
| 99    | -1420.1017 | -170.5803 | 355.9299  | 1806.3322 | 172.5796  | -361.4743 |
| 100   | -1862.8093 | -224.7588 | 498.3572  | 2371.4976 | 195.6118  | -426.8475 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -2411.7002 | 244.7866  | -565.3491 | 1815.8627 | -252.6648 | 577.7756  |
| 102   | -1840.4875 | 233.8562  | -529.9603 | 1350.5781 | -205.0399 | 439.0408  |
| 103   | -1411.6731 | 152.8612  | -301.3582 | 1067.7719 | -152.8619 | 301.4362  |
| 104   | -1123.3123 | 98.1992   | -154.5472 | 902.3193  | -98.1990  | 154.5736  |
| 105   | -949.8036  | 56.5038   | -30.9617  | 822.6475  | -56.5018  | 31.0017   |
| 106   | -900.5479  | 7.8362    | 5.6800    | 882.9134  | -7.8378   | -5.6224   |
| 107   | -882.9024  | 7.8424    | 5.4054    | 865.2567  | -7.8448   | -5.3708   |
| 108   | -865.2452  | 7.8702    | 5.1217    | 847.5304  | -7.8737   | -5.1064   |
| 109   | -847.5204  | 7.8867    | 5.1068    | 829.7798  | -7.8874   | -5.0821   |
| 110   | -829.7911  | 7.8692    | 4.6067    | 812.0955  | -7.8689   | -4.5842   |
| 111   | -812.1099  | 7.8731    | 4.5773    | 794.3988  | -7.8765   | -4.5592   |
| 112   | -794.4053  | 7.9254    | 4.0892    | 776.5760  | -7.9256   | -4.0726   |
| 113   | -776.5709  | 7.9321    | 4.0635    | 758.7351  | -7.9308   | -4.0546   |
| 114   | -758.7403  | 7.9463    | 3.6024    | 749.5104  | 9.4817    | -23.3053  |
| 115   | -749.5149  | -9.4869   | 23.0461   | 773.3706  | 11.4868   | -28.6839  |
| 116   | -773.3603  | -11.4853  | 28.4946   | 802.2011  | 13.9857   | -35.5448  |
| 117   | -839.0581  | -67.9954  | 72.9946   | 994.6594  | 70.4958   | -80.0352  |
| 118   | -1041.7968 | -112.2395 | 203.3500  | 1296.3862 | 114.2395  | -208.9187 |
| 119   | -1364.7085 | -168.9372 | 355.4251  | 1747.3578 | 170.9372  | -361.0212 |
| 120   | -1803.8955 | -223.1232 | 499.4403  | 2308.9473 | 194.0670  | -427.9811 |
| 121   | -2349.5896 | 238.3957  | -564.1586 | 1768.2584 | -246.1715 | 576.6387  |
| 122   | -1792.9813 | 227.3760  | -528.8499 | 1318.7421 | -198.7663 | 437.9792  |
| 123   | -1380.2598 | 146.6663  | -300.2973 | 1050.2786 | -146.6669 | 300.3488  |
| 124   | -1106.5070 | 92.2188   | -153.1459 | 899.0260  | -92.2204  | 153.1692  |
| 125   | -946.6910  | 50.8774   | -29.9212  | 832.1985  | -50.8751  | 29.9861   |
| 126   | -890.7423  | 15.5116   | 10.0173   | 855.8360  | -15.5086  | -9.9816   |
| 127   | -855.8335  | 15.4823   | 10.0320   | 821.0079  | -15.4823  | -10.0030  |
| 128   | -821.0116  | 15.4843   | 9.5141    | 786.1690  | -15.4844  | -9.4817   |
| 129   | -786.1570  | 15.4860   | 9.4876    | 751.3134  | -15.4876  | -9.4768   |
| 130   | -751.3240  | 15.5058   | 9.2824    | 716.4474  | -15.5069  | -9.2480   |
| 131   | -716.4381  | 15.5228   | 8.8064    | 681.4938  | -15.5223  | -8.7883   |
| 132   | -681.4980  | 15.5271   | 8.8243    | 646.5671  | -15.5288  | -8.8158   |
| 133   | -646.5512  | 15.5379   | 8.6159    | 611.5881  | -15.5388  | -8.6038   |
| 134   | -611.5830  | 15.5308   | 8.4008    | 576.6356  | -15.5310  | -8.3940   |
| 135   | -576.6440  | 15.5439   | 8.2261    | 572.9794  | 3.0866    | -34.0227  |
| 136   | -572.9832  | -3.0933   | 33.7050   | 582.9517  | 5.5934    | -40.7555  |
| 137   | -631.7992  | -60.1151  | 78.1330   | 769.6765  | 62.6151   | -85.1794  |
| 138   | -826.0205  | -116.6459 | 241.3735  | 1090.5366 | 118.6460  | -246.9823 |
| 139   | -1139.1213 | -161.6129 | 361.1964  | 1505.2053 | 163.6128  | -366.7921 |
| 140   | -1566.8425 | -215.9545 | 504.8109  | 2055.7966 | 187.0840  | -438.3993 |
| 141   | -2097.4956 | 219.8284  | -443.7560 | 1662.5343 | -232.2710 | 464.4707  |
| 142   | -1679.1511 | 216.9838  | -427.5390 | 1337.7377 | -187.1111 | 344.4468  |
| 143   | -1381.1871 | 143.8938  | -233.7284 | 1122.2385 | -143.8935 | 233.7623  |
| 144   | -1166.5183 | 95.7891   | -116.6296 | 994.0118  | -95.7889  | 116.6913  |
| 145   | -1045.7312 | 38.3464   | 27.0508   | 976.7229  | -38.3463  | -27.0279  |
| 146   | -980.1955  | 36.3117   | 35.6010   | 914.8278  | -36.3082  | -35.5700  |
| 147   | -914.8374  | 36.2779   | 35.5667   | 849.5390  | -36.2758  | -35.5421  |
| 148   | -849.5497  | 36.2744   | 35.2801   | 784.2820  | -36.2758  | -35.2342  |
| 149   | -784.2876  | 36.2839   | 34.9497   | 718.9752  | -36.2836  | -34.9255  |
| 150   | -718.9774  | 36.2699   | 34.9220   | 653.6934  | -36.2731  | -34.9024  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|---------|----------|-----------|----------|
| 151   | -653.7086 | 36.2945   | 34.6715 | 588.3594 | -36.2976  | -34.6332 |
| 152   | -588.3633 | 36.3073   | 34.4443 | 523.0221 | -36.3032  | -34.4294 |
| 153   | -523.0217 | 36.2836   | 34.4278 | 457.7206 | -36.2839  | -34.4289 |
| 154   | -457.7197 | 36.3148   | 34.4391 | 392.3480 | -36.3201  | -34.4165 |
| 155   | -392.3676 | 36.3352   | 34.1576 | 326.9806 | -36.3344  | -34.1262 |
| 156   | -326.9857 | 36.3313   | 34.0126 | 261.5743 | -36.3310  | -34.0091 |
| 157   | -261.5544 | 36.3363   | 34.1036 | 196.1577 | -36.3385  | -34.1039 |
| 158   | -196.1693 | 36.3333   | 34.0335 | 130.7618 | -36.3326  | -34.0234 |
| 159   | -130.7688 | 36.3319   | 33.9816 | 65.3892  | -36.3317  | -33.9766 |
| 160   | -65.3989  | 36.3285   | 33.9534 | -0.0017  | -35.1416  | -32.0172 |



ENVOLVENTE MINIMOS CORTANTES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | 0.0060     | -15.2984  | -70.6485 | 39.2894   | 31.6015   | 24.2424   |
| 2     | -12.8655   | -16.9192  | -64.5766 | 44.7684   | 33.6389   | 16.8889   |
| 3     | 4.4931     | -19.9614  | -55.1948 | 24.0866   | 37.1011   | 6.6333    |
| 4     | 44.3835    | -24.4217  | -42.8354 | -15.1739  | 41.9653   | -6.5598   |
| 5     | 99.3258    | -30.2826  | -27.5650 | -46.8187  | 47.3042   | -20.3401  |
| 6     | 143.2748   | -36.5964  | -11.6988 | -98.7283  | 54.7522   | -39.0091  |
| 7     | 204.1322   | -44.9923  | 9.0462   | -147.9677 | 63.5427   | -60.6401  |
| 8     | 259.0891   | -54.7128  | 32.8497  | -187.6442 | 73.6558   | -85.2905  |
| 9     | 301.4752   | -65.7614  | 59.4948  | -210.3181 | 85.0008   | -112.0504 |
| 10    | 323.9457   | -77.9866  | 88.4546  | -207.6437 | 95.8254   | -137.1477 |
| 11    | 318.4076   | -89.6863  | 115.5942 | -157.2585 | 108.9669  | -169.2512 |
| 12    | 262.6797   | -103.6429 | 149.8020 | -92.7202  | 123.0770  | -203.1118 |
| 13    | 190.6663   | -118.5577 | 185.7397 | 9.2288    | 138.0497  | -239.3165 |
| 14    | 79.1851    | -134.2677 | 223.9629 | 152.0561  | 153.8025  | -277.8713 |
| 15    | -74.8334   | -150.7382 | 264.5905 | 338.2568  | 168.7869  | -314.4685 |
| 16    | -273.3650  | -166.3889 | 303.4780 | 580.7391  | 185.7797  | -357.7889 |
| 17    | -529.8340  | -184.0080 | 348.0369 | 859.5820  | 203.5695  | -402.6090 |
| 18    | -822.4572  | -202.3610 | 395.9318 | 1187.0675 | 221.9195  | -450.7432 |
| 19    | -1164.7644 | -221.2299 | 445.3251 | 1564.3304 | 240.7520  | -500.3340 |
| 20    | -1556.8381 | -240.5286 | 496.5090 | 1998.8365 | 233.6187  | -492.2335 |
| 21    | 143.8900   | -31.3584  | -17.7135 | -251.0095 | 31.2316   | 20.3483   |
| 22    | 263.2475   | -12.0437  | -71.6013 | -213.3608 | 32.2962   | 14.3878   |
| 23    | 248.4234   | -13.9174  | -63.0541 | -194.3215 | 34.1684   | 5.8447    |
| 24    | 251.4403   | -16.6954  | -51.9906 | -191.0910 | 36.9464   | -5.2182   |
| 25    | 268.8452   | -20.4566  | -38.2756 | -224.4952 | 41.6851   | -36.6789  |
| 26    | 320.7675   | -26.2458  | -3.9740  | -274.0837 | 48.0610   | -57.7350  |
| 27    | 386.1854   | -33.7289  | 19.8299  | -323.6161 | 55.7360   | -82.2298  |
| 28    | 448.4275   | -42.5629  | 46.8489  | -366.1974 | 64.7556   | -109.6320 |
| 29    | 500.2113   | -52.7527  | 77.0359  | -413.8909 | 76.2668   | -143.1960 |
| 30    | 553.3145   | -65.4612  | 113.4350 | -419.7006 | 88.0940   | -176.9121 |
| 31    | 560.7578   | -78.4975  | 149.5193 | -395.9479 | 101.2808  | -213.2216 |
| 32    | 534.4805   | -92.9123  | 188.9415 | -334.7626 | 115.8445  | -252.9616 |
| 33    | 467.2939   | -108.6398 | 231.1214 | -245.2481 | 133.1408  | -298.8409 |
| 34    | 367.9958   | -127.0880 | 279.6628 | -86.9889  | 150.3057  | -344.2201 |
| 35    | 196.4362   | -145.3758 | 327.7261 | 129.1189  | 168.6850  | -392.5584 |
| 36    | -35.7431   | -164.8263 | 378.6726 | 396.5810  | 188.3063  | -443.4073 |
| 37    | -321.3347  | -185.4457 | 432.4431 | 745.3788  | 210.4189  | -502.0189 |
| 38    | -690.8472  | -208.4843 | 492.9099 | 1166.1621 | 231.9729  | -558.4832 |
| 39    | -1132.4799 | -230.8668 | 552.9020 | 1660.9961 | 254.3723  | -618.6308 |
| 40    | -1649.8103 | -254.0223 | 614.1296 | 2232.6707 | 252.6212  | -616.6884 |
| 41    | 325.7433   | -36.6458  | -7.7715  | -476.2634 | 38.0493   | 19.7033   |
| 42    | 489.3418   | -18.8872  | -70.8689 | -424.0655 | 39.1373   | 13.6474   |
| 43    | 460.3321   | -20.7973  | -62.3185 | -390.7313 | 41.0529   | 5.0836    |
| 44    | 449.2886   | -23.6305  | -51.1089 | -373.3470 | 43.8796   | -6.0991   |
| 45    | 452.6383   | -27.4488  | -37.3726 | -368.1062 | 47.6973   | -19.8406  |
| 46    | 465.9196   | -32.3212  | -20.7020 | -396.9410 | 53.6854   | -59.2718  |
| 47    | 510.5601   | -39.4110  | 21.3255  | -435.5911 | 61.4403   | -83.7310  |
| 48    | 561.7439   | -48.3200  | 48.4730  | -466.8898 | 70.5319   | -111.2642 |
| 49    | 602.1119   | -58.5994  | 78.7268  | -503.0098 | 82.1285   | -144.8371 |
| 50    | 643.5375   | -71.3996  | 114.8454 | -496.7166 | 94.0479   | -178.3279 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 638.5380   | -84.5191  | 151.2951 | -460.2485 | 107.3175  | -215.0275 |
| 52    | 599.6203   | -98.9965  | 190.4528 | -386.2980 | 121.9365  | -254.4221 |
| 53    | 519.1814   | -114.7917 | 232.7296 | -283.3348 | 139.2985  | -300.5354 |
| 54    | 406.3307   | -133.3115 | 281.4414 | -111.2560 | 156.5413  | -346.0186 |
| 55    | 220.9649   | -151.6611 | 329.5694 | 118.6299  | 174.9704  | -394.3337 |
| 56    | -24.9980   | -171.1498 | 380.5590 | 400.0704  | 194.6182  | -445.2910 |
| 57    | -325.1718  | -191.7736 | 433.8703 | 763.5215  | 216.7410  | -503.4904 |
| 58    | -708.6558  | -214.8281 | 495.1272 | 1198.1848 | 238.3093  | -560.6594 |
| 59    | -1164.8389 | -237.2183 | 554.3579 | 1707.5728 | 260.7136  | -620.0774 |
| 60    | -1696.4193 | -260.3648 | 615.5459 | 2293.3865 | 258.9708  | -617.8259 |
| 61    | 395.0958   | -38.4882  | -7.5301  | -545.5471 | 40.0358   | 19.7532   |
| 62    | 558.7169   | -20.8770  | -70.7534 | -488.9682 | 41.1258   | 13.5282   |
| 63    | 525.3542   | -22.7884  | -62.1683 | -451.2799 | 43.0429   | 4.9362    |
| 64    | 509.9780   | -25.6253  | -50.9310 | -429.5522 | 45.8732   | -6.2736   |
| 65    | 508.9964   | -29.4468  | -37.1846 | -419.9743 | 49.6951   | -20.0213  |
| 66    | 517.9719   | -34.3211  | -20.6312 | -442.1394 | 55.5855   | -59.3619  |
| 67    | 555.8870   | -41.3280  | 21.5612  | -476.6526 | 63.3624   | -83.9696  |
| 68    | 602.9816   | -50.2543  | 48.5860  | -503.7565 | 72.4716   | -111.3699 |
| 69    | 639.0291   | -60.5419  | 78.8049  | -535.6207 | 84.0677   | -144.9035 |
| 70    | 676.1544   | -73.3488  | 115.0671 | -524.9667 | 95.9922   | -178.5777 |
| 71    | 666.8146   | -86.4666  | 151.5955 | -484.1605 | 109.2607  | -215.3344 |
| 72    | 623.5463   | -100.9519 | 190.7859 | -405.8305 | 123.8909  | -254.7268 |
| 73    | 538.8130   | -116.7426 | 232.9567 | -298.4685 | 141.2561  | -300.7673 |
| 74    | 421.3670   | -135.2615 | 281.7345 | -121.9210 | 158.4843  | -346.3101 |
| 75    | 231.6650   | -153.6051 | 329.8743 | 112.1959  | 176.9089  | -394.6084 |
| 76    | -18.6560   | -173.0825 | 380.7507 | 398.3358  | 196.5633  | -445.5418 |
| 77    | -323.4620  | -193.7341 | 434.2046 | 765.8874  | 218.6856  | -503.7764 |
| 78    | -710.9305  | -216.7654 | 495.5767 | 1204.9818 | 240.2517  | -561.1177 |
| 79    | -1171.7771 | -239.1621 | 554.4806 | 1718.8713 | 262.6559  | -620.2004 |
| 80    | -1707.7296 | -262.3062 | 615.6661 | 2309.0178 | 260.8930  | -617.9151 |
| 81    | 407.2659   | -38.4268  | -7.4428  | -558.1461 | 39.9682   | 19.6730   |
| 82    | 571.3147   | -20.8043  | -70.8251 | -501.7016 | 41.0587   | 13.5901   |
| 83    | 538.0836   | -22.7297  | -62.2514 | -464.1706 | 42.9776   | 5.0320    |
| 84    | 522.8708   | -25.5621  | -50.8632 | -442.5911 | 45.8085   | -6.3408   |
| 85    | 522.0480   | -29.3777  | -37.2577 | -433.1488 | 49.6315   | -19.9685  |
| 86    | 531.1071   | -34.2699  | -20.3861 | -455.3115 | 55.5214   | -59.5770  |
| 87    | 569.0877   | -41.2545  | 21.3529  | -490.0085 | 63.2880   | -83.7444  |
| 88    | 616.3029   | -50.1791  | 48.6336  | -517.2489 | 72.3943   | -111.4670 |
| 89    | 652.5367   | -60.4737  | 79.1081  | -549.2464 | 84.0085   | -145.2443 |
| 90    | 689.8216   | -73.2840  | 115.2976 | -538.8012 | 95.9321   | -178.7338 |
| 91    | 680.7150   | -86.4289  | 151.4497 | -498.1178 | 109.2234  | -215.2025 |
| 92    | 637.3504   | -100.8966 | 191.0220 | -419.6855 | 123.8301  | -255.0224 |
| 93    | 552.7337   | -116.6702 | 233.0704 | -312.6500 | 141.1779  | -300.7976 |
| 94    | 435.5097   | -135.1903 | 281.7472 | -136.3025 | 158.4114  | -346.3356 |
| 95    | 245.9809   | -153.5242 | 329.8920 | 97.9570   | 176.8340  | -394.6940 |
| 96    | -4.4452    | -173.0130 | 380.8816 | 383.6839  | 196.4826  | -445.6138 |
| 97    | -308.7062  | -193.6417 | 434.3719 | 751.1074  | 218.6032  | -503.9634 |
| 98    | -696.3988  | -216.6835 | 495.2733 | 1190.3928 | 240.1762  | -560.8576 |
| 99    | -1156.8923 | -239.0895 | 555.0356 | 1703.6327 | 262.5767  | -620.7246 |
| 100   | -1692.6614 | -262.2286 | 615.6490 | 2293.8005 | 260.8205  | -617.8824 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== |            |           |          |           |           |           |
| 101   | 394.9130   | -36.7446  | -7.3172  | -549.5711 | 38.2922   | 19.5439   |
| 102   | 562.7248   | -19.1344  | -70.8699 | -496.8941 | 39.3834   | 13.6517   |
| 103   | 533.2771   | -21.0534  | -62.1565 | -463.1335 | 41.3013   | 4.9341    |
| 104   | 521.8404   | -23.8809  | -50.9143 | -445.3090 | 44.1345   | -6.3108   |
| 105   | 524.7671   | -27.7034  | -37.1723 | -439.6337 | 47.9573   | -20.0544  |
| 106   | 537.6190   | -32.5888  | -20.4436 | -465.5594 | 53.8468   | -59.5466  |
| 107   | 579.2807   | -39.5931  | 21.6163  | -503.9887 | 61.6207   | -84.0050  |
| 108   | 630.2851   | -48.5164  | 48.7860  | -534.9719 | 70.7362   | -111.5765 |
| 109   | 670.2914   | -58.8106  | 78.8777  | -570.7050 | 82.3433   | -144.9996 |
| 110   | 711.1822   | -71.6124  | 115.3195 | -563.9016 | 94.2573   | -178.8126 |
| 111   | 705.7933   | -84.7509  | 151.5414 | -526.9731 | 107.5547  | -215.2666 |
| 112   | 666.2090   | -99.2501  | 190.9704 | -452.3020 | 122.1918  | -254.9427 |
| 113   | 585.2341   | -115.0599 | 233.0826 | -348.7566 | 139.5732  | -300.8449 |
| 114   | 471.5723   | -133.6079 | 281.8336 | -175.9056 | 156.8281  | -346.4269 |
| 115   | 285.5091   | -151.9479 | 330.0068 | 54.9006   | 175.2645  | -394.8146 |
| 116   | 38.4895    | -171.4490 | 381.0142 | 337.2365  | 194.9118  | -445.7357 |
| 117   | -262.2659  | -192.0745 | 434.6477 | 701.0110  | 217.0275  | -504.2048 |
| 118   | -646.3967  | -215.1203 | 495.5276 | 1136.7794 | 238.6084  | -561.0898 |
| 119   | -1103.6405 | -237.5191 | 554.5008 | 1646.9957 | 261.0129  | -620.2524 |
| 120   | -1635.5520 | -260.6623 | 616.7286 | 2233.1694 | 259.2195  | -618.9673 |
| 121   | 325.3959   | -29.5711  | -2.8105  | -496.7144 | 31.1477   | 15.0461   |
| 122   | 509.9462   | -11.9991  | -66.3626 | -460.1686 | 32.2492   | 9.1418    |
| 123   | 496.6445   | -13.9376  | -57.6636 | -442.5096 | 34.1863   | 0.4467    |
| 124   | 501.2703   | -16.7952  | -46.5801 | -440.7060 | 37.0442   | -10.6298  |
| 125   | 520.1808   | -20.6492  | -32.6985 | -450.9184 | 40.9030   | -24.5382  |
| 126   | 548.8401   | -25.5676  | -15.9394 | -492.5209 | 46.8314   | -64.0542  |
| 127   | 606.0308   | -32.6231  | 25.9660  | -546.3572 | 54.6594   | -88.3411  |
| 128   | 672.3055   | -41.6043  | 53.3134  | -592.4053 | 63.8379   | -116.1286 |
| 129   | 727.2345   | -51.9708  | 83.4562  | -642.8108 | 75.5267   | -149.5655 |
| 130   | 782.6329   | -64.8723  | 119.7450 | -650.3472 | 87.5305   | -183.2507 |
| 131   | 791.3188   | -78.0885  | 156.3665 | -627.1955 | 100.9089  | -220.1322 |
| 132   | 765.4388   | -92.6621  | 195.5687 | -566.1710 | 115.6094  | -259.4926 |
| 133   | 697.8236   | -108.5571 | 237.7893 | -475.5796 | 133.0910  | -305.5710 |
| 134   | 597.1396   | -127.1649 | 286.5374 | -315.6219 | 150.4039  | -351.1229 |
| 135   | 423.7880   | -145.6035 | 334.7363 | -97.5110  | 168.9262  | -399.5399 |
| 136   | 189.3819   | -165.1737 | 385.8024 | 172.4904  | 188.6521  | -450.5571 |
| 137   | -98.8477   | -185.8789 | 439.4867 | 523.7371  | 210.8364  | -509.0550 |
| 138   | -470.2670  | -208.9548 | 500.4675 | 946.7448  | 232.4397  | -566.0414 |
| 139   | -914.2681  | -231.3758 | 559.9000 | 1443.4813 | 254.8599  | -625.6272 |
| 140   | -1432.5186 | -254.5206 | 621.6665 | 2016.0117 | 252.9965  | -624.4862 |
| 141   | 131.3394   | -12.8550  | 28.4035  | -352.6548 | 10.3105   | -4.1586   |
| 142   | 361.7656   | 5.2000    | -36.4554 | -356.5444 | 11.0023   | -9.3160   |
| 143   | 381.1554   | 3.9865    | -29.6100 | -373.7554 | 12.2099   | -16.1535  |
| 144   | 413.6259   | 2.2165    | -20.2928 | -403.0249 | 13.9916   | -25.5132  |
| 145   | 457.5345   | -0.1947   | -9.1530  | -442.6107 | 16.3900   | -36.6071  |
| 146   | 510.8322   | -3.2542   | 4.2036   | -490.3923 | 19.4548   | -49.9807  |
| 147   | 571.0686   | -7.0139   | 19.4792  | -549.7537 | 23.4627   | -90.1579  |
| 148   | 641.2135   | -11.7916  | 61.9461  | -643.4117 | 29.7421   | -113.6019 |
| 149   | 743.8416   | -18.8734  | 87.5514  | -734.3798 | 37.0477   | -139.9412 |
| 150   | 841.6624   | -26.9720  | 115.7116 | -797.7614 | 44.2382   | -164.9302 |

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| ===== |           |           |          |           |           |           |
| 151   | 909.4257  | -35.0723  | 143.0972 | -868.9296 | 53.5799   | -196.0592 |
| 152   | 982.3230  | -45.2836  | 176.3259 | -922.4568 | 63.9937   | -229.5442 |
| 153   | 1034.8636 | -56.5850  | 211.6152 | -952.7975 | 75.5090   | -265.0911 |
| 154   | 1061.1741 | -69.1023  | 249.2032 | -953.8606 | 88.2385   | -303.0253 |
| 155   | 1054.8096 | -82.7637  | 289.9026 | -905.1097 | 100.5073  | -339.8762 |
| 156   | 995.6375  | -96.0049  | 328.5627 | -831.4899 | 115.4453  | -382.7806 |
| 157   | 908.3131  | -111.9226 | 372.9008 | -710.8369 | 131.5409  | -427.3615 |
| 158   | 769.9952  | -129.0071 | 420.0982 | -536.1284 | 148.8253  | -474.9093 |
| 159   | 574.2670  | -147.3011 | 469.6370 | -301.4054 | 167.2919  | -524.6868 |
| 160   | 314.8992  | -166.7737 | 521.4098 | -0.0452   | 184.9384  | -571.9292 |

ENVOLVENTE MINIMOS TORSORES TREN IPF-B, l=15 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====     | =====     | =====     | =====    |
| 1     | 0.0406     | 138.3418  | -537.3465 | -247.2670 | -136.8097 | 533.9436 |
| 2     | 220.8412   | 122.1275  | -493.6089 | -434.4000 | -119.0014 | 486.5587 |
| 3     | 385.3163   | 105.3247  | -448.1355 | -566.6979 | -102.1235 | 440.7606 |
| 4     | 497.4429   | 89.2701   | -404.4399 | -647.6157 | -86.0057  | 396.7984 |
| 5     | 563.4600   | 74.3278   | -362.6757 | -684.4504 | -71.5202  | 356.1326 |
| 6     | 584.6691   | 60.4190   | -323.8939 | -684.5436 | -58.2505  | 318.3698 |
| 7     | 579.1729   | 48.5024   | -288.4104 | -647.2328 | -45.1425  | 279.9733 |
| 8     | 520.8673   | 35.0920   | -251.8664 | -562.5536 | -31.7168  | 243.2052 |
| 9     | 448.9275   | 23.8381   | -217.5647 | -468.3190 | -20.4701  | 208.5940 |
| 10    | 354.1751   | 13.4195   | -184.7726 | -353.1379 | -10.5719  | 176.9118 |
| 11    | 242.5757   | 4.4390    | -155.3772 | -235.7928 | -2.2804   | 149.2547 |
| 12    | 115.9274   | -3.7683   | -129.8099 | -79.0769  | 7.0523    | 120.2842 |
| 13    | -18.8681   | -11.5877  | -102.9085 | 229.5674  | 9.8184    | 94.5426  |
| 14    | -318.8866  | -13.6229  | -79.3686  | 343.4055  | 13.6229   | 79.3700  |
| 15    | -420.8659  | -16.6872  | -66.3126  | 450.9049  | 16.6872   | 66.3120  |
| 16    | -515.5241  | -19.0806  | -55.0076  | 549.8730  | 19.0806   | 55.0059  |
| 17    | -601.3151  | -20.8603  | -46.6082  | 638.8587  | 20.8603   | 46.6089  |
| 18    | -675.8984  | -22.0742  | -39.4119  | 715.6381  | 22.0742   | 39.4122  |
| 19    | -738.0538  | -22.7719  | -34.6365  | 779.0374  | 22.7719   | 34.6356  |
| 20    | -786.6851  | -22.9924  | -31.7969  | 1054.3204 | 14.5096   | 59.8193  |
| 21    | -1034.7521 | 171.1774  | -572.8137 | 578.5201  | -201.4473 | 639.3987 |
| 22    | -593.4822  | 182.6384  | -588.2148 | 203.1587  | -180.5106 | 582.4319 |
| 23    | -238.8140  | 162.2907  | -533.7165 | -107.2417 | -159.9887 | 527.6514 |
| 24    | 50.1196    | 142.5147  | -481.5034 | -345.3875 | -139.2671 | 473.3338 |
| 25    | 267.6320   | 122.7759  | -429.8418 | -527.1225 | -119.5912 | 421.7062 |
| 26    | 431.0577   | 104.1459  | -380.6581 | -648.9247 | -101.3396 | 373.6544 |
| 27    | 536.4555   | 86.8588   | -335.3006 | -713.9804 | -83.9370  | 328.0910 |
| 28    | 589.1825   | 70.7573   | -292.7119 | -720.5091 | -66.6985  | 282.8963 |
| 29    | 584.9128   | 54.4881   | -250.0310 | -686.7196 | -50.8458  | 240.7446 |
| 30    | 531.6735   | 38.5098   | -210.5370 | -596.1341 | -35.3164  | 202.5146 |
| 31    | 469.8194   | 26.9139   | -175.3378 | -505.5724 | -23.6855  | 167.0234 |
| 32    | 348.7824   | 14.0608   | -142.2694 | -341.1631 | -9.6806   | 130.8197 |
| 33    | 208.6410   | 2.4809    | -108.9785 | 9.2870    | 1.1772    | 104.0460 |
| 34    | -132.5399  | -7.2498   | -84.8657  | 148.8617  | 7.2498    | 84.8659  |
| 35    | -273.0968  | -12.8584  | -68.5211  | 302.0333  | 12.8584   | 68.5223  |
| 36    | -395.8579  | -16.7373  | -54.9869  | 433.5122  | 16.7373   | 54.9874  |
| 37    | -508.5819  | -19.5882  | -43.7631  | 552.6692  | 19.5882   | 43.7639  |
| 38    | -607.6132  | -21.5257  | -35.8672  | 656.0357  | 21.5257   | 35.8665  |
| 39    | -689.6101  | -22.6275  | -29.7874  | 740.5266  | 22.6275   | 29.7853  |
| 40    | -752.0059  | -22.9780  | -26.7294  | 1031.6046 | 14.3878   | 46.4097  |
| 41    | -1014.7434 | 170.8353  | -564.7862 | 559.5084  | -201.0463 | 638.6618 |
| 42    | -573.6540  | 182.0492  | -587.4942 | 184.2537  | -179.9072 | 581.7058 |
| 43    | -221.1453  | 161.7183  | -532.9443 | -124.0468 | -159.4071 | 526.8701 |
| 44    | 65.6129    | 141.9841  | -480.7124 | -360.0047 | -138.7220 | 472.5456 |
| 45    | 280.7111   | 122.2836  | -429.0745 | -539.2008 | -119.0982 | 420.9398 |
| 46    | 441.6003   | 103.7308  | -379.9124 | -658.5809 | -100.9257 | 372.9303 |
| 47    | 544.5110   | 86.5129   | -334.6963 | -721.3163 | -83.5904  | 327.4872 |
| 48    | 595.2215   | 70.4824   | -291.9855 | -725.8770 | -66.4209  | 282.1401 |
| 49    | 589.1498   | 54.2823   | -249.3028 | -690.4341 | -50.6491  | 240.0951 |
| 50    | 549.9012   | 39.9046   | -210.1009 | -617.4164 | -36.7068  | 202.0257 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====     | =====     | =====     | =====    |
| 51    | 456.3107   | 25.6516   | -174.5598 | -489.1471 | -22.4300  | 166.2522 |
| 52    | 349.7836   | 14.0988   | -141.6776 | -342.1275 | -9.7289   | 130.2591 |
| 53    | 201.8791   | 2.1602    | -108.3587 | 16.7366   | 1.5296    | 104.0279 |
| 54    | -145.0114  | -7.7923   | -84.9121  | 162.5467  | 7.7923    | 84.9127  |
| 55    | -272.6849  | -12.6899  | -68.5281  | 301.2292  | 12.6899   | 68.5278  |
| 56    | -394.8616  | -16.5109  | -54.7537  | 432.0060  | 16.5109   | 54.7545  |
| 57    | -507.3969  | -19.3606  | -43.9818  | 550.9756  | 19.3606   | 43.9832  |
| 58    | -605.8187  | -21.2758  | -35.5253  | 653.6765  | 21.2758   | 35.5255  |
| 59    | -687.1616  | -22.3649  | -29.8534  | 737.4786  | 22.3649   | 29.8529  |
| 60    | -748.9605  | -22.7112  | -26.8005  | 1026.9332 | 14.0817   | 46.1244  |
| 61    | -1006.1278 | 170.2623  | -564.3038 | 552.1830  | -200.4077 | 638.4603 |
| 62    | -569.3600  | 181.8284  | -587.4115 | 180.4254  | -179.6857 | 581.6398 |
| 63    | -216.6334  | 161.3472  | -532.8853 | -127.7327 | -159.0327 | 526.8104 |
| 64    | 69.1528    | 141.6051  | -480.6659 | -362.7045 | -138.3405 | 472.5016 |
| 65    | 283.2580   | 121.8960  | -429.0441 | -540.8538 | -118.7055 | 420.9218 |
| 66    | 442.9719   | 103.3178  | -379.9858 | -659.0747 | -100.5039 | 372.9933 |
| 67    | 544.8997   | 86.0828   | -334.6219 | -720.7437 | -83.1623  | 327.4133 |
| 68    | 594.4093   | 70.0447   | -292.0255 | -724.0930 | -65.9820  | 282.2132 |
| 69    | 587.2422   | 53.8665   | -249.4006 | -687.5418 | -50.2374  | 240.1521 |
| 70    | 538.1656   | 38.6598   | -210.0289 | -602.8793 | -35.4710  | 201.9168 |
| 71    | 443.2205   | 26.3926   | -174.4814 | -477.7173 | -23.1711  | 166.1770 |
| 72    | 338.3349   | 14.8430   | -141.6282 | -332.3600 | -10.4771  | 130.2476 |
| 73    | 193.8274   | 3.1931    | -108.3557 | 24.4167   | 0.1593    | 104.0637 |
| 74    | -151.6894  | -6.1869   | -84.9791  | 165.6563  | 6.1730    | 84.9799  |
| 75    | -275.3911  | -11.0535  | -68.5242  | 300.2680  | 11.0410   | 68.5242  |
| 76    | -394.0546  | -14.7571  | -54.8882  | 427.2768  | 14.7696   | 54.8907  |
| 77    | -502.5050  | -17.7093  | -44.0729  | 542.3423  | 17.7093   | 44.0730  |
| 78    | -596.8624  | -19.5211  | -35.4919  | 640.7881  | 19.5211   | 35.4920  |
| 79    | -674.8309  | -20.7163  | -30.0060  | 721.9213  | 20.7795   | 30.0054  |
| 80    | -736.2825  | -21.5204  | -26.9447  | 1014.3208 | 13.1602   | 46.2837  |
| 81    | -988.0567  | 169.5340  | -564.4422 | 535.7252  | -199.6931 | 638.5995 |
| 82    | -550.6821  | 180.7850  | -587.4083 | 163.9962  | -178.6420 | 581.6169 |
| 83    | -200.8557  | 160.4338  | -532.8521 | -141.3546 | -158.1197 | 526.7720 |
| 84    | 82.8716    | 140.7000  | -480.5865 | -374.3847 | -137.4362 | 472.4311 |
| 85    | 294.8848   | 121.0021  | -429.0345 | -550.5654 | -117.8146 | 420.8917 |
| 86    | 449.4215   | 102.5826  | -379.7629 | -663.7780 | -99.7735  | 372.8144 |
| 87    | 552.8049   | 85.3962   | -334.8546 | -727.0919 | -82.4732  | 327.6441 |
| 88    | 591.9073   | 69.6735   | -291.9343 | -720.7819 | -65.6106  | 282.0276 |
| 89    | 576.8342   | 52.5997   | -249.0886 | -674.3173 | -48.9633  | 239.8564 |
| 90    | 533.7439   | 38.2330   | -209.9046 | -597.4841 | -35.0391  | 201.9069 |
| 91    | 455.5559   | 25.5192   | -174.6174 | -488.0760 | -22.2958  | 166.2673 |
| 92    | 331.1482   | 15.6753   | -141.5456 | -327.0668 | -11.3195  | 130.1441 |
| 93    | 194.2230   | 4.1555    | -108.3100 | 21.9979   | -0.8391   | 104.0410 |
| 94    | -145.9736  | -4.9804   | -84.9280  | 157.2708  | 4.9556    | 84.9293  |
| 95    | -267.0117  | -9.8408   | -68.5480  | 289.1263  | 9.8658    | 68.5488  |
| 96    | -382.6939  | -13.6920  | -54.8838  | 413.4883  | 13.6790   | 54.8839  |
| 97    | -488.5638  | -16.5113  | -43.9481  | 525.7177  | 16.5113   | 43.9460  |
| 98    | -580.5467  | -18.4339  | -35.7173  | 622.0410  | 18.4339   | 35.7170  |
| 99    | -655.5224  | -19.5182  | -29.7837  | 699.7465  | 19.5605   | 29.7813  |
| 100   | -715.3159  | -20.4556  | -26.9517  | 991.4565  | 12.1536   | 46.3130  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 101   | -972.2079 | 168.3407  | -564.3327 | 522.5948  | -198.4940 | 638.4801 |
| 102   | -535.7542 | 179.3387  | -587.1556 | 152.4171  | -177.1950 | 581.3443 |
| 103   | -188.6696 | 158.8780  | -532.6065 | -150.0475 | -156.5629 | 526.5456 |
| 104   | 91.4368   | 139.1362  | -480.3649 | -379.5323 | -135.8731 | 472.2009 |
| 105   | 300.0764  | 119.4382  | -428.7153 | -552.2453 | -116.2505 | 420.5827 |
| 106   | 453.8842  | 100.9106  | -379.5430 | -664.5686 | -98.0992  | 372.5683 |
| 107   | 547.5824  | 83.9946   | -334.3653 | -718.6543 | -81.0706  | 327.1580 |
| 108   | 584.3320  | 68.3700   | -291.6280 | -710.2512 | -64.3044  | 281.8119 |
| 109   | 574.9241  | 52.3763   | -249.1165 | -671.8973 | -48.7396  | 239.8675 |
| 110   | 529.8349  | 38.1435   | -209.6486 | -593.3822 | -34.9611  | 201.5834 |
| 111   | 451.4829  | 25.4279   | -174.2981 | -483.8030 | -22.1922  | 165.9910 |
| 112   | 328.5715  | 15.4111   | -141.3221 | -323.8857 | -11.0525  | 129.9098 |
| 113   | 190.9354  | 3.9202    | -108.0499 | 25.6045   | -0.6047   | 103.7573 |
| 114   | -149.6108 | -5.1876   | -84.6520  | 161.4311  | 5.1485    | 84.6524  |
| 115   | -271.6440 | -9.8732   | -68.2848  | 293.8408  | 9.8850    | 68.2853  |
| 116   | -387.3037 | -13.6975  | -54.6239  | 418.1301  | 13.7106   | 54.6270  |
| 117   | -493.1031 | -16.5475  | -43.5350  | 530.3327  | 16.5476   | 43.5355  |
| 118   | -585.0691 | -18.4576  | -35.2986  | 626.6071  | 18.4576   | 35.2991  |
| 119   | -661.8073 | -19.8888  | -29.8070  | 706.5621  | 19.8888   | 29.8055  |
| 120   | -718.0040 | -20.2364  | -26.2922  | 993.4830  | 11.9838   | 45.5975  |
| 121   | -976.3613 | 168.8887  | -558.6170 | 525.5820  | -199.0121 | 632.8153 |
| 122   | -538.8115 | 179.8602  | -581.4979 | 154.2030  | -177.6994 | 575.6880 |
| 123   | -190.6901 | 159.3985  | -526.9607 | -149.2441 | -157.0686 | 520.8924 |
| 124   | 90.4830   | 139.6751  | -474.7599 | -379.7339 | -136.3864 | 466.5742 |
| 125   | 300.1264  | 119.9999  | -422.9951 | -553.5615 | -116.8018 | 414.8506 |
| 126   | 454.7848  | 101.5319  | -373.8305 | -666.8167 | -98.7069  | 366.8712 |
| 127   | 553.2767  | 84.5089   | -328.8408 | -725.3984 | -81.5768  | 321.6102 |
| 128   | 588.4385  | 69.0977   | -285.9193 | -715.9054 | -65.0225  | 276.0676 |
| 129   | 581.0799  | 53.1594   | -243.3982 | -679.7607 | -49.5189  | 234.1919 |
| 130   | 537.8138  | 39.0028   | -204.1027 | -603.2297 | -35.8056  | 195.9871 |
| 131   | 445.6138  | 27.6804   | -168.5321 | -483.0384 | -24.4552  | 160.2287 |
| 132   | 344.7934  | 16.2111   | -135.7081 | -342.0096 | -11.8525  | 124.3300 |
| 133   | 208.5681  | 5.0111    | -102.4527 | 2.3873    | -1.8556   | 98.1960  |
| 134   | -124.9524 | -3.8978   | -79.0619  | 133.8222  | 3.8702    | 79.0615  |
| 135   | -242.1272 | -8.6503   | -62.6707  | 261.5740  | 8.6635    | 62.6700  |
| 136   | -353.5958 | -12.4246  | -49.1099  | 381.5641  | 12.4389   | 49.1110  |
| 137   | -455.1975 | -15.2063  | -38.0501  | 489.3647  | 15.1919   | 38.0492  |
| 138   | -543.0329 | -17.0954  | -29.8149  | 581.5829  | 17.1098   | 29.8136  |
| 139   | -614.1801 | -18.1767  | -24.1090  | 657.4802  | 18.4855   | 24.1080  |
| 140   | -671.5815 | -19.2045  | -20.8392  | 914.7288  | 10.3382   | 36.8634  |
| 141   | -899.1754 | 174.5478  | -437.4514 | 538.4017  | -205.1855 | 510.9877 |
| 142   | -547.5897 | 189.6831  | -470.4163 | 225.1494  | -187.4948 | 463.5041 |
| 143   | -249.6737 | 172.4991  | -424.6498 | -44.3923  | -170.0923 | 417.3902 |
| 144   | 4.4067    | 155.6671  | -380.5953 | -270.2129 | -153.0464 | 373.0693 |
| 145   | 215.6820  | 139.2446  | -338.4407 | -458.7398 | -137.8526 | 334.5458 |
| 146   | 390.1941  | 124.7396  | -301.8248 | -598.6351 | -121.8212 | 293.8378 |
| 147   | 517.8984  | 109.4272  | -263.3323 | -698.1994 | -106.2952 | 255.0331 |
| 148   | 604.7662  | 94.7183   | -226.4344 | -757.1357 | -91.3834  | 217.8165 |
| 149   | 645.0390  | 81.0378   | -191.2663 | -770.6175 | -77.5205  | 182.3885 |
| 150   | 663.3531  | 67.4775   | -158.1566 | -772.7563 | -65.6477  | 153.5794 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 658.3237 | 56.5855   | -131.2186 | -731.6744 | -52.7817  | 121.8630 |
| 152   | 611.6501 | 44.8820   | -101.6657 | -673.9038 | -39.9201  | 88.4091  |
| 153   | 560.0360 | 32.6438   | -70.4737  | -396.7578 | -25.2465  | 67.4766  |
| 154   | 291.5379 | 18.5403   | -51.6160  | -324.8832 | -18.5423  | 51.6148  |
| 155   | 208.0173 | 14.5026   | -37.6539  | -231.1175 | -14.8365  | 37.6558  |
| 156   | 138.8806 | 10.4992   | -25.9359  | -157.8793 | -10.4860  | 25.9362  |
| 157   | 82.4389  | 6.7835    | -16.4093  | -94.5129  | -6.8087   | 16.4097  |
| 158   | 34.2700  | 4.4561    | -8.8617   | -42.2936  | -4.4560   | 8.8624   |
| 159   | 4.0104   | 2.9380    | -3.4129   | -9.3192   | -2.9261   | 3.4134   |
| 160   | -4.3505  | 2.4163    | -0.0287   | 0.0000    | -2.4162   | 0.0288   |

ENVOLVENTE MAXIMOS FLECTORES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====      | =====     | =====     |
| 1     | 0.0000    | -0.5338   | 0.6107    | -73.8452   | -41.0343  | -112.2372 |
| 2     | 301.4827  | 160.3311  | 466.2568  | -566.1662  | -132.0596 | -389.1919 |
| 3     | 566.0264  | 132.0587  | 389.3833  | -797.3013  | -114.3405 | -342.6811 |
| 4     | 797.2011  | 114.3243  | 342.8908  | -990.8384  | -102.7591 | -313.0742 |
| 5     | 990.8485  | 102.7562  | 313.0805  | -1149.5400 | -80.6511  | -252.9571 |
| 6     | 1149.4546 | 80.6717   | 253.3479  | -1276.6736 | -58.5788  | -193.2120 |
| 7     | 1276.6821 | 58.5809   | 193.2073  | -1365.0834 | -47.1398  | -163.4898 |
| 8     | 1364.9927 | 47.0888   | 164.3013  | -1419.5485 | -18.9407  | -87.2714  |
| 9     | 1419.5734 | 18.9133   | 86.7914   | -1440.8608 | -1.5073   | -40.1562  |
| 10    | 1440.8254 | 1.4686    | 41.1330   | -1428.5872 | 14.3987   | 2.0523    |
| 11    | 1428.6055 | -14.3884  | -2.1442   | -1382.4199 | 31.6102   | 48.8038   |
| 12    | 1382.4344 | -31.5955  | -48.3315  | -1304.9117 | 59.5685   | 125.3402  |
| 13    | 1304.9062 | -59.5686  | -125.3239 | -1196.0320 | 70.5128   | 155.1044  |
| 14    | 1196.0968 | -70.5425  | -154.6978 | -1052.8160 | 81.3521   | 184.4614  |
| 15    | 1052.8579 | -81.3391  | -184.1698 | -878.9788  | 98.0805   | 230.9029  |
| 16    | 878.9004  | -98.0844  | -231.1516 | -676.8724  | 125.7991  | 308.2031  |
| 17    | 677.2875  | -124.0008 | -299.9037 | -450.4842  | 140.4853  | 346.5765  |
| 18    | 496.1150  | -89.4055  | -223.0059 | -333.7239  | 99.6099   | 252.7519  |
| 19    | 371.0958  | -56.8470  | -150.6658 | -297.6113  | 42.8401   | 126.5179  |
| 20    | 328.1690  | -4.4279   | -30.7780  | -307.2383  | 22.3390   | 69.0069   |
| 21    | 329.6721  | -29.3907  | 23.6047   | -255.6549  | 32.9006   | -25.2492  |
| 22    | 276.4384  | -16.1485  | 66.8911   | -260.8385  | 7.9221    | -63.5859  |
| 23    | 310.9443  | 38.5985   | 183.8541  | -385.4340  | -29.9853  | -159.4846 |
| 24    | 428.4406  | 68.1618   | 258.4000  | -542.4599  | -35.8937  | -169.0692 |
| 25    | 600.8046  | 83.9044   | 303.8677  | -776.8708  | -63.6975  | -248.3998 |
| 26    | 842.3089  | 112.0746  | 279.2750  | -1081.7603 | -102.7606 | -254.8500 |
| 27    | 1081.6426 | 102.7661  | 255.3627  | -1274.7754 | -82.3169  | -199.9308 |
| 28    | 1274.7657 | 82.3191   | 199.9224  | -1417.1921 | -49.6065  | -110.6810 |
| 29    | 1417.1440 | 49.6123   | 111.0559  | -1510.1683 | -29.0533  | -55.6870  |
| 30    | 1510.1178 | 29.0505   | 56.4375   | -1554.0316 | -8.4704   | -0.9603   |
| 31    | 1554.0183 | 8.4815    | 0.5445    | -1548.7684 | 12.1030   | 54.8514   |
| 32    | 1548.8103 | -12.1284  | -53.6575  | -1494.3450 | 32.6824   | 109.0057  |
| 33    | 1494.3484 | -32.6513  | -108.9979 | -1391.0839 | 53.1700   | 164.5173  |
| 34    | 1391.1022 | -53.1313  | -164.5051 | -1238.3394 | 85.7865   | 253.7210  |
| 35    | 1238.4705 | -85.7765  | -253.1164 | -1036.1306 | 106.1577  | 308.4807  |
| 36    | 1036.2976 | -106.1382 | -307.9534 | -788.6307  | 115.3192  | 332.5028  |
| 37    | 807.1266  | -88.2360  | -313.1207 | -575.8214  | 108.3337  | 368.6425  |
| 38    | 625.6336  | -67.3281  | -247.5438 | -441.0146  | 99.4690   | 336.7004  |
| 39    | 499.5621  | -51.0811  | -209.7072 | -410.4593  | 35.4742   | 177.7208  |
| 40    | 459.6694  | 10.8249   | -57.4553  | -463.7732  | 10.6661   | 105.6267  |
| 41    | 499.5865  | -34.2279  | 22.5808   | -417.0907  | 33.5886   | -20.4778  |
| 42    | 438.9014  | -16.8686  | 62.1345   | -414.1665  | 1.5988    | -93.5937  |
| 43    | 468.3693  | 44.7932   | 213.7836  | -532.2259  | -24.8491  | -158.3552 |
| 44    | 581.1683  | 73.4617   | 285.6337  | -707.5795  | -41.1780  | -196.3304 |
| 45    | 749.3918  | 78.2864   | 302.7770  | -913.1324  | -58.0712  | -247.3202 |
| 46    | 988.1284  | 106.0387  | 278.2476  | -1214.2612 | -96.7217  | -253.7903 |
| 47    | 1214.1744 | 96.7297   | 254.1065  | -1393.8483 | -76.2732  | -198.6715 |
| 48    | 1393.7882 | 76.2947   | 198.9628  | -1522.6321 | -43.5844  | -109.7751 |
| 49    | 1522.6016 | 43.5554   | 110.1931  | -1601.9331 | -22.9978  | -54.7282  |
| 50    | 1601.9136 | 22.9675   | 54.7254   | -1632.0696 | -2.3931   | 0.6799    |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====      | =====     | =====     |
| 51    | 1632.0742 | 2.3751    | 0.1189    | -1612.9504 | 18.2062   | 55.2920   |
| 52    | 1612.9423 | -18.2296  | -55.2770  | -1544.6565 | 38.7802   | 110.6855  |
| 53    | 1544.6935 | -38.8003  | -109.9269 | -1427.5382 | 59.3124   | 165.2774  |
| 54    | 1427.5692 | -59.3083  | -164.8841 | -1260.7712 | 91.9557   | 254.1135  |
| 55    | 1260.8275 | -91.9701  | -253.8402 | -1044.5060 | 112.3398  | 309.3270  |
| 56    | 1044.5100 | -112.3504 | -309.3167 | -782.9385  | 121.4985  | 333.8366  |
| 57    | 811.0098  | -78.2892  | -302.9342 | -602.0444  | 98.3728   | 358.4311  |
| 58    | 642.9155  | -61.3171  | -252.0060 | -471.9202  | 93.4411   | 341.2021  |
| 59    | 531.5860  | -44.8612  | -213.8858 | -456.6893  | 29.2244   | 181.8437  |
| 60    | 506.4019  | 17.1495   | -61.4953  | -524.7375  | 4.3299    | 109.6735  |
| 61    | 560.6448  | -35.8739  | 22.1683   | -480.5869  | 35.4098   | -20.0533  |
| 62    | 502.4931  | -18.6938  | 61.8476   | -468.3392  | 3.2457    | -93.3454  |
| 63    | 522.9175  | 43.1375   | 213.5691  | -583.1090  | -23.1929  | -158.1506 |
| 64    | 632.7065  | 71.7916   | 285.4663  | -755.3935  | -39.5035  | -196.1708 |
| 65    | 797.8393  | 76.5823   | 302.6211  | -957.7652  | -56.3622  | -247.1379 |
| 66    | 1033.3483 | 103.9499  | 277.9428  | -1254.8564 | -94.6227  | -253.4836 |
| 67    | 1254.7532 | 94.6164   | 254.1240  | -1429.6455 | -74.1544  | -198.6877 |
| 68    | 1429.6514 | 74.1336   | 198.6873  | -1553.6676 | -41.4214  | -109.4260 |
| 69    | 1553.6538 | 41.4521   | 109.7589  | -1628.2401 | -20.9074  | -54.3575  |
| 70    | 1628.2106 | 20.8944   | 54.7983   | -1653.6689 | -0.3226   | 0.5396    |
| 71    | 1653.6760 | 0.3389    | 0.2995    | -1629.9741 | 20.2365   | 55.0943   |
| 72    | 1629.9639 | -20.2631  | -55.0942  | -1557.0786 | 40.8176   | 110.5556  |
| 73    | 1557.1000 | -40.8271  | -110.1292 | -1435.3665 | 61.3341   | 165.5131  |
| 74    | 1435.4333 | -61.3117  | -164.8078 | -1264.1239 | 93.9552   | 254.0358  |
| 75    | 1264.1112 | -93.9465  | -254.0944 | -1043.4441 | 114.3068  | 309.5545  |
| 76    | 1043.5447 | -114.3119 | -309.2061 | -777.4186  | 123.4704  | 333.7220  |
| 77    | 808.3601  | -76.8226  | -302.9019 | -602.8312  | 96.8947   | 358.3942  |
| 78    | 643.7484  | -59.8209  | -252.1225 | -476.0850  | 91.9481   | 341.3380  |
| 79    | 535.9025  | -43.3659  | -213.9178 | -464.3583  | 27.7294   | 181.8627  |
| 80    | 514.0919  | 18.6493   | -61.5121  | -535.8262  | -1.1013   | 113.4887  |
| 81    | 571.7101  | -31.8845  | 18.4179   | -492.1467  | 35.3626   | -20.0940  |
| 82    | 514.0558  | -18.6427  | 61.7819   | -479.6977  | 3.1931    | -93.2433  |
| 83    | 534.3124  | 43.1825   | 213.4174  | -594.5912  | -23.2435  | -158.0352 |
| 84    | 644.1129  | 71.8281   | 285.5310  | -766.8719  | -39.5433  | -196.2356 |
| 85    | 809.3488  | 76.6241   | 302.5257  | -969.4290  | -56.4013  | -247.0662 |
| 86    | 1043.4542 | 103.0262  | 278.3552  | -1262.7959 | -93.7042  | -253.8415 |
| 87    | 1262.8677 | 93.7234   | 253.5611  | -1435.8199 | -73.2679  | -198.1000 |
| 88    | 1435.7656 | 73.2732   | 198.8248  | -1557.8057 | -40.5626  | -109.7247 |
| 89    | 1557.7449 | 40.5367   | 110.5083  | -1630.2543 | -19.9698  | -55.0954  |
| 90    | 1630.2629 | 19.9268   | 55.1113   | -1653.5776 | 0.6495    | 0.4084    |
| 91    | 1653.5679 | -0.6827   | -0.4066   | -1627.5657 | 21.2565   | 55.7503   |
| 92    | 1627.6287 | -21.2259  | -54.4891  | -1552.5876 | 41.7694   | 109.9142  |
| 93    | 1552.5636 | -41.7274  | -110.3429 | -1428.8444 | 62.2312   | 165.8204  |
| 94    | 1428.9381 | -62.2265  | -165.1139 | -1255.6611 | 94.8692   | 254.2725  |
| 95    | 1255.7372 | -94.8412  | -253.9225 | -1032.9053 | 115.2085  | 309.3777  |
| 96    | 1032.9833 | -115.2078 | -309.1373 | -765.0185  | 124.3543  | 333.6633  |
| 97    | 796.7334  | -76.7436  | -303.0921 | -591.3468  | 96.8193   | 358.5844  |
| 98    | 632.4518  | -59.7542  | -251.9895 | -464.8662  | 91.8873   | 341.2053  |
| 99    | 524.5796  | -43.3088  | -214.0926 | -452.8972  | 27.6786   | 182.0482  |
| 100   | 502.6867  | 18.6981   | -61.5608  | -524.8848  | -1.1596   | 113.5326  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| ===== |           |           |           |            |           |           |
| 101   | 560.7533  | -30.3990  | 18.4631   | -484.5309  | 33.8779   | -20.1346  |
| 102   | 506.4546  | -17.1630  | 61.6448   | -475.4450  | 1.7084    | -93.1223  |
| 103   | 530.0402  | 44.6720   | 213.4532  | -593.6508  | -24.7329  | -158.0598 |
| 104   | 643.2115  | 73.3110   | 285.4072  | -769.3435  | -41.0171  | -196.0999 |
| 105   | 811.7868  | 78.0865   | 302.5369  | -975.1567  | -57.8664  | -247.0672 |
| 106   | 1044.2646 | 101.0772  | 277.9904  | -1259.3055 | -91.7494  | -253.5212 |
| 107   | 1259.2444 | 91.7442   | 253.7979  | -1427.6290 | -71.2890  | -198.3761 |
| 108   | 1427.5634 | 71.2630   | 198.7473  | -1545.0923 | -38.5433  | -109.4955 |
| 109   | 1545.0649 | 38.5225   | 109.4908  | -1613.0865 | -17.9657  | -54.0797  |
| 110   | 1613.0665 | 17.9904   | 54.8909   | -1632.0040 | 2.5756    | 0.5122    |
| 111   | 1632.0233 | -2.5859   | -0.5099   | -1601.7423 | 23.1650   | 55.9161   |
| 112   | 1601.7838 | -23.2238  | -55.1084  | -1522.2164 | 43.7825   | 110.5116  |
| 113   | 1522.2024 | -43.7885  | -110.5004 | -1393.8363 | 64.2981   | 165.9202  |
| 114   | 1393.9434 | -64.3288  | -165.2304 | -1215.9268 | 96.9726   | 254.3806  |
| 115   | 1216.0045 | -96.9567  | -254.0397 | -988.4176  | 117.3237  | 309.4982  |
| 116   | 988.4702  | -117.3274 | -309.2967 | -715.7437  | 126.4704  | 333.8538  |
| 117   | 748.3779  | -78.5077  | -303.4261 | -539.1334  | 98.5760   | 358.9309  |
| 118   | 580.8520  | -61.4679  | -252.3476 | -409.5639  | 93.5917   | 341.5130  |
| 119   | 470.0104  | -44.9755  | -214.1166 | -388.7745  | 29.5225   | 182.1092  |
| 120   | 438.8302  | 16.8626   | -62.0692  | -463.4607  | 0.4990    | 114.0272  |
| 121   | 499.5019  | -24.0418  | 14.2757   | -437.5591  | 27.5312   | -15.9568  |
| 122   | 459.5801  | -10.8284  | 57.4727   | -442.9657  | -4.5962   | -88.9407  |
| 123   | 497.9244  | 50.9029   | 209.2350  | -575.6112  | -30.9458  | -153.8134 |
| 124   | 625.7969  | 79.3385   | 280.9508  | -765.4983  | -47.0320  | -191.6648 |
| 125   | 808.0916  | 88.0635   | 312.6018  | -993.8717  | -67.8257  | -257.1632 |
| 126   | 1036.1688 | 94.9635   | 277.3354  | -1237.3804 | -85.6140  | -252.8111 |
| 127   | 1237.3762 | 85.6399   | 252.7434  | -1391.9377 | -65.1855  | -197.3409 |
| 128   | 1391.8425 | 65.1846   | 198.0854  | -1495.5658 | -32.4571  | -108.8740 |
| 129   | 1495.5576 | 32.4485   | 108.8718  | -1549.8062 | -11.8717  | -53.4012  |
| 130   | 1549.8085 | 11.8531   | 53.7474   | -1554.8137 | 8.7318    | 1.5838    |
| 131   | 1554.7999 | -8.7581   | -0.7519   | -1510.5164 | 29.3408   | 56.1777   |
| 132   | 1510.5154 | -29.3355  | -56.2468  | -1417.1824 | 49.8864   | 111.7085  |
| 133   | 1417.1774 | -49.9018  | -111.3380 | -1275.0305 | 70.4060   | 166.7493  |
| 134   | 1275.0614 | -70.3978  | -166.3998 | -1083.3668 | 103.0527  | 255.6191  |
| 135   | 1083.4358 | -103.0710 | -255.3782 | -842.3483  | 123.4240  | 310.7968  |
| 136   | 842.5004  | -123.4169 | -310.4287 | -556.5720  | 132.5475  | 334.9480  |
| 137   | 599.8360  | -84.1408  | -304.4427 | -378.4457  | 104.1910  | 359.9561  |
| 138   | 428.2216  | -56.1605  | -225.0741 | -269.6030  | 88.2616   | 314.2659  |
| 139   | 312.5566  | -50.0703  | -215.2720 | -222.0915  | 30.3464   | 186.9996  |
| 140   | 276.6042  | 16.1740   | -66.8283  | -292.7472  | 5.3415    | 115.0101  |
| 141   | 329.8693  | -5.6492   | -3.4033   | -313.3756  | 9.1624    | 1.7326    |
| 142   | 328.3043  | 4.4230    | 31.0370   | -331.1978  | -24.3417  | -71.3561  |
| 143   | 369.7937  | 62.7483   | 166.8377  | -455.3941  | -46.4295  | -120.2450 |
| 144   | 494.9421  | 89.1717   | 222.5673  | -630.7363  | -61.5342  | -145.4912 |
| 145   | 676.8982  | 112.5870  | 269.1830  | -876.9915  | -95.9922  | -222.4770 |
| 146   | 880.0045  | 97.8005   | 230.4534  | -1053.8164 | -93.2422  | -217.5305 |
| 147   | 1053.8247 | 93.2915   | 217.5302  | -1194.5151 | -76.3823  | -170.8390 |
| 148   | 1194.4703 | 76.3726   | 171.1831  | -1303.3910 | -48.4625  | -94.2193  |
| 149   | 1303.3381 | 48.4608   | 94.6476   | -1382.7667 | -31.3355  | -47.9776  |
| 150   | 1382.7622 | 31.3415   | 47.9924   | -1428.7153 | -14.0910  | -1.3322   |

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| ===== |           |           |           |            |           |          |
| 151   | 1428.7205 | 14.0653   | 1.7967    | -1440.4297 | 1.8142    | 41.3845  |
| 152   | 1440.4352 | -1.8253   | -40.9744  | -1418.8442 | 29.9099   | 117.9901 |
| 153   | 1418.8402 | -29.8818  | -117.9857 | -1366.2051 | 35.1392   | 130.9350 |
| 154   | 1366.2073 | -35.1905  | -130.9537 | -1275.0588 | 52.7440   | 177.5622 |
| 155   | 1275.1733 | -52.7738  | -176.8027 | -1149.9331 | 80.9741   | 253.7051 |
| 156   | 1150.0007 | -80.9709  | -253.3406 | -990.6589  | 96.9853   | 296.6449 |
| 157   | 990.5440  | -96.9958  | -296.9603 | -796.3025  | 114.6688  | 343.7147 |
| 158   | 796.4192  | -114.6635 | -343.4595 | -565.9375  | 142.9188  | 420.4986 |
| 159   | 566.0525  | -142.9145 | -420.3386 | -301.9521  | 160.6503  | 467.0527 |
| 160   | 302.0996  | -160.6407 | -466.9588 | 0.0326     | 131.8800  | 395.2644 |



ENVOLVENTE MAXIMOS CORTANTES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 1     | -0.0374    | 178.0972  | 513.0416 | -301.4861  | -160.3370 | -466.2619 |
| 2     | 289.3432   | 160.7841  | 469.2335 | -553.7326  | -143.0510 | -422.5062 |
| 3     | 519.5847   | 144.4014  | 427.4961 | -748.7986  | -126.7066 | -380.8029 |
| 4     | 696.0260   | 128.9371  | 387.6187 | -891.7812  | -111.2994 | -340.9154 |
| 5     | 823.6690   | 114.4300  | 349.3658 | -1002.2824 | -98.4387  | -306.1379 |
| 6     | 921.6882   | 102.4681  | 316.7016 | -1059.3579 | -84.9382  | -270.0311 |
| 7     | 969.4968   | 89.8174   | 282.0885 | -1079.8241 | -72.3667  | -235.4840 |
| 8     | 983.3999   | 78.0551   | 249.9035 | -1068.4553 | -60.6915  | -203.2298 |
| 9     | 968.6379   | 67.2420   | 218.5599 | -1030.7162 | -50.0036  | -171.9408 |
| 10    | 929.8180   | 57.3518   | 189.9928 | -995.3803  | -41.5746  | -146.7853 |
| 11    | 896.1401   | 49.7571   | 165.9615 | -920.3395  | -32.7198  | -119.3081 |
| 12    | 825.0195   | 41.6565   | 140.5957 | -832.9816  | -24.7536  | -93.9351  |
| 13    | 743.7127   | 34.4205   | 116.7722 | -737.8087  | -17.6737  | -70.0930  |
| 14    | 656.4733   | 28.0320   | 94.9380  | -639.0797  | -11.4479  | -48.2644  |
| 15    | 567.3526   | 22.4971   | 74.8523  | -567.3216  | -7.0823   | -31.5475  |
| 16    | 506.6932   | 18.7535   | 59.6584  | -472.6710  | -2.4449   | -13.0938  |
| 17    | 424.1838   | 14.7157   | 43.5532  | -385.2008  | 1.3947    | 2.7782    |
| 18    | 349.7696   | 11.4244   | 28.9753  | -345.0552  | 3.3598    | 24.8614   |
| 19    | 323.1641   | 9.9690    | 8.9466   | -328.1552  | 4.4273    | 30.8975   |
| 20    | 320.0446   | 9.3525    | 4.6470   | -212.3592  | -16.0395  | -29.1007  |
| 21    | -1692.9976 | 229.4472  | 546.5044 | 1203.8984  | -233.0746 | -546.9961 |
| 22    | -1213.9646 | 233.3792  | 549.6548 | 746.5443   | -213.4610 | -494.2291 |
| 23    | -775.7925  | 214.4006  | 498.9202 | 350.0575   | -194.3321 | -443.3883 |
| 24    | -397.7015  | 196.0048  | 450.8147 | 13.2231    | -175.7976 | -395.2796 |
| 25    | -78.6814   | 178.2667  | 405.0688 | -248.1205  | -156.7521 | -346.7815 |
| 26    | 166.1193   | 160.0944  | 358.9307 | -469.3572  | -139.6437 | -303.5628 |
| 27    | 373.0277   | 143.9250  | 318.1172 | -637.7167  | -123.4108 | -262.6799 |
| 28    | 529.6772   | 128.6698  | 279.4390 | -757.5144  | -108.1126 | -223.9895 |
| 29    | 640.4353   | 114.4000  | 243.2256 | -812.4189  | -92.5284  | -185.0219 |
| 30    | 689.4761   | 99.8601   | 206.7191 | -848.2937  | -79.2846  | -151.2398 |
| 31    | 723.0610   | 87.6863   | 174.8091 | -851.6173  | -67.1476  | -119.4244 |
| 32    | 727.3106   | 76.6201   | 145.9522 | -828.3467  | -56.1262  | -90.5695  |
| 33    | 708.5912   | 66.6759   | 118.9145 | -759.6896  | -45.0730  | -60.5702  |
| 34    | 647.7892   | 56.6827   | 91.2680  | -701.9171  | -36.4044  | -35.8362  |
| 35    | 601.0062   | 49.0334   | 69.1356  | -636.9872  | -28.8747  | -13.7394  |
| 36    | 549.9740   | 42.4956   | 49.3194  | -571.1476  | -22.4783  | 6.1464    |
| 37    | 500.5201   | 37.0411   | 31.4064  | -422.5078  | -18.3152  | 44.2749   |
| 38    | 370.2628   | 33.7753   | -3.9020  | -426.0006  | -15.7788  | 53.7307   |
| 39    | 393.5622   | 32.0512   | -11.4796 | -445.4327  | -14.0488  | 61.3214   |
| 40    | 433.6579   | 31.0705   | -16.4443 | -381.9567  | -30.9120  | -1.1268   |
| 41    | -1888.7415 | 235.0337  | 541.8990 | 1385.6737  | -238.5922 | -542.9074 |
| 42    | -1396.0044 | 238.9033  | 545.5194 | 915.4588   | -218.9645 | -490.0887 |
| 43    | -945.2986  | 219.9333  | 494.9613 | 506.4773   | -199.8431 | -439.4376 |
| 44    | -555.2388  | 201.5455  | 446.7135 | 157.9877   | -181.3279 | -391.2009 |
| 45    | -224.6272  | 183.8399  | 401.0088 | -114.9650  | -162.3186 | -342.7331 |
| 46    | 31.7133    | 165.7239  | 354.7974 | -347.6770  | -145.2766 | -299.3983 |
| 47    | 250.1593   | 149.6072  | 313.8744 | -527.6944  | -129.0927 | -258.4394 |
| 48    | 418.3744   | 134.4152  | 275.2770 | -659.0480  | -113.8670 | -219.8707 |
| 49    | 540.8880   | 120.1976  | 239.0765 | -725.7394  | -98.3357  | -180.7843 |
| 50    | 601.9312   | 105.7207  | 202.2244 | -773.7713  | -85.1448  | -146.8272 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 647.6195   | 93.5995   | 170.8374 | -789.3519 | -73.0657  | -115.4247 |
| 52    | 664.4574   | 82.5921   | 141.4939 | -778.8257 | -62.1074  | -86.0864  |
| 53    | 658.5454   | 72.7036   | 114.7399 | -722.9886 | -51.1217  | -56.5284  |
| 54    | 610.7374   | 62.7654   | 87.3569  | -678.4673 | -42.4942  | -31.8992  |
| 55    | 577.3554   | 55.1698   | 65.0202  | -627.1066 | -35.0259  | -9.5322   |
| 56    | 540.0300   | 48.6857   | 44.8759  | -575.1574 | -28.6884  | 10.5465   |
| 57    | 504.5456   | 43.2852   | 27.4086  | -442.7266 | -25.2631  | 48.4639   |
| 58    | 390.5277   | 40.7483   | -8.4501  | -461.9530 | -22.7525  | 58.2769   |
| 59    | 429.6174   | 39.0423   | -15.7566 | -497.2199 | -21.0416  | 65.5845   |
| 60    | 485.5156   | 38.0719   | -20.6790 | -443.3017 | -37.2671  | 2.9182    |
| 61    | -1942.5869 | 236.4753  | 542.3199 | 1436.0103 | -240.0190 | -543.3356 |
| 62    | -1446.4911 | 240.3308  | 545.5458 | 962.7180  | -220.3933 | -490.1232 |
| 63    | -992.6215  | 221.3641  | 494.9724 | 550.5625  | -201.2712 | -439.4569 |
| 64    | -599.4180  | 202.9703  | 446.7132 | 198.9530  | -182.7532 | -391.2046 |
| 65    | -265.7088  | 185.2686  | 400.9976 | -77.0943  | -163.7401 | -342.6907 |
| 66    | -6.2103    | 167.1264  | 354.7876 | -312.9808 | -146.6631 | -299.3908 |
| 67    | 215.2591   | 151.0028  | 313.8742 | -495.9191 | -130.4914 | -258.4290 |
| 68    | 386.5608   | 135.8056  | 275.2196 | -630.4239 | -115.2504 | -219.7517 |
| 69    | 512.1730   | 121.6216  | 238.9476 | -700.1467 | -99.7729  | -180.7267 |
| 70    | 576.2742   | 107.1574  | 202.2832 | -751.3092 | -86.5878  | -146.9366 |
| 71    | 625.1253   | 95.0689   | 170.9168 | -770.1397 | -74.5371  | -115.5049 |
| 72    | 645.2236   | 84.0597   | 141.5510 | -762.9019 | -63.5792  | -86.0980  |
| 73    | 642.6357   | 74.1812   | 114.6220 | -710.4395 | -52.5951  | -56.3961  |
| 74    | 598.1543   | 64.2528   | 87.3391  | -669.2498 | -43.9909  | -31.8743  |
| 75    | 568.1576   | 56.6654   | 64.8528  | -621.2586 | -36.5327  | -9.3936   |
| 76    | 534.2147   | 50.1860   | 44.8885  | -433.8650 | -30.1996  | 36.5878   |
| 77    | 363.2333   | 44.8053   | 1.3193   | -443.7784 | -26.8092  | 48.5108   |
| 78    | 391.6132   | 42.2864   | -8.6136  | -466.5103 | -24.2846  | 58.4535   |
| 79    | 434.1817   | 40.5780   | -15.7978 | -505.2360 | -22.5781  | 65.6194   |
| 80    | 493.5325   | 39.6079   | -20.7167 | -454.3956 | -38.7662  | 2.9573    |
| 81    | -1956.1663 | 236.5121  | 542.0465 | 1449.5294 | -240.0524 | -543.0533 |
| 82    | -1459.8835 | 240.3667  | 545.6513 | 975.8502  | -220.4227 | -490.2111 |
| 83    | -1005.7416 | 221.3978  | 495.1341 | 563.7574  | -201.3129 | -439.6580 |
| 84    | -612.7181  | 203.0069  | 446.6661 | 212.1959  | -182.7895 | -391.1568 |
| 85    | -278.8314  | 185.3086  | 401.0727 | -64.1791  | -163.7767 | -342.7850 |
| 86    | -19.2752   | 167.1699  | 354.7644 | -299.9263 | -146.7224 | -299.3066 |
| 87    | 202.4692   | 151.0688  | 313.7671 | -483.3115 | -130.5556 | -258.3217 |
| 88    | 373.8363   | 135.8883  | 275.2320 | -617.8373 | -115.3264 | -219.9067 |
| 89    | 499.5153   | 121.6639  | 239.1617 | -687.6298 | -99.7987  | -180.9050 |
| 90    | 563.7802   | 107.1863  | 202.3145 | -738.9380 | -86.6234  | -146.8145 |
| 91    | 612.8354   | 95.0885   | 170.5706 | -757.8891 | -74.5588  | -115.2258 |
| 92    | 632.9236   | 84.1021   | 141.6635 | -750.7225 | -63.6216  | -86.2211  |
| 93    | 630.5055   | 74.2363   | 114.4486 | -698.4569 | -52.6634  | -56.1547  |
| 94    | 586.2248   | 64.3135   | 87.1114  | -657.4080 | -44.0521  | -31.7178  |
| 95    | 556.3556   | 56.7271   | 64.8543  | -609.6456 | -36.5813  | -9.3859   |
| 96    | 522.5766   | 50.2408   | 44.8391  | -422.3462 | -30.2644  | 36.6344   |
| 97    | 351.7587   | 44.8615   | 1.1639   | -432.4523 | -26.8598  | 48.6766   |
| 98    | 380.2852   | 42.3399   | -8.5220  | -455.3206 | -24.3342  | 58.3800   |
| 99    | 422.9762   | 40.6324   | -16.0119 | -494.1376 | -22.6371  | 65.8221   |
| 100   | 482.4504   | 39.6625   | -20.7800 | -443.4287 | -38.8198  | 3.0140    |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== |            |           |          |           |           |           |
| 101   | -1942.6722 | 234.8122  | 541.6564 | 1439.8405 | -238.3516 | -542.6495 |
| 102   | -1450.0468 | 238.6627  | 545.7553 | 969.9746  | -218.7233 | -490.3424 |
| 103   | -999.9952  | 219.6998  | 494.9151 | 561.8357  | -199.6119 | -439.4215 |
| 104   | -610.6957  | 201.3107  | 446.6238 | 213.8550  | -181.0902 | -391.1046 |
| 105   | -280.6006  | 183.6113  | 400.9137 | -58.5841  | -162.0794 | -342.6257 |
| 106   | -24.8036   | 165.4788  | 354.6558 | -290.6918 | -145.0247 | -299.2405 |
| 107   | 193.0615   | 149.3645  | 313.6958 | -469.9350 | -128.8524 | -258.2727 |
| 108   | 360.5469   | 134.1756  | 275.0947 | -600.7119 | -113.6079 | -219.6287 |
| 109   | 482.5040   | 119.9532  | 238.7457 | -666.8008 | -98.0990  | -180.5101 |
| 110   | 542.8781   | 105.5137  | 202.1447 | -714.2432 | -84.9545  | -146.7358 |
| 111   | 588.1656   | 93.4126   | 170.4904 | -729.4658 | -72.8730  | -115.0884 |
| 112   | 604.5551   | 82.4081   | 141.3874 | -718.4841 | -61.9219  | -85.9714  |
| 113   | 598.3088   | 72.5304   | 114.3461 | -662.3989 | -50.9507  | -56.0982  |
| 114   | 550.2275   | 62.6095   | 87.0210  | -617.5853 | -42.3462  | -31.6228  |
| 115   | 516.6056   | 55.0276   | 64.7394  | -566.0982 | -34.8849  | -9.2655   |
| 116   | 479.1241   | 48.5562   | 44.6964  | -375.4680 | -28.6063  | 36.7858   |
| 117   | 304.9927   | 43.2103   | 0.8864   | -381.9553 | -25.2134  | 48.9462   |
| 118   | 329.9095   | 40.6957   | -8.8008  | -401.2302 | -22.6938  | 58.6359   |
| 119   | 368.9952   | 38.9923   | -16.0305 | -436.4787 | -20.9908  | 65.8659   |
| 120   | 424.8302   | 38.0230   | -21.2487 | -382.1637 | -37.1656  | 3.4778    |
| 121   | -1888.5657 | 229.1806  | 540.7838 | 1398.2330 | -232.6829 | -541.7574 |
| 122   | -1408.4707 | 232.9962  | 544.8434 | 941.0524  | -213.0386 | -489.4244 |
| 123   | -971.1252  | 214.0206  | 494.0145 | 545.6621  | -193.9140 | -438.4940 |
| 124   | -594.4489  | 195.6319  | 445.9560 | 210.4518  | -175.3984 | -390.4665 |
| 125   | -277.3201  | 177.9452  | 400.1319 | -49.0891  | -156.3940 | -341.8643 |
| 126   | -34.2591   | 159.8314  | 353.8859 | -268.4941 | -139.3593 | -298.4168 |
| 127   | 171.0691   | 143.7374  | 312.8867 | -435.1533 | -123.2270 | -257.4897 |
| 128   | 325.9864   | 128.5928  | 274.3571 | -553.5059 | -108.0232 | -218.9221 |
| 129   | 435.6993   | 114.4187  | 238.0356 | -607.4076 | -92.5387  | -179.7484 |
| 130   | 484.0778   | 99.9916   | 201.2734 | -642.9004 | -79.4262  | -145.9342 |
| 131   | 517.4900   | 87.9443   | 169.8704 | -646.4978 | -67.3993  | -114.4310 |
| 132   | 522.5012   | 77.0117   | 140.4777 | -624.2921 | -56.5362  | -85.0241  |
| 133   | 505.1892   | 67.1925   | 113.5087 | -557.4573 | -45.6235  | -55.2573  |
| 134   | 446.5101   | 57.3433   | 86.0611  | -502.3346 | -37.0880  | -30.6068  |
| 135   | 402.6568   | 49.8356   | 63.7153  | -440.8455 | -29.7083  | -8.2882   |
| 136   | 355.2736   | 43.4317   | 43.7761  | -244.6145 | -23.6504  | 37.6577   |
| 137   | 175.5144   | 38.3081   | 0.0253   | -241.4589 | -20.3108  | 49.8099   |
| 138   | 190.7064   | 35.8398   | -9.7050  | -251.1044 | -17.8359  | 59.5478   |
| 139   | 219.9575   | 34.1707   | -17.0856 | -276.5834 | -16.1736  | 66.9084   |
| 140   | 265.7060   | 33.2255   | -22.2023 | -212.8925 | -32.3516  | 5.8072    |
| 141   | -1688.8727 | 212.0846  | 440.0269 | 1315.0647 | -220.0541 | -451.2493 |
| 142   | -1322.0345 | 220.2544  | 453.4805 | 973.7952  | -203.9300 | -406.8255 |
| 143   | -993.6162  | 204.5491  | 411.6998 | 671.6028  | -188.0469 | -364.9977 |
| 144   | -704.7419  | 189.1174  | 370.5062 | 393.7410  | -173.5872 | -327.2047 |
| 145   | -439.2852  | 175.1796  | 335.2242 | 170.8211  | -158.4228 | -288.5262 |
| 146   | -228.4654  | 160.5514  | 298.1676 | -13.4243  | -143.6386 | -251.4663 |
| 147   | -55.2632   | 146.3745  | 263.0763 | -159.8949 | -129.3251 | -216.3912 |
| 148   | 81.2370    | 132.6735  | 229.7771 | -269.6478 | -115.4932 | -183.1713 |
| 149   | 182.6017   | 119.5244  | 198.3669 | -364.4500 | -103.6796 | -155.1256 |
| 150   | 270.7504   | 108.4072  | 172.1459 | -408.5943 | -91.0466  | -125.4929 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|-----------|-----------|----------|
| ===== |          |           |          |           |           |          |
| 151   | 310.1388 | 96.5135   | 144.3368 | -422.8429 | -79.0394  | -97.7225 |
| 152   | 321.8275 | 85.2754   | 118.3559 | -410.0223 | -67.7407  | -71.6864 |
| 153   | 308.9182 | 74.7511   | 94.0882  | -373.4196 | -57.1368  | -47.3831 |
| 154   | 274.7085 | 64.9941   | 71.6002  | -347.5155 | -48.9586  | -28.4106 |
| 155   | 253.8934 | 57.6279   | 54.4527  | -276.7047 | -39.9253  | -7.8604  |
| 156   | 191.0429 | 49.4484   | 35.6391  | -193.5643 | -31.7094  | 11.1306  |
| 157   | 118.7777 | 42.1013   | 18.4747  | 22.6366   | -25.7761  | 47.8403  |
| 158   | -83.4323 | 37.0411   | -16.4238 | 29.7115   | -22.6378  | 56.3178  |
| 159   | -73.4417 | 34.7928   | -23.0858 | 23.7823   | -20.3953  | 62.9559  |
| 160   | -47.2410 | 33.4378   | -27.9168 | 0.0057    | -19.0350  | 67.7993  |



ENVOLVENTE MAXIMOS TORSORES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 1     | -0.0394   | 150.0342  | 539.4589 | -250.9804 | -132.2740 | -492.6781 |
| 2     | 238.8385  | 132.7249  | 495.6510 | -452.7304 | -114.9918 | -448.9229 |
| 3     | 418.5903  | 116.3478  | 453.8676 | -597.2921 | -98.6530  | -407.1741 |
| 4     | 544.5126  | 100.8913  | 413.9382 | -689.7970 | -83.2536  | -367.2354 |
| 5     | 621.6810  | 86.3828   | 375.6821 | -749.8175 | -70.3915  | -332.4535 |
| 6     | 669.2141  | 74.4120   | 342.9046 | -756.3746 | -56.8821  | -296.2356 |
| 7     | 666.5096  | 61.7614   | 308.2945 | -726.3297 | -44.3107  | -261.6925 |
| 8     | 630.0967  | 50.0435   | 275.8368 | -664.7268 | -32.6799  | -229.1611 |
| 9     | 564.7213  | 39.2293   | 244.6717 | -576.3900 | -21.9909  | -198.0500 |
| 10    | 485.3448  | 29.9699   | 215.7073 | -501.6017 | -14.1927  | -172.5008 |
| 11    | 396.7472  | 22.0507   | 191.7179 | -371.1051 | -5.0134   | -145.0649 |
| 12    | 283.4173  | 14.3292   | 166.1144 | -242.1966 | 2.5737    | -119.4544 |
| 13    | 152.9273  | 7.0945    | 142.2804 | -97.8421  | 9.6523    | -95.6023  |
| 14    | 40.7608   | 1.7633    | 120.1714 | 23.9277   | 14.8208   | -73.5008  |
| 15    | -78.8149  | -3.1109   | 99.8574  | 124.9358  | 18.5257   | -56.5530  |
| 16    | -207.9049 | -7.6789   | 84.9101  | 289.5243  | 23.9875   | -38.3469  |
| 17    | -307.8786 | -10.6707  | 67.9739  | 392.5475  | 26.7811   | -21.6434  |
| 18    | -430.8138 | -14.0579  | 53.6586  | 518.6173  | 29.9886   | -9.2463   |
| 19    | -537.5022 | -16.5775  | 42.7719  | 626.2986  | 32.3186   | -0.2337   |
| 20    | -634.3948 | -18.5326  | 35.3999  | 702.5166  | 9.3543    | -53.1238  |
| 21    | -764.7845 | 183.0798  | 584.2659 | 379.9953  | -186.7072 | -584.7576 |
| 22    | -390.0103 | 187.0045  | 587.7039 | 26.9465   | -167.0863 | -532.2773 |
| 23    | -56.2185  | 168.0233  | 537.4187 | -265.1635 | -147.9548 | -481.8872 |
| 24    | 217.5180  | 149.6265  | 489.3154 | -497.6407 | -129.4193 | -433.7801 |
| 25    | 432.1852  | 131.8908  | 443.5686 | -654.6323 | -110.3762 | -385.2831 |
| 26    | 572.6089  | 113.7152  | 397.6863 | -771.4979 | -93.2645  | -342.3164 |
| 27    | 675.1477  | 97.5450   | 357.0599 | -835.4953 | -77.0308  | -301.6219 |
| 28    | 727.4589  | 82.2900   | 318.3806 | -850.9559 | -61.7328  | -262.9314 |
| 29    | 733.9328  | 68.0284   | 282.2003 | -801.5647 | -46.1568  | -223.9961 |
| 30    | 678.6424  | 53.4924   | 245.6857 | -733.1268 | -32.9169  | -190.2077 |
| 31    | 607.8571  | 41.3148   | 213.8158 | -632.1003 | -20.7761  | -158.4298 |
| 32    | 516.6929  | 30.8574   | 184.7475 | -514.7584 | -10.3635  | -129.3655 |
| 33    | 395.0064  | 20.9081   | 157.7082 | -343.1251 | 0.6948    | -99.3625  |
| 34    | 231.2237  | 10.9051   | 130.0570 | -182.3481 | 9.3732    | -74.6281  |
| 35    | 101.4116  | 4.1884    | 107.6031 | -36.4966  | 15.9703   | -52.2062  |
| 36    | -27.8538  | -1.3976   | 87.4175  | 105.4246  | 21.4149   | -31.9515  |
| 37    | -179.6055 | -6.9823   | 69.6911  | 293.8649  | 27.7231   | -11.7102  |
| 38    | -339.5497 | -12.0260  | 51.3868  | 436.1319  | 31.6331   | 3.0364    |
| 39    | -468.5987 | -15.3608  | 39.4528  | 570.3819  | 34.7984   | 13.4565   |
| 40    | -580.1902 | -17.7126  | 30.8162  | 684.1554  | 12.8104   | -38.3523  |
| 41    | -742.8237 | 182.5278  | 583.3850 | 357.8652  | -186.0863 | -584.3918 |
| 42    | -368.1468 | 186.3871  | 587.3647 | 5.7651    | -166.4484 | -531.9328 |
| 43    | -35.6178  | 167.4203  | 537.1206 | -285.0184 | -147.3301 | -481.5978 |
| 44    | 236.2406  | 149.0296  | 489.0930 | -515.3374 | -128.8120 | -433.5787 |
| 45    | 448.7002  | 131.3215  | 443.3866 | -670.1348 | -109.8002 | -385.1111 |
| 46    | 586.8559  | 113.2107  | 397.5199 | -784.6812 | -92.7634  | -342.1228 |
| 47    | 687.1456  | 97.0968   | 356.7495 | -846.5170 | -76.5823  | -301.3112 |
| 48    | 737.1808  | 81.9067   | 318.2390 | -859.7341 | -61.3585  | -262.8327 |
| 49    | 741.6293  | 67.6930   | 282.1081 | -808.3344 | -45.8311  | -223.8128 |
| 50    | 684.5295  | 53.2146   | 245.2525 | -738.2228 | -32.6387  | -189.8544 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 51    | 612.2452  | 41.1139   | 213.8434 | -635.8821 | -20.5801  | -158.4302 |
| 52    | 510.9895  | 30.1060   | 184.5000 | -507.2646 | -9.6213   | -129.0941 |
| 53    | 397.3036  | 20.8191   | 157.5795 | -345.0165 | 0.7628    | -99.3683  |
| 54    | 233.0564  | 10.8987   | 130.0643 | -184.0622 | 9.3725    | -74.6055  |
| 55    | 104.7166  | 4.3068    | 107.5958 | -40.0444  | 15.8371   | -52.1071  |
| 56    | -46.1613  | -2.1381   | 87.4468  | 125.3654  | 22.1354   | -32.0225  |
| 57    | -176.7619 | -6.8077   | 69.5058  | 290.5828  | 27.5241   | -11.5173  |
| 58    | -342.7765 | -12.0344  | 51.5824  | 439.2941  | 31.6262   | 2.8396    |
| 59    | -468.8921 | -15.2455  | 39.3703  | 570.3125  | 34.6676   | 13.5275   |
| 60    | -580.1334 | -17.5766  | 30.7424  | 683.6707  | 12.6697   | -38.2865  |
| 61    | -790.3351 | 183.9959  | 583.5611 | 401.8380  | -187.5396 | -584.5766 |
| 62    | -410.4681 | 187.7957  | 587.4273 | 44.8900   | -167.8582 | -532.0052 |
| 63    | -72.3111  | 168.7459  | 537.1773 | -251.3341 | -148.6530 | -481.6620 |
| 64    | 204.9655  | 150.2576  | 489.1392 | -486.8392 | -130.0405 | -433.6308 |
| 65    | 420.0861  | 132.5455  | 443.4265 | -644.2796 | -111.0170 | -385.1198 |
| 66    | 574.9940  | 113.8194  | 397.4124 | -774.2312 | -93.3561  | -342.0144 |
| 67    | 688.7079  | 97.1306   | 356.7998 | -848.1464 | -76.6192  | -301.3544 |
| 68    | 738.7906  | 81.9305   | 318.1464 | -861.4302 | -61.3753  | -262.6762 |
| 69    | 743.1681  | 67.7487   | 281.9372 | -809.9594 | -45.9000  | -223.7166 |
| 70    | 686.0705  | 53.2881   | 245.3080 | -739.8994 | -32.7185  | -189.9621 |
| 71    | 613.8145  | 41.2059   | 213.9346 | -637.6523 | -20.6741  | -158.5219 |
| 72    | 512.7388  | 30.1969   | 184.5651 | -509.2351 | -9.7164   | -129.1129 |
| 73    | 394.9991  | 20.6685   | 157.5539 | -342.3781 | 0.9176    | -99.3280  |
| 74    | 245.9515  | 11.5582   | 130.0407 | -198.4659 | 8.7037    | -74.5753  |
| 75    | 80.2965   | 3.1803    | 107.5835 | -13.1109  | 16.9524   | -52.1231  |
| 76    | -34.7290  | -1.6596   | 87.3797  | 112.8954  | 21.6689   | -31.9447  |
| 77    | -178.0369 | -6.8521   | 69.4702  | 291.9026  | 27.5562   | -11.4913  |
| 78    | -346.5951 | -12.1716  | 51.6145  | 443.4318  | 31.7689   | 2.8217    |
| 79    | -473.0413 | -15.3806  | 39.2594  | 574.7624  | 34.8019   | 13.6402   |
| 80    | -584.5868 | -17.7173  | 30.6201  | 688.4475  | 12.8112   | -38.1606  |
| 81    | -811.2391 | 184.8802  | 583.4492 | 420.7698  | -188.4205 | -584.4570 |
| 82    | -431.1387 | 188.7388  | 587.4102 | 63.2982   | -168.7948 | -531.9692 |
| 83    | -90.2517  | 169.6748  | 537.1515 | -235.3699 | -149.5899 | -481.6756 |
| 84    | 193.9965  | 151.0132  | 489.1830 | -477.5521 | -130.7958 | -433.6746 |
| 85    | 406.9167  | 133.4711  | 443.3965 | -633.2726 | -111.9392 | -385.1093 |
| 86    | 588.9420  | 113.6937  | 397.6222 | -787.8507 | -93.2462  | -342.1644 |
| 87    | 690.4048  | 97.5958   | 356.4883 | -850.9156 | -77.0826  | -301.0429 |
| 88    | 741.4189  | 82.4103   | 318.1859 | -865.0900 | -61.8484  | -262.8593 |
| 89    | 753.2953  | 67.8087   | 282.2731 | -820.2336 | -45.9435  | -224.0162 |
| 90    | 696.3840  | 53.3269   | 245.4271 | -750.3600 | -32.7640  | -189.9263 |
| 91    | 624.2577  | 41.2293   | 213.6824 | -648.1326 | -20.6996  | -158.3350 |
| 92    | 523.2308  | 30.2324   | 184.6692 | -519.7955 | -9.7519   | -129.2279 |
| 93    | 399.5892  | 20.3638   | 157.5335 | -346.3387 | 1.2091    | -99.2388  |
| 94    | 234.0767  | 10.4432   | 129.9759 | -184.0693 | 9.8182    | -74.5814  |
| 95    | 101.1901  | 3.6909    | 107.5564 | -35.1276  | 16.4549   | -52.0877  |
| 96    | -44.5238  | -2.4875   | 87.3795  | 124.5182  | 22.4833   | -31.9445  |
| 97    | -192.6359 | -7.7900   | 69.5095  | 308.6341  | 28.5026   | -11.5391  |
| 98    | -358.7099 | -12.9526  | 51.4205  | 457.3158  | 32.5557   | 3.0355    |
| 99    | -489.6567 | -16.2520  | 39.3880  | 593.3074  | 35.6684   | 13.5000   |
| 100   | -603.1572 | -18.5844  | 30.5426  | 708.9566  | 13.6783   | -38.0777  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 101   | -813.7153 | 184.8049  | 583.1570 | 423.3972  | -188.3443 | -584.1500 |
| 102   | -433.6056 | 188.6575  | 587.2498 | 66.0357   | -168.7181 | -531.8375 |
| 103   | -93.1168  | 169.6019  | 536.9770 | -232.3339 | -149.5140 | -481.4831 |
| 104   | 186.7706  | 151.0918  | 488.9618 | -470.6003 | -130.8713 | -433.4421 |
| 105   | 403.8554  | 133.3962  | 443.2480 | -630.0340 | -111.8643 | -384.9587 |
| 106   | 586.6009  | 113.5951  | 397.3566 | -785.3415 | -93.1410  | -341.9414 |
| 107   | 689.6176  | 97.3897   | 356.5396 | -849.5737 | -76.8776  | -301.1152 |
| 108   | 740.1680  | 82.1961   | 318.0634 | -863.3721 | -61.6284  | -262.5966 |
| 109   | 745.1629  | 67.9702   | 281.7149 | -812.4886 | -46.1160  | -223.4799 |
| 110   | 696.1111  | 53.0224   | 245.2136 | -749.3699 | -32.4632  | -189.8052 |
| 111   | 623.2969  | 40.9265   | 213.5554 | -646.4996 | -20.3869  | -158.1552 |
| 112   | 521.7856  | 29.9021   | 184.4007 | -517.5846 | -9.4159   | -128.9879 |
| 113   | 397.4075  | 20.0230   | 157.3609 | -343.3588 | 1.5567    | -99.1128  |
| 114   | 231.1619  | 10.1050   | 129.8379 | -180.3928 | 10.1583   | -74.4394  |
| 115   | 79.3988   | 2.5199    | 107.4038 | -10.7296  | 17.6228   | -51.9309  |
| 116   | -76.2528  | -3.9516   | 87.2051  | 159.4869  | 23.9429   | -31.7428  |
| 117   | -229.9624 | -9.3452   | 69.4121  | 349.3197  | 30.0458   | -11.4473  |
| 118   | -401.3794 | -14.5598  | 51.3206  | 503.5148  | 34.1539   | 3.0992    |
| 119   | -535.7795 | -17.8575  | 38.9394  | 642.9641  | 37.2758   | 13.9656   |
| 120   | -654.6118 | -20.2447  | 30.6472  | 763.9926  | 15.3480   | -38.1878  |
| 121   | -820.5679 | 185.4046  | 578.1726 | 428.7301  | -188.9069 | -579.1471 |
| 122   | -438.9702 | 189.2184  | 582.2417 | 70.0462   | -169.2608 | -526.8228 |
| 123   | -97.0796  | 170.1437  | 531.9582 | -229.6649 | -150.0371 | -476.4402 |
| 124   | 180.8797  | 151.7515  | 483.8996 | -466.1511 | -131.5180 | -428.4086 |
| 125   | 402.2766  | 133.9509  | 438.3047 | -629.6752 | -112.3997 | -380.0378 |
| 126   | 586.4157  | 114.1508  | 392.4348 | -786.3681 | -93.6787  | -336.9656 |
| 127   | 688.7958  | 98.0709   | 351.4044 | -850.1783 | -77.5605  | -296.0099 |
| 128   | 749.4621  | 82.4828   | 313.1540 | -873.2296 | -61.9132  | -257.7222 |
| 129   | 754.9359  | 68.3374   | 276.8362 | -822.9532 | -46.4574  | -218.5510 |
| 130   | 703.0547  | 53.6735   | 240.1376 | -757.6809 | -33.1081  | -184.7973 |
| 131   | 632.5235  | 41.6055   | 208.8087 | -657.2304 | -21.0605  | -153.3703 |
| 132   | 533.2356  | 30.6699   | 179.4161 | -530.7885 | -10.1944  | -123.9620 |
| 133   | 411.6686  | 20.8514   | 152.4151 | -359.6691 | 0.7176    | -94.1640  |
| 134   | 248.7064  | 11.0015   | 124.8991 | -200.2316 | 9.2538    | -69.4466  |
| 135   | 100.5666  | 3.4859    | 102.4692 | -34.4738  | 16.6414   | -47.0423  |
| 136   | -51.1165  | -2.9235   | 82.2806  | 131.4732  | 22.8976   | -26.8344  |
| 137   | -200.5742 | -8.2370   | 64.5109  | 316.2126  | 28.8950   | -6.5315   |
| 138   | -366.9467 | -13.3577  | 46.4312  | 465.2713  | 32.9168   | 8.0112    |
| 139   | -496.4162 | -16.5814  | 34.2442  | 599.3401  | 35.9541   | 18.6667   |
| 140   | -610.2300 | -18.9009  | 25.7576  | 714.8928  | 13.9905   | -31.9989  |
| 141   | -773.2199 | 186.6562  | 464.3966 | 445.1845  | -194.6257 | -475.6194 |
| 142   | -448.7734 | 194.7246  | 478.2222 | 146.4884  | -178.4002 | -431.5669 |
| 143   | -169.5099 | 179.1168  | 436.0880 | -106.7319 | -162.6146 | -389.3855 |
| 144   | 84.9822   | 163.3114  | 395.5608 | -349.5112 | -147.7812 | -352.2596 |
| 145   | 303.3534  | 149.3888  | 360.2352 | -525.4074 | -132.6320 | -313.5385 |
| 146   | 506.0611  | 133.3480  | 323.4610 | -698.9812 | -116.4352 | -276.7623 |
| 147   | 633.2816  | 119.0764  | 288.3750 | -799.3000 | -102.0270 | -241.6904 |
| 148   | 721.4781  | 105.3435  | 255.3079 | -860.7090 | -88.1632  | -208.7011 |
| 149   | 776.0142  | 92.0775   | 224.1479 | -908.4573 | -76.2327  | -180.9055 |
| 150   | 814.7618  | 80.9657   | 197.9316 | -903.2150 | -63.6051  | -151.2797 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| 151   | 814.0510 | 68.5453   | 170.3319 | -876.3954 | -51.0712  | -123.7201 |
| 152   | 776.0437 | 57.2573   | 144.5219 | -813.8044 | -39.7226  | -97.8524  |
| 153   | 712.6552 | 46.7513   | 120.2530 | -726.7612 | -29.1370  | -73.5463  |
| 154   | 628.0514 | 36.9614   | 97.7581  | -650.4058 | -20.9259  | -54.5692  |
| 155   | 556.9354 | 29.5715   | 80.8450  | -529.2537 | -11.8689  | -34.2528  |
| 156   | 443.6112 | 21.3885   | 62.1342  | -395.6124 | -3.6495   | -15.3661  |
| 157   | 320.8049 | 14.0424   | 44.8876  | -159.2495 | 7.9031    | 17.0625   |
| 158   | 98.4565  | 3.3614    | 14.4176  | -91.5522  | 11.0445   | 25.4650   |
| 159   | 47.8195  | 1.1109    | 7.8044   | -36.8645  | 13.2868   | 32.0615   |
| 160   | 13.3941  | -0.2402   | 2.9993   | 0.0030    | 14.6426   | 36.8810   |

ENVOLVENTE MINIMOS FLECTORES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | -0.0394    | 150.6103  | 539.4460  | -168.2667 | -86.3121  | -384.7564 |
| 2     | -59.3731   | -32.9870  | 30.7330   | 118.7393  | 32.9872   | -30.7276  |
| 3     | -118.7517  | -32.9872  | 30.6835   | 178.1477  | 32.9864   | -30.6737  |
| 4     | -178.1543  | -32.9788  | 30.6229   | 237.5000  | 32.9780   | -30.6184  |
| 5     | -237.5035  | -32.9793  | 30.6148   | 296.8594  | 32.9800   | -30.6017  |
| 6     | -296.8684  | -32.9887  | 30.4916   | 356.2579  | 32.9889   | -30.4824  |
| 7     | -356.2616  | -32.9888  | 30.4837   | 415.6524  | 32.9876   | -30.4602  |
| 8     | -415.6742  | -32.9605  | 30.1913   | 475.0046  | 32.9565   | -30.1782  |
| 9     | -474.9896  | -32.9439  | 30.3552   | 534.2665  | 32.9401   | -30.3310  |
| 10    | -534.2873  | -32.9179  | 29.9425   | 593.5603  | 32.9177   | -29.9101  |
| 11    | -593.5685  | -32.9309  | 29.9508   | 652.8121  | 32.9322   | -29.9311  |
| 12    | -652.8245  | -32.9391  | 29.6918   | 712.1097  | 32.9390   | -29.6690  |
| 13    | -712.1101  | -32.9378  | 29.6577   | 771.3937  | 32.9331   | -29.6280  |
| 14    | -771.4127  | -32.9110  | 29.3490   | 830.6665  | 32.9101   | -29.3013  |
| 15    | -830.6679  | -32.9174  | 29.0567   | 889.9208  | 32.9191   | -29.0581  |
| 16    | -889.9077  | -32.9167  | 29.3184   | 949.1798  | 32.9165   | -29.2576  |
| 17    | -949.3470  | -34.7233  | 20.6642   | 1011.8396 | 34.7238   | -20.6042  |
| 18    | -1057.5566 | -85.7968  | -102.7974 | 1212.0273 | 85.7977   | 102.7989  |
| 19    | -1249.2955 | -128.5589 | -205.1450 | 1480.6523 | 128.5593  | 205.2161  |
| 20    | -1511.0641 | -166.9720 | -301.4157 | 1811.6609 | 148.8063  | 262.8323  |
| 21    | -1834.4067 | 219.5034  | 524.3645  | 1348.1877 | -193.5880 | -429.0394 |
| 22    | -1369.1318 | 176.8362  | 387.0550  | 971.1993  | -176.8365 | -386.9831 |
| 23    | -1021.5569 | 130.3118  | 266.3190  | 728.3339  | -130.3122 | -266.2738 |
| 24    | -771.3408  | 92.1398   | 167.3577  | 564.0183  | -92.1401  | -167.3588 |
| 25    | -622.3632  | 44.1290   | 32.5570   | 523.0644  | -44.1295  | -32.5203  |
| 26    | -588.6612  | -4.2500   | 1.7423    | 598.2188  | 4.2497    | -1.6758   |
| 27    | -598.2304  | -4.2533   | 1.3683    | 607.7986  | 4.2543    | -1.3347   |
| 28    | -607.7934  | -4.2549   | 1.3384    | 617.3665  | 4.2569    | -1.3269   |
| 29    | -617.3633  | -4.2619   | 1.1463    | 626.9472  | 4.2602    | -1.1083   |
| 30    | -626.9386  | -4.2577   | 0.7573    | 644.5902  | 14.5046   | -7.6274   |
| 31    | -644.5831  | -14.5102  | 7.8214    | 677.2242  | 14.5102   | -7.7937   |
| 32    | -677.2284  | -14.4938  | 7.2073    | 709.8424  | 14.4942   | -7.1675   |
| 33    | -709.8482  | -14.5171  | 7.1622    | 742.5146  | 14.5205   | -7.1619   |
| 34    | -742.5243  | -14.5490  | 7.1504    | 775.2632  | 14.5498   | -7.1132   |
| 35    | -775.2659  | -14.5555  | 6.7036    | 808.0159  | 14.5571   | -6.6266   |
| 36    | -808.0264  | -14.5689  | 6.1926    | 840.8035  | 14.5696   | -6.1725   |
| 37    | -859.3771  | -41.6621  | -13.1834  | 953.1326  | 41.6598   | 13.2322   |
| 38    | -1002.6333 | -82.6631  | -134.6495 | 1188.5875 | 82.6632   | 134.6939  |
| 39    | -1247.2418 | -131.0525 | -261.5073 | 1542.1503 | 131.0516  | 261.5401  |
| 40    | -1591.0847 | -177.3498 | -382.4326 | 1990.1611 | 159.2612  | 343.5418  |
| 41    | -2026.0648 | 225.0312  | 519.9571  | 1554.3446 | -199.8431 | -424.8367 |
| 42    | -1576.3105 | 183.1229  | 382.8283  | 1164.2784 | -183.1227 | -382.7685 |
| 43    | -1218.6179 | 136.7308  | 262.3486  | 910.8870  | -136.7319 | -262.2984 |
| 44    | -959.9257  | 88.1173   | 134.9232  | 761.6676  | -88.1188  | -134.9025 |
| 45    | -803.4821  | 51.0109   | 28.4575   | 688.7146  | -51.0072  | -28.4198  |
| 46    | -763.8621  | 3.0467    | -2.4296   | 757.0166  | -3.0457   | 2.4915    |
| 47    | -756.9984  | 3.0372    | -2.7009   | 750.1544  | -3.0383   | 2.7334    |
| 48    | -750.1419  | 3.0264    | -2.9070   | 743.3367  | -3.0257   | 2.9368    |
| 49    | -743.3400  | 3.0463    | -3.1617   | 736.4874  | -3.0471   | 3.1787    |
| 50    | -736.4723  | 3.0654    | -3.1764   | 730.0252  | 7.7823    | -3.8714   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -730.0306  | -7.7630   | 3.4641    | 747.4973  | 7.7599    | -3.4426   |
| 52    | -747.5008  | -7.7435   | 3.4343    | 764.9259  | 7.7432    | -3.4030   |
| 53    | -764.9177  | -7.7355   | 2.9908    | 782.3160  | 7.7357    | -2.9444   |
| 54    | -782.3075  | -7.7409   | 2.7105    | 799.7212  | 7.7405    | -2.6767   |
| 55    | -799.7235  | -7.7332   | 2.4940    | 817.1149  | 7.7306    | -2.4752   |
| 56    | -817.1170  | -7.7164   | 2.4676    | 834.4717  | 7.7162    | -2.4171   |
| 57    | -862.3417  | -50.9225  | -28.5412  | 976.9668  | 50.9243   | 28.5870   |
| 58    | -1017.8623 | -87.9803  | -134.9906 | 1215.7756 | 87.9792   | 135.0135  |
| 59    | -1275.3099 | -136.5632 | -262.5516 | 1582.5950 | 136.5621  | 262.6352  |
| 60    | -1632.0271 | -182.9357 | -383.6085 | 2043.6348 | 164.8791  | 344.6917  |
| 61    | -2079.5349 | 226.4889  | 520.3908  | 1606.2587 | -201.3083 | -425.2557 |
| 62    | -1628.4436 | 184.5910  | 382.8453  | 1213.1428 | -184.5906 | -382.7616 |
| 63    | -1267.8599 | 138.2095  | 262.3073  | 956.8204  | -138.2115 | -262.2573 |
| 64    | -1006.5154 | 89.6071   | 134.8467  | 804.9203  | -89.6102  | -134.8249 |
| 65    | -847.3748  | 52.5318   | 28.3701   | 729.1932  | -52.5332  | -28.3480  |
| 66    | -804.8680  | 4.9308    | -2.4052   | 793.7639  | -4.9317   | 2.4649    |
| 67    | -793.7787  | 4.9382    | -2.9017   | 782.6639  | -4.9410   | 2.9416    |
| 68    | -782.6639  | 4.9484    | -2.9372   | 771.5302  | -4.9478   | 2.9451    |
| 69    | -771.5301  | 4.9340    | -3.1288   | 760.4300  | -4.9336   | 3.1572    |
| 70    | -760.4204  | 4.9370    | -3.3876   | 749.3105  | -4.9374   | 3.4227    |
| 71    | -749.3177  | 4.9414    | -3.8624   | 762.6786  | 5.9435    | -3.1758   |
| 72    | -762.6854  | -5.9329   | 3.1727    | 776.0321  | 5.9312    | -3.1595   |
| 73    | -776.0286  | -5.9260   | 2.9313    | 789.3652  | 5.9236    | -2.8797   |
| 74    | -789.3483  | -5.9373   | 2.4586    | 802.7102  | 5.9381    | -2.4302   |
| 75    | -802.7174  | -5.9465   | 2.4654    | 816.1067  | 5.9463    | -2.4429   |
| 76    | -816.1077  | -5.9454   | 2.1545    | 829.4983  | 5.9471    | -2.0880   |
| 77    | -860.2745  | -52.5910  | -28.7805  | 978.5793  | 52.5930   | 28.7989   |
| 78    | -1019.5970 | -89.6702  | -134.9731 | 1221.3744 | 89.6692   | 135.0055  |
| 79    | -1280.9382 | -138.2509 | -262.8336 | 1592.0104 | 138.2507  | 262.9413  |
| 80    | -1641.4647 | -184.6296 | -383.9168 | 2056.9219 | 191.9231  | 429.4525  |
| 81    | -2093.1121 | 201.1777  | 435.6353  | 1619.8442 | -201.3548 | -424.9868 |
| 82    | -1641.9061 | 184.6360  | 382.9546  | 1226.3770 | -184.6358 | -382.8998 |
| 83    | -1281.1045 | 138.2644  | 262.5385  | 970.0460  | -138.2648 | -262.4679 |
| 84    | -1019.7867 | 89.6694   | 134.7554  | 818.0607  | -89.6690  | -134.7273 |
| 85    | -860.4424  | 52.5910   | 28.4648   | 742.0947  | -52.5905  | -28.4250  |
| 86    | -816.3371  | 5.9544    | -2.7401   | 802.9364  | -5.9539   | 2.7848    |
| 87    | -802.9397  | 5.9477    | -2.5920   | 789.5608  | -5.9484   | 2.6090    |
| 88    | -789.5835  | 5.9484    | -3.0452   | 776.1969  | -5.9517   | 3.1070    |
| 89    | -776.2047  | 5.9689    | -3.5430   | 762.7722  | -5.9705   | 3.5727    |
| 90    | -762.7821  | 5.9901    | -3.5787   | 749.3073  | -5.9926   | 3.5752    |
| 91    | -749.2960  | 6.0258    | -3.5799   | 760.1631  | 4.8587    | -3.4556   |
| 92    | -760.1733  | -4.8916   | 2.8036    | 771.1891  | 4.8947    | -2.7797   |
| 93    | -771.1907  | -4.9144   | 3.0123    | 782.2447  | 4.9155    | -2.9976   |
| 94    | -782.2520  | -4.9175   | 2.5788    | 793.3205  | 4.9191    | -2.5246   |
| 95    | -793.3261  | -4.9373   | 2.2880    | 804.4386  | 4.9378    | -2.2489   |
| 96    | -804.4456  | -4.9421   | 2.0547    | 815.5659  | 4.9421    | -2.0142   |
| 97    | -847.1810  | -52.5463  | -28.5912  | 965.4197  | 52.5476   | 28.6380   |
| 98    | -1006.4126 | -89.6191  | -135.3566 | 1208.1285 | 89.6188   | 135.3777  |
| 99    | -1267.8658 | -138.1995 | -262.4505 | 1578.7343 | 138.1979  | 262.5326  |
| 100   | -1628.0876 | -184.5743 | -383.9835 | 2043.4460 | 191.8659  | 429.5503  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| ===== |            |           |           |           |           |           |
| 101   | -2079.6086 | 199.4796  | 435.2364  | 1610.1639 | -199.6559 | -424.6193 |
| 102   | -1632.0859 | 182.9391  | 383.1151  | 1220.4850 | -182.9384 | -383.0620 |
| 103   | -1275.3296 | 136.5639  | 262.3252  | 968.0916  | -136.5637 | -262.2443 |
| 104   | -1017.7726 | 87.9782   | 134.7739  | 819.7878  | -87.9781  | -134.7500 |
| 105   | -862.2215  | 50.9109   | 28.3152   | 747.6477  | -50.9095  | -28.2744  |
| 106   | -816.9121  | 7.6989    | -2.5639   | 799.5845  | -7.6989   | 2.6222    |
| 107   | -799.5782  | 7.7015    | -2.8139   | 782.2417  | -7.7049   | 2.8464    |
| 108   | -782.2285  | 7.7276    | -3.0662   | 764.8390  | -7.7288   | 3.0830    |
| 109   | -764.8235  | 7.7369    | -3.0823   | 747.4124  | -7.7362   | 3.1104    |
| 110   | -747.4181  | 7.7238    | -3.5307   | 730.0398  | -7.7243   | 3.5595    |
| 111   | -730.0514  | 7.7324    | -3.5628   | 736.6105  | 3.1152    | -3.4891   |
| 112   | -736.6201  | -3.0762   | 3.0742    | 743.5329  | 3.0737    | -3.0491   |
| 113   | -743.5263  | -3.0683   | 3.0409    | 750.4295  | 3.0651    | -3.0059   |
| 114   | -750.4371  | -3.0469   | 2.6019    | 757.2970  | 3.0475    | -2.5489   |
| 115   | -757.3011  | -3.0584   | 2.3219    | 764.1886  | 3.0596    | -2.2850   |
| 116   | -764.1725  | -3.0561   | 2.1134    | 771.0408  | 3.0566    | -2.0961   |
| 117   | -803.6777  | -51.0131  | -28.3316  | 918.4401  | 51.0148   | 28.3577   |
| 118   | -960.0370  | -88.1215  | -135.0650 | 1158.3331 | 88.1210   | 135.1424  |
| 119   | -1218.5299 | -136.7391 | -262.9500 | 1526.2111 | 136.7387  | 263.0023  |
| 120   | -1576.2662 | -183.1221 | -383.0476 | 1990.3115 | 190.4402  | 428.6068  |
| 121   | -2026.2609 | 193.8692  | 434.3776  | 1569.3102 | -194.0828 | -423.7090 |
| 122   | -1591.3354 | 177.3767  | 382.1838  | 1192.2354 | -177.3768 | -382.1301 |
| 123   | -1247.4401 | 131.0725  | 261.4259  | 952.5461  | -131.0740 | -261.3714 |
| 124   | -1002.7247 | 82.6756   | 134.2401  | 816.7133  | -82.6759  | -134.2177 |
| 125   | -859.4062  | 41.6499   | 13.2455   | 765.6764  | -41.6469  | -13.1809  |
| 126   | -808.1278  | 14.5148   | -6.9049   | 775.4628  | -14.5139  | 6.9434    |
| 127   | -775.4547  | 14.4958   | -6.8978   | 742.8556  | -14.4941  | 6.9299    |
| 128   | -742.8523  | 14.4976   | -7.3591   | 710.2358  | -14.4960  | 7.3967    |
| 129   | -710.2299  | 14.4955   | -7.3936   | 677.6092  | -14.4968  | 7.4058    |
| 130   | -677.6236  | 14.5151   | -7.5774   | 644.9647  | -14.5178  | 7.6136    |
| 131   | -644.9564  | 14.5290   | -7.9995   | 627.1844  | -4.2836   | 1.1661    |
| 132   | -627.1893  | 4.2919    | -1.1354   | 617.5387  | -4.2924   | 1.1465    |
| 133   | -617.5200  | 4.2917    | -1.3224   | 607.8618  | -4.2921   | 1.3523    |
| 134   | -607.8452  | 4.2864    | -1.5324   | 598.2057  | -4.2870   | 1.5661    |
| 135   | -598.2070  | 4.3011    | -1.7123   | 588.5343  | -4.3014   | 1.7617    |
| 136   | -588.5333  | 4.2951    | -2.0415   | 578.8702  | -4.2950   | 2.0769    |
| 137   | -622.1360  | -44.1142  | -32.5814  | 721.3811  | 44.1141   | 32.6039   |
| 138   | -771.0423  | -92.1417  | -167.5982 | 978.4055  | 92.1432   | 167.6418  |
| 139   | -1021.2433 | -130.3330 | -266.8186 | 1314.4460 | 130.3332  | 266.8671  |
| 140   | -1368.8071 | -176.8560 | -387.3736 | 1797.5050 | 184.9026  | 433.1679  |
| 141   | -1834.7107 | 176.6623  | 334.5861  | 1496.8009 | -180.5643 | -333.5264 |
| 142   | -1511.8689 | 166.9790  | 300.3105  | 1211.2694 | -166.9779 | -300.3097 |
| 143   | -1249.7372 | 128.5740  | 205.1534  | 1018.3518 | -128.5748 | -205.1173 |
| 144   | -1058.1191 | 85.8262   | 102.3711  | 903.5514  | -85.8290  | -102.3047 |
| 145   | -949.6983  | 34.7831   | -21.3696  | 887.1059  | -34.7827  | 21.3952   |
| 146   | -890.1930  | 32.9700   | -29.3941  | 830.8460  | -32.9651  | 29.4273   |
| 147   | -830.8528  | 32.9413   | -29.4300  | 771.5579  | -32.9395  | 29.4551   |
| 148   | -771.5550  | 32.9357   | -29.6881  | 712.2893  | -32.9395  | 29.7361   |
| 149   | -712.2739  | 32.9470   | -29.9883  | 652.9664  | -32.9466  | 30.0119   |
| 150   | -652.9706  | 32.9412   | -30.0177  | 593.6895  | -32.9393  | 30.0397   |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol  | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|----------|-----------|----------|
| ===== |           |           |          |          |           |          |
| 151   | -593.6828 | 32.9501   | -30.2443 | 534.3509 | -32.9521  | 30.2847  |
| 152   | -534.3379 | 32.9597   | -30.4490 | 475.0036 | -32.9589  | 30.4667  |
| 153   | -475.0024 | 32.9445   | -30.4655 | 415.7145 | -32.9457  | 30.4653  |
| 154   | -415.7159 | 32.9778   | -30.4599 | 356.3532 | -32.9813  | 30.4802  |
| 155   | -356.3323 | 32.9887   | -30.7091 | 296.9587 | -32.9901  | 30.7423  |
| 156   | -296.9438 | 32.9899   | -30.8428 | 237.5457 | -32.9904  | 30.8461  |
| 157   | -237.5523 | 32.9931   | -30.7641 | 178.1752 | -32.9920  | 30.7626  |
| 158   | -178.1675 | 32.9905   | -30.8247 | 118.7741 | -32.9906  | 30.8358  |
| 159   | -118.7650 | 32.9885   | -30.8723 | 59.3978  | -32.9883  | 30.8763  |
| 160   | -59.3861  | 32.9844   | -30.8974 | 0.0123   | 13.8878   | 139.4500 |

ENVOLVENTE MINIMOS CORTANTES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====     | =====     | =====     | =====    |
| 1     | -0.0052    | -19.0448  | 67.6255   | 47.2347   | 33.4434   | -27.7550 |
| 2     | -23.7534   | -20.3926  | 62.8072   | 73.4099   | 34.7913   | -22.9325 |
| 3     | -29.6743   | -22.6339  | 56.1530   | 83.3953   | 37.0365   | -16.2604 |
| 4     | -22.5923   | -25.7656  | 47.6632   | -126.2037 | 42.4280   | 19.2930  |
| 5     | 200.9588   | -32.0438  | 10.2976   | -164.0965 | 48.1102   | 32.9635  |
| 6     | 249.7826   | -38.5916  | -5.1581   | -229.1249 | 56.3068   | 51.8472  |
| 7     | 322.7636   | -47.6324  | -25.8546  | -280.4896 | 65.3114   | 72.4868  |
| 8     | 379.2460   | -57.4585  | -48.2282  | -314.2615 | 75.0669   | 94.8911  |
| 9     | 415.3432   | -68.0506  | -72.5247  | -326.7694 | 85.5944   | 119.1807 |
| 10    | 427.8390   | -79.3510  | -98.4965  | -293.1595 | 95.2841   | 141.6770 |
| 11    | 391.5465   | -89.8325  | -122.8622 | -255.1900 | 107.2202  | 169.5201 |
| 12    | 348.9439   | -102.4852 | -152.4875 | -186.5928 | 119.7789  | 199.1281 |
| 13    | 273.6102   | -115.7485 | -183.9101 | -84.9502  | 132.9311  | 230.5833 |
| 14    | 163.6441   | -129.5682 | -217.2121 | 51.6897   | 146.6169  | 263.8558 |
| 15    | 17.0583    | -143.8910 | -252.3187 | 240.3514  | 159.5641  | 295.6017 |
| 16    | -182.8346  | -157.4309 | -285.6797 | 451.5099  | 174.2588  | 332.3914 |
| 17    | -405.6921  | -172.6857 | -325.0349 | 701.0386  | 189.3421  | 371.6940 |
| 18    | -668.2128  | -188.2627 | -365.2588 | 990.2018  | 204.7512  | 412.0290 |
| 19    | -970.1418  | -204.1352 | -407.9476 | 1317.9150 | 220.4337  | 454.5483 |
| 20    | -1310.9249 | -220.2334 | -452.3295 | 1703.2871 | 211.5374  | 439.0860 |
| 21    | 197.8660   | -31.7923  | 7.1564    | -265.5669 | 33.2041   | -22.1695 |
| 22    | 276.4384   | -16.1485  | 66.8911   | -219.8430 | 34.1507   | -17.0594 |
| 23    | 250.9789   | -17.8160  | 59.5945   | -190.6351 | 35.8165   | -9.7582  |
| 24    | 241.3996   | -20.2862  | 49.8093   | -175.5003 | 38.2868   | 0.0343   |
| 25    | 244.6117   | -23.6303  | 37.6487   | -360.4311 | 43.6326   | 44.3437  |
| 26    | 445.9991   | -29.9102  | -8.8625   | -407.7762 | 50.0480   | 64.2582  |
| 27    | 507.4136   | -37.3113  | -31.0629  | -451.4967 | 57.5745   | 86.4920  |
| 28    | 562.3971   | -45.8559  | -55.7782  | -485.5490 | 66.2192   | 111.2420 |
| 29    | 604.6658   | -55.5546  | -82.7519  | -527.1062 | 77.2580   | 140.9661 |
| 30    | 651.0853   | -67.6559  | -114.6887 | -521.8026 | 88.1942   | 170.1462 |
| 31    | 647.0413   | -79.6669  | -146.4993 | -487.9485 | 100.2391  | 201.9134 |
| 32    | 611.3110   | -92.7921  | -180.2246 | -419.7156 | 113.3764  | 235.5676 |
| 33    | 537.4715   | -106.9730 | -216.4255 | -329.5293 | 128.8128  | 274.7630 |
| 34    | 438.5897   | -123.4383 | -257.9763 | -174.2069 | 143.9577  | 313.4202 |
| 35    | 271.7545   | -139.5749 | -298.9747 | 30.9956   | 160.0353  | 354.3444 |
| 36    | 52.3233    | -156.5947 | -342.2993 | 290.3298  | 176.9775  | 397.7577 |
| 37    | -223.6304  | -174.4416 | -387.8339 | 591.1888  | 195.8287  | 446.1989 |
| 38    | -542.0771  | -194.1029 | -439.3569 | 967.3795  | 214.1922  | 494.8289 |
| 39    | -937.6518  | -213.2121 | -489.3280 | 1404.9561 | 233.1584  | 544.7856 |
| 40    | -1394.4489 | -232.8415 | -542.5584 | 1903.9316 | 228.5999  | 539.9091 |
| 41    | 366.6214   | -36.6217  | 4.5001    | -424.9294 | 38.0287   | -21.1493 |
| 42    | 436.5590   | -20.9972  | 65.9041   | -369.0641 | 38.9972   | -16.0743 |
| 43    | 401.2996   | -22.6957  | 58.5910   | -329.9570 | 40.7006   | -8.7422  |
| 44    | 382.0015   | -25.2174  | 48.8614   | -305.0219 | 43.2162   | 0.9758   |
| 45    | 375.5021   | -28.6091  | 36.6898   | -484.3243 | 48.7745   | 45.3316  |
| 46    | 571.2687   | -35.1114  | -9.7865   | -521.7042 | 55.2584   | 65.2036  |
| 47    | 622.6912   | -42.5728  | -32.0523  | -555.1439 | 62.8476   | 87.4982  |
| 48    | 667.2694   | -51.1835  | -56.7056  | -578.6025 | 71.5514   | 112.1169 |
| 49    | 698.8066   | -60.9442  | -83.6015  | -609.1636 | 82.6567   | 141.8953 |
| 50    | 734.0314   | -73.1187  | -115.8476 | -592.4639 | 93.6605   | 171.2684 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====     | =====     | =====     | =====    |
| 51    | 718.6120   | -85.1846  | -147.3160 | -547.0182 | 105.7504  | 202.7234 |
| 52    | 670.8452   | -98.3528  | -181.2969 | -466.6576 | 118.9314  | 236.7102 |
| 53    | 584.9372   | -112.5922 | -217.4533 | -364.3061 | 134.4278  | 275.6369 |
| 54    | 473.7368   | -129.0961 | -258.7801 | -196.4909 | 149.6103  | 314.2189 |
| 55    | 294.1065   | -145.2783 | -299.7352 | 21.5116   | 165.7245  | 355.2100 |
| 56    | 61.6958    | -162.3217 | -343.0773 | 293.7996  | 182.6864  | 398.5445 |
| 57    | -226.8062  | -180.1613 | -389.0259 | 607.2527  | 201.5210  | 447.3512 |
| 58    | -558.5338  | -199.8147 | -439.8570 | 996.6018  | 219.8869  | 495.3744 |
| 59    | -966.6924  | -218.9198 | -490.5151 | 1446.6503 | 238.8486  | 545.9359 |
| 60    | -1436.1630 | -238.5360 | -543.7393 | 1958.2661 | 234.2601  | 541.0625 |
| 61    | 427.6259   | -38.2693  | 4.1076    | -482.3115 | 39.6658   | -20.7289 |
| 62    | 494.0043   | -22.6376  | 65.6232   | -422.8240 | 40.6364   | -15.8023 |
| 63    | 455.1558   | -24.3363  | 58.3404   | -380.1274 | 42.3396   | -8.4959  |
| 64    | 432.2910   | -26.8588  | 48.6343   | -351.6230 | 44.8551   | 1.1987   |
| 65    | 422.2309   | -30.2545  | 36.4750   | -527.7639 | 50.4348   | 45.5368  |
| 66    | 614.8650   | -36.7755  | -10.0678  | -561.5543 | 56.9377   | 65.4956  |
| 67    | 662.6702   | -44.2617  | -32.2190  | -591.3482 | 64.5432   | 87.6535  |
| 68    | 703.6060   | -52.8949  | -56.9520  | -611.0460 | 73.2696   | 112.4293 |
| 69    | 731.2915   | -62.6747  | -83.9626  | -637.8452 | 84.3744   | 142.2074 |
| 70    | 762.7881   | -74.8369  | -116.0278 | -617.3849 | 95.3664   | 171.3828 |
| 71    | 743.5611   | -86.8952  | -147.3940 | -568.1070 | 107.4611  | 202.7763 |
| 72    | 691.9451   | -100.0700 | -181.3411 | -483.8927 | 120.6494  | 236.7949 |
| 73    | 602.1673   | -114.3037 | -217.5874 | -377.5946 | 136.1368  | 275.8042 |
| 74    | 487.0695   | -130.8045 | -258.8974 | -205.9907 | 151.3156  | 314.3322 |
| 75    | 303.4841   | -146.9770 | -299.8619 | 15.8277   | 167.4133  | 355.3198 |
| 76    | 67.5224    | -164.0136 | -343.2467 | 291.9948  | 184.3877  | 398.7019 |
| 77    | -225.0888  | -181.8645 | -389.1263 | 609.0875  | 203.2129  | 447.4417 |
| 78    | -560.4384  | -201.5110 | -439.7928 | 1002.4491 | 221.5882  | 495.3396 |
| 79    | -972.4232  | -220.6151 | -490.7787 | 1456.1422 | 240.5416  | 546.1861 |
| 80    | -1445.6527 | -240.2295 | -543.9924 | 1971.5576 | 235.9514  | 541.3235 |
| 81    | 438.6836   | -38.2090  | 4.1468    | -493.4932 | 39.6021   | -20.7739 |
| 82    | 505.1949   | -22.5698  | 65.5603   | -434.1423 | 40.5743   | -15.7171 |
| 83    | 466.4770   | -24.2824  | 58.2076   | -391.6002 | 42.2801   | -8.3802  |
| 84    | 443.7505   | -26.7994  | 48.6629   | -363.2177 | 44.7963   | 1.1672   |
| 85    | 433.8363   | -30.1915  | 36.4049   | -539.4589 | 50.3807   | 45.5987  |
| 86    | 626.5222   | -36.7287  | -9.8951   | -573.3353 | 56.8832   | 65.3347  |
| 87    | 674.4218   | -44.2016  | -32.4310  | -603.2358 | 64.4772   | 87.9194  |
| 88    | 715.5182   | -52.8276  | -56.9798  | -623.1431 | 73.2064   | 112.3227 |
| 89    | 743.4359   | -62.6015  | -83.6648  | -650.0908 | 84.3107   | 141.8905 |
| 90    | 774.9964   | -74.7906  | -115.8017 | -629.6524 | 95.3361   | 171.3078 |
| 91    | 755.7539   | -86.8771  | -147.5797 | -580.3477 | 107.4373  | 202.9558 |
| 92    | 704.3373   | -100.0453 | -181.1652 | -496.3088 | 120.6162  | 236.5697 |
| 93    | 614.4231   | -114.2518 | -217.5498 | -390.0396 | 136.0808  | 275.8609 |
| 94    | 499.4665   | -130.7534 | -258.9742 | -218.6229 | 151.2584  | 314.3528 |
| 95    | 316.2538   | -146.9084 | -299.8604 | 3.1252    | 167.3534  | 355.3076 |
| 96    | 80.1254    | -163.9552 | -343.2064 | 279.0253  | 184.3189  | 398.6569 |
| 97    | -212.1735  | -181.7923 | -388.9941 | 596.1288  | 203.1463  | 447.3211 |
| 98    | -547.2555  | -201.4441 | -440.1017 | 989.2498  | 221.5269  | 495.6348 |
| 99    | -959.5127  | -220.5586 | -490.3576 | 1442.9691 | 240.4806  | 545.7864 |
| 100   | -1432.3306 | -240.1683 | -544.0743 | 1958.0702 | 235.8914  | 541.4050 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | 427.7233   | -36.7238  | 4.1876    | -485.6055 | 38.0823   | -20.8339 |
| 102   | 497.3215   | -21.0550  | 65.4414   | -429.7002 | 39.0545   | -15.6101 |
| 103   | 462.0257   | -22.7615  | 58.2434   | -390.5689 | 40.7597   | -8.4187  |
| 104   | 442.7382   | -25.2763  | 48.5959   | -365.6008 | 43.2792   | 1.2524   |
| 105   | 436.2204   | -28.6761  | 36.4252   | -545.1983 | 48.9030   | 45.5973  |
| 106   | 632.2870   | -35.2403  | -9.9988   | -582.4392 | 55.3979   | 65.4291  |
| 107   | 683.5046   | -42.7287  | -32.2916  | -615.6702 | 63.0055   | 87.7194  |
| 108   | 727.9198   | -51.3554  | -56.8697  | -638.8140 | 71.7343   | 112.3357 |
| 109   | 759.0512   | -61.1453  | -83.9689  | -668.9636 | 82.8515   | 142.2296 |
| 110   | 793.9091   | -73.3171  | -115.9031 | -651.8914 | 93.8515   | 171.3073 |
| 111   | 777.9756   | -85.3849  | -147.5769 | -605.9178 | 105.9569  | 202.9866 |
| 112   | 729.7944   | -98.5801  | -181.3239 | -525.0946 | 119.1636  | 236.7200 |
| 113   | 643.2115   | -112.8247 | -217.6088 | -422.0257 | 134.6544  | 275.8617 |
| 114   | 531.4052   | -129.3502 | -258.9447 | -253.6924 | 149.8643  | 314.3111 |
| 115   | 351.2545   | -145.5281 | -299.7973 | -34.9846  | 165.9707  | 355.2463 |
| 116   | 118.1437   | -162.5783 | -343.1405 | 237.9246  | 182.9388  | 398.6188 |
| 117   | -171.2946  | -180.4176 | -388.8210 | 551.9986  | 201.7623  | 447.1701 |
| 118   | -503.2121  | -200.0577 | -439.9476 | 941.8821  | 220.1325  | 495.4461 |
| 119   | -911.9196  | -219.1651 | -490.8406 | 1392.3566 | 239.0886  | 546.2403 |
| 120   | -1382.1718 | -238.7756 | -543.1495 | 1904.7534 | 234.4837  | 540.5090 |
| 121   | 366.1271   | -30.3583  | 0.0057    | -433.5965 | 31.0704   | -16.4241 |
| 122   | 445.3841   | -14.0521  | 61.0392   | -393.5170 | 32.0522   | -11.2052 |
| 123   | 425.9324   | -15.7748  | 53.8199   | -370.1929 | 33.7738   | -3.9893  |
| 124   | 422.4319   | -18.3185  | 44.0051   | -360.9708 | 36.3175   | 5.8334   |
| 125   | 431.6160   | -21.7440  | 31.9750   | -555.1438 | 42.6929   | 49.8130  |
| 126   | 642.1860   | -29.0663  | -14.2010  | -606.1550 | 49.2389   | 69.6653  |
| 127   | 707.0246   | -36.6059  | -36.6949  | -652.9054 | 56.8843   | 92.1218  |
| 128   | 764.8844   | -45.2764  | -61.1145  | -689.3258 | 65.6686   | 116.5368 |
| 129   | 809.1284   | -55.1254  | -88.1591  | -732.3438 | 76.8580   | 146.4654 |
| 130   | 856.6309   | -67.3876  | -120.2956 | -727.8523 | 87.9364   | 175.6483 |
| 131   | 853.2780   | -79.5445  | -151.5591 | -694.1154 | 100.1320  | 206.9723 |
| 132   | 816.9403   | -92.7972  | -185.5770 | -625.1670 | 113.3782  | 241.0273 |
| 133   | 742.2579   | -107.1053 | -221.7975 | -533.8094 | 128.9461  | 280.0451 |
| 134   | 641.9614   | -123.6808 | -263.1500 | -376.8814 | 144.1931  | 318.5905 |
| 135   | 473.1449   | -139.9286 | -304.0836 | -169.6308 | 160.3720  | 359.4998 |
| 136   | 251.6231   | -157.0282 | -347.3685 | 91.7538   | 177.3832  | 402.8137 |
| 137   | -26.3056   | -174.9187 | -393.0248 | 394.1238  | 196.2487  | 451.3707 |
| 138   | -346.3572  | -194.5767 | -444.0968 | 772.1571  | 214.6304  | 499.6175 |
| 139   | -743.0465  | -213.6826 | -494.6511 | 1210.2084 | 233.5784  | 550.0633 |
| 140   | -1200.1412 | -233.2778 | -547.3927 | 1709.3252 | 228.9231  | 545.2683 |
| 141   | 196.2425   | -15.5035  | -27.9030  | -320.2039 | 9.3624    | 4.5251   |
| 142   | 328.3043   | 4.4230    | 31.0370   | -323.3033 | 9.9785    | 8.8417   |
| 143   | 345.1901   | 3.3423    | 24.7258   | -354.8120 | 11.5987   | 29.7271  |
| 144   | 390.2653   | 1.2241    | 2.4312    | -429.4598 | 14.9177   | 43.9549  |
| 145   | 477.9013   | -2.6578   | -13.9201  | -485.4921 | 17.9934   | 57.1114  |
| 146   | 546.1389   | -6.3189   | -28.7042  | -572.5816 | 22.7321   | 75.3794  |
| 147   | 644.2647   | -11.6729  | -48.9434  | -661.6507 | 28.2678   | 95.6506  |
| 148   | 742.9454   | -17.9014  | -70.8541  | -748.8246 | 34.6592   | 117.4788 |
| 149   | 838.1026   | -24.9910  | -94.4132  | -829.9971 | 41.9064   | 141.0809 |
| 150   | 925.2891   | -32.9699  | -120.0381 | -876.6479 | 48.6778   | 163.2804 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 151   | 975.9408  | -40.5219  | -143.7604 | -934.1572 | 57.6578   | 190.3794 |
| 152   | 1034.9880 | -50.2840  | -172.6699 | -972.5348 | 67.5319   | 219.3258 |
| 153   | 1072.3844 | -60.9437  | -203.6711 | -987.0082 | 78.3020   | 250.3911 |
| 154   | 1083.2596 | -72.6122  | -236.5745 | -972.6235 | 90.0772   | 283.1918 |
| 155   | 1062.6157 | -85.2242  | -270.5797 | -910.3554 | 101.1880  | 313.7032 |
| 156   | 990.9681  | -97.1732  | -303.1373 | -825.9296 | 114.7597  | 349.8510 |
| 157   | 893.9227  | -111.6370 | -341.6711 | -697.5678 | 129.2726  | 388.4179 |
| 158   | 750.3491  | -127.0219 | -381.5715 | -520.6111 | 144.7236  | 428.2684 |
| 159   | 554.7220  | -143.3678 | -423.3141 | -289.8058 | 161.1036  | 470.0282 |
| 160   | 302.0996  | -160.6407 | -466.9588 | 0.0425    | 176.7215  | 510.2752 |



ENVOLVENTE MINIMOS TORSORES TREN UIC-71, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0051   | 14.5145   | 35.1379   | -24.5970  | 0.3075    | 5.5986   |
| 2     | 48.0772   | 12.7395   | 29.4523   | -94.3362  | 3.1002    | 15.0963  |
| 3     | 138.0842  | 9.0572    | 18.1694   | -200.9106 | 7.8842    | 30.3444  |
| 4     | 261.7084  | 3.3768    | 1.1101    | -328.1789 | 14.3834   | 45.6130  |
| 5     | 402.9376  | -3.9979   | -16.0187  | -416.5499 | 20.0643   | 59.2790  |
| 6     | 502.1747  | -10.5446  | -31.3610  | -532.0095 | 28.2598   | 78.0516  |
| 7     | 625.6826  | -19.5827  | -52.0605  | -633.9050 | 37.2617   | 98.6952  |
| 8     | 731.7666  | -29.5090  | -74.1614  | -717.0959 | 47.1174   | 120.8223 |
| 9     | 818.8462  | -40.0666  | -98.6365  | -780.6304 | 57.6104   | 145.2899 |
| 10    | 872.9929  | -51.9273  | -124.2110 | -787.6942 | 67.8604   | 167.3926 |
| 11    | 886.0896  | -62.3956  | -148.6185 | -799.0905 | 79.7833   | 195.2770 |
| 12    | 890.5291  | -75.1589  | -178.0062 | -777.3590 | 92.4525   | 224.6475 |
| 13    | 864.3767  | -88.4235  | -209.4183 | -724.8964 | 105.6061  | 256.0926 |
| 14    | 784.1229  | -103.0961 | -242.4455 | -616.4504 | 120.1448  | 289.0923 |
| 15    | 666.7443  | -118.1435 | -277.3238 | -455.6755 | 133.8166  | 320.6072 |
| 16    | 534.8462  | -130.8844 | -310.9313 | -313.9734 | 147.7122  | 357.6446 |
| 17    | 326.5817  | -147.2919 | -349.4556 | -76.9337  | 163.9484  | 396.1155 |
| 18    | 112.7352  | -162.7685 | -389.9422 | 163.3505  | 179.2570  | 436.7129 |
| 19    | -146.4453 | -178.7279 | -432.3490 | 448.4938  | 195.0264  | 478.9503 |
| 20    | -441.4914 | -194.8315 | -476.3533 | 788.1193  | 186.1355  | 463.1091 |
| 21    | -730.0816 | 14.5483   | -30.6049  | 606.3060  | -18.7878  | 25.9887  |
| 22    | -595.4204 | 35.8424   | 18.4453   | 492.1605  | -16.4455  | 34.5935  |
| 23    | -461.0655 | 32.7946   | 7.4913    | 362.4769  | -13.2183  | 47.0724  |
| 24    | -311.7111 | 28.7497   | -7.0232   | 220.7838  | -8.9996   | 62.2815  |
| 25    | -151.6751 | 23.6536   | -24.5978  | 46.1087   | -2.7200   | 82.8453  |
| 26    | 39.4758   | 16.4411   | -47.6180  | -105.5393 | 3.6967    | 103.0117 |
| 27    | 205.1729  | 9.0336    | -70.0054  | -253.5188 | 11.2296   | 125.4340 |
| 28    | 364.4166  | 0.4888    | -94.7199  | -391.8301 | 19.8745   | 150.1839 |
| 29    | 510.9575  | -9.2097   | -121.7265 | -537.6902 | 30.9131   | 179.9403 |
| 30    | 661.4631  | -21.3331  | -153.6552 | -636.4133 | 41.8714   | 209.1140 |
| 31    | 761.9148  | -33.3221  | -185.5059 | -707.0757 | 53.8943   | 240.9189 |
| 32    | 822.5621  | -46.9868  | -219.0198 | -734.0345 | 67.5711   | 274.3636 |
| 33    | 851.7867  | -61.1624  | -255.2192 | -746.9215 | 83.0022   | 313.5553 |
| 34    | 855.9829  | -77.6178  | -296.7653 | -694.7006 | 98.1372   | 352.2122 |
| 35    | 776.6730  | -94.4817  | -337.4422 | -575.3776 | 114.9421  | 392.8111 |
| 36    | 630.1831  | -112.7002 | -380.3974 | -386.2773 | 133.0829  | 435.8557 |
| 37    | 459.4692  | -130.3038 | -426.1186 | -191.2435 | 151.6909  | 484.4843 |
| 38    | 230.4784  | -150.3197 | -476.9460 | 96.3323   | 170.4090  | 532.4186 |
| 39    | -66.4018  | -169.4230 | -527.1557 | 435.1668  | 189.3693  | 582.6154 |
| 40    | -424.8642 | -189.0627 | -579.7837 | 835.8403  | 184.8211  | 577.1346 |
| 41    | -779.3364 | 15.8881   | -36.9854  | 649.9503  | -20.1013  | 30.8082  |
| 42    | -638.3076 | 37.1349   | 13.5856   | 530.9107  | -17.7007  | 39.4326  |
| 43    | -498.6623 | 33.9991   | 2.7689    | 396.3602  | -14.3845  | 51.8059  |
| 44    | -344.2993 | 29.8706   | -11.9061  | 250.0652  | -10.0930  | 67.1444  |
| 45    | -179.5874 | 24.7026   | -29.4788  | 70.8514   | -3.7397   | 87.7096  |
| 46    | 16.1200   | 17.3976   | -52.5090  | -84.6848  | 2.7494    | 107.9281 |
| 47    | 185.6897  | 9.9334    | -74.9274  | -236.2963 | 10.3414   | 130.3700 |
| 48    | 348.4380  | 1.3208    | -99.6675  | -377.8823 | 19.0471   | 155.0788 |
| 49    | 498.0984  | -8.4356   | -126.6330 | -526.6112 | 30.1481   | 184.9236 |
| 50    | 651.4757  | -20.6086  | -158.8755 | -628.0641 | 41.1504   | 214.2954 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 51    | 753.9615  | -32.7010  | -190.3220 | -700.4589 | 53.2668   | 245.7290 |
| 52    | 824.2837  | -45.8687  | -224.3030 | -738.1847 | 66.4473   | 279.7181 |
| 53    | 847.7760  | -60.6147  | -260.2929 | -744.0845 | 82.4503   | 318.4768 |
| 54    | 852.0247  | -77.1982  | -301.4875 | -691.5731 | 97.7124   | 356.9251 |
| 55    | 771.4018  | -94.2007  | -342.3106 | -570.6897 | 114.6469  | 397.7849 |
| 56    | 650.1801  | -111.4022 | -385.6480 | -409.2318 | 131.7668  | 441.1136 |
| 57    | 454.7213  | -130.0600 | -431.1231 | -187.0498 | 151.4197  | 489.4483 |
| 58    | 235.7635  | -149.7179 | -482.0053 | 89.6109   | 169.7901  | 537.5233 |
| 59    | -62.4389  | -168.9139 | -532.3537 | 429.8782  | 188.8426  | 587.7758 |
| 60    | -421.5321 | -188.5986 | -584.9436 | 831.2730  | 184.3227  | 582.2673 |
| 61    | -724.5064 | 14.1979   | -37.1335  | 598.6795  | -18.4179  | 30.9699  |
| 62    | -588.9134 | 35.5119   | 13.2837   | 485.0642  | -16.0769  | 39.7290  |
| 63    | -454.9886 | 32.4527   | 2.4864    | 356.0742  | -12.8372  | 52.0786  |
| 64    | -306.5975 | 28.4165   | -12.1611  | 215.5684  | -8.6382   | 67.3915  |
| 65    | -144.9628 | 23.2492   | -29.7204  | 39.4292   | -2.2828   | 87.9659  |
| 66    | 37.6227   | 16.3639   | -52.6925  | -103.8888 | 3.7983    | 108.1192 |
| 67    | 189.2139  | 9.6084    | -75.1446  | -239.1088 | 10.6731   | 130.5789 |
| 68    | 351.3640  | 0.9781    | -99.8787  | -380.0229 | 19.3966   | 155.3538 |
| 69    | 500.1967  | -8.8140   | -126.9522 | -527.9055 | 30.5137   | 185.1974 |
| 70    | 652.8649  | -20.9798  | -159.0525 | -628.6406 | 41.5093   | 214.4084 |
| 71    | 752.9858  | -33.1808  | -190.4119 | -698.3742 | 53.7467   | 245.7934 |
| 72    | 821.9545  | -46.3728  | -224.3552 | -734.7121 | 66.9522   | 279.8098 |
| 73    | 849.2626  | -60.8226  | -260.5193 | -745.0436 | 82.6557   | 318.7361 |
| 74    | 852.0324  | -77.4542  | -301.5989 | -691.0110 | 97.9653   | 357.0333 |
| 75    | 791.3010  | -93.4940  | -342.5927 | -592.2708 | 113.9303  | 398.0493 |
| 76    | 639.6477  | -112.0351 | -385.7379 | -397.1330 | 132.4092  | 441.1925 |
| 77    | 457.5847  | -130.1340 | -431.2353 | -189.9496 | 151.4824  | 489.5504 |
| 78    | 238.5840  | -149.7772 | -482.1276 | 87.0167   | 169.8544  | 537.6738 |
| 79    | -59.9160  | -168.9829 | -532.5383 | 427.4607  | 188.9094  | 587.9461 |
| 80    | -418.8506 | -188.6521 | -585.1100 | 828.7148  | 184.3740  | 582.4414 |
| 81    | -706.2439 | 13.4229   | -37.2562  | 582.1740  | -17.6423  | 31.0920  |
| 82    | -570.4575 | 34.6706   | 13.3391   | 468.4737  | -15.2285  | 39.6943  |
| 83    | -436.1281 | 31.5195   | 2.5369    | 339.3142  | -11.9090  | 52.0094  |
| 84    | -296.9615 | 27.7381   | -12.2259  | 207.4657  | -7.9594   | 67.4507  |
| 85    | -130.3342 | 22.3120   | -29.6845  | 26.8972   | -1.3425   | 87.9229  |
| 86    | 18.1120   | 16.7556   | -52.7529  | -85.2358  | 3.3989    | 108.1925 |
| 87    | 186.4415  | 9.2735    | -75.1522  | -235.5916 | 11.0021   | 130.6406 |
| 88    | 342.2017  | 0.9453    | -99.9338  | -370.8193 | 19.4335   | 155.2753 |
| 89    | 489.4470  | -8.7341   | -126.7762 | -517.3054 | 30.4433   | 185.0017 |
| 90    | 642.2109  | -20.9190  | -158.9143 | -618.0760 | 41.4645   | 214.4196 |
| 91    | 744.1773  | -33.0057  | -190.6915 | -689.9772 | 53.5659   | 246.0650 |
| 92    | 813.9733  | -46.1701  | -224.1709 | -727.1913 | 66.7410   | 279.5765 |
| 93    | 845.3225  | -60.3772  | -260.6347 | -742.1455 | 82.2062   | 318.9450 |
| 94    | 851.5824  | -76.8776  | -301.8387 | -691.9413 | 97.3826   | 357.2164 |
| 95    | 774.2482  | -93.7353  | -342.5625 | -574.5295 | 114.1803  | 398.0095 |
| 96    | 649.5526  | -111.1239 | -385.7465 | -409.2493 | 131.4875  | 441.1981 |
| 97    | 471.2708  | -129.1473 | -431.3020 | -205.7789 | 150.5013  | 489.6308 |
| 98    | 252.3509  | -148.8764 | -482.1381 | 71.3253   | 168.9592  | 537.6718 |
| 99    | -41.5916  | -167.9964 | -532.4500 | 406.8126  | 187.9184  | 587.8779 |
| 100   | -398.0370 | -187.6681 | -585.1662 | 805.6653  | 183.3912  | 582.4967 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 101   | -701.1805 | 13.2820   | -37.3129  | 577.4288  | -17.5016  | 31.1402  |
| 102   | -565.7107 | 34.5268   | 13.4733   | 464.0648  | -15.0891  | 39.5513  |
| 103   | -434.4677 | 31.4679   | 2.5152    | 337.7737  | -11.8574  | 52.0305  |
| 104   | -289.0495 | 27.4670   | -12.1297  | 200.1610  | -7.6818   | 67.3731  |
| 105   | -129.5422 | 22.2811   | -29.6924  | 26.1755   | -1.3089   | 87.9304  |
| 106   | 21.3573   | 16.6237   | -52.6996  | -88.2197  | 3.5339    | 108.1301 |
| 107   | 189.1781  | 9.1435    | -75.1354  | -238.0298 | 11.1333   | 130.5619 |
| 108   | 342.2723  | 0.9340    | -99.8384  | -370.8246 | 19.4449   | 155.3036 |
| 109   | 490.4272  | -8.8155   | -126.9380 | -518.0915 | 30.5217   | 185.1994 |
| 110   | 640.5101  | -20.8146  | -158.9720 | -616.6235 | 41.3490   | 214.3767 |
| 111   | 742.7032  | -32.8876  | -190.6419 | -688.7681 | 53.4596   | 246.0534 |
| 112   | 812.5776  | -46.0754  | -224.3372 | -726.0049 | 66.6589   | 279.7365 |
| 113   | 844.1237  | -60.3186  | -260.6236 | -741.0736 | 82.1483   | 318.8763 |
| 114   | 850.4458  | -76.8415  | -301.7616 | -690.8695 | 97.3556   | 357.1277 |
| 115   | 788.4459  | -93.0162  | -342.4617 | -590.3472 | 113.4588  | 397.9117 |
| 116   | 673.5145  | -110.0663 | -385.6492 | -435.5765 | 130.4268  | 441.1293 |
| 117   | 502.2065  | -127.8993 | -431.3286 | -239.6471 | 149.2440  | 489.6789 |
| 118   | 288.4476  | -147.5431 | -482.1843 | 32.0495   | 167.6179  | 537.6828 |
| 119   | -2.0574   | -166.6484 | -532.5106 | 364.3231  | 186.5719  | 587.9098 |
| 120   | -354.1391 | -186.2578 | -584.8147 | 758.5559  | 181.9659  | 582.1746 |
| 121   | -701.9383 | 13.4198   | -37.3832  | 577.6686  | -17.6334  | 31.2217  |
| 122   | -565.8787 | 34.6535   | 13.3847   | 463.8686  | -15.2009  | 39.6381  |
| 123   | -434.3433 | 31.5725   | 2.4313    | 337.3765  | -11.9456  | 52.1302  |
| 124   | -285.0942 | 27.4028   | -12.1118  | 196.3364  | -7.6076   | 67.3496  |
| 125   | -129.2092 | 22.3152   | -29.7720  | 25.8133   | -1.3172   | 87.9866  |
| 126   | 21.3782   | 16.6202   | -52.7499  | -88.1606  | 3.5524    | 108.2141 |
| 127   | 189.0273  | 9.0735    | -75.2126  | -237.6383 | 11.2049   | 130.6420 |
| 128   | 339.3909  | 0.9389    | -99.9113  | -367.8207 | 19.4533   | 155.3369 |
| 129   | 487.6222  | -8.9101   | -126.9596 | -514.8292 | 30.6427   | 185.2680 |
| 130   | 637.1420  | -21.0344  | -159.1598 | -612.6378 | 41.5832   | 214.5114 |
| 131   | 737.9139  | -33.1790  | -190.4974 | -683.1123 | 53.7665   | 245.9116 |
| 132   | 805.9355  | -46.4288  | -224.5154 | -718.4593 | 67.0098   | 279.9652 |
| 133   | 835.5007  | -60.7291  | -260.7038 | -731.3984 | 82.5699   | 318.9518 |
| 134   | 839.5659  | -77.3039  | -301.9880 | -678.8633 | 97.8162   | 357.4303 |
| 135   | 775.1388  | -93.5510  | -342.8375 | -575.9687 | 113.9944  | 398.2539 |
| 136   | 657.9849  | -110.6497 | -385.8731 | -418.9448 | 131.0047  | 441.3187 |
| 137   | 484.3939  | -128.5431 | -431.5234 | -220.9088 | 149.8731  | 489.8702 |
| 138   | 268.6876  | -148.2000 | -482.3911 | 52.7449   | 168.2537  | 537.9115 |
| 139   | -23.6229  | -167.3041 | -532.7383 | 386.4485  | 187.1999  | 588.1504 |
| 140   | -376.4339 | -186.9090 | -585.1981 | 781.2740  | 182.5543  | 583.0743 |
| 141   | -719.1462 | 9.9176    | -52.2727  | 630.4649  | -18.4272  | 35.8386  |
| 142   | -625.5355 | 32.3078   | -0.6481   | 536.1596  | -16.5419  | 43.3378  |
| 143   | -511.2712 | 29.7714   | -9.4171   | 423.2981  | -13.8263  | 54.1149  |
| 144   | -398.7221 | 27.0060   | -22.6234  | 313.0990  | -10.8642  | 69.0098  |
| 145   | -260.7159 | 22.9933   | -38.9311  | 206.9668  | -7.6577   | 82.1237  |
| 146   | -174.4456 | 20.3681   | -53.9976  | 99.9628   | -3.9549   | 100.6755 |
| 147   | -28.2893  | 14.9913   | -74.2419  | -37.0947  | 1.6036    | 120.9498 |
| 148   | 102.8711  | 9.4216    | -96.3849  | -157.9175 | 7.3362    | 143.0087 |
| 149   | 238.8707  | 2.7251    | -120.1942 | -280.6552 | 14.1903   | 166.8608 |
| 150   | 375.1280  | -5.2182   | -145.8238 | -376.4361 | 20.9261   | 189.0672 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 471.1859 | -12.5069  | -169.7555 | -479.8464 | 29.6428   | 216.3770 |
| 152   | 580.6237 | -22.2568  | -198.8359 | -568.6211 | 39.5047   | 245.4918 |
| 153   | 668.4717 | -32.9317  | -229.8359 | -633.5129 | 50.2900   | 276.5543 |
| 154   | 729.7631 | -44.5673  | -262.7324 | -669.6011 | 62.0323   | 309.3504 |
| 155   | 759.5833 | -57.1687  | -296.9720 | -657.8149 | 73.1325   | 340.0956 |
| 156   | 738.3781 | -69.1108  | -329.6324 | -623.8637 | 86.6973   | 376.3477 |
| 157   | 691.8616 | -83.5734  | -368.0840 | -546.0129 | 101.2090  | 414.8308 |
| 158   | 598.8020 | -98.9598  | -408.0479 | -419.5822 | 116.6615  | 454.7458 |
| 159   | 453.6967 | -115.3063 | -449.8289 | -239.2790 | 133.0421  | 496.5417 |
| 160   | 251.5845 | -132.5833 | -493.4940 | 0.0445    | 148.6641  | 536.8103 |



ENVOLVENTE MAXIMOS FLECTORES TREN UIC-71, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0427    | 149.2934  | -563.7516 | -249.7246  | -131.5313 | 514.8614  |
| 2     | 301.5192  | 160.3105  | -493.1357 | -566.2015  | -132.0411 | 412.2944  |
| 3     | 566.3404  | 132.0423  | -412.1065 | -797.6583  | -114.3201 | 363.1072  |
| 4     | 797.7488  | 114.3005  | -362.8988 | -991.3719  | -102.7355 | 331.6638  |
| 5     | 991.3813  | 102.7355  | -331.6584 | -1150.0361 | -80.6270  | 268.4933  |
| 6     | 1150.1252 | 80.6448   | -268.0997 | -1277.3453 | -58.5495  | 204.9269  |
| 7     | 1277.3508 | 58.5431   | -204.9322 | -1365.7018 | -47.1021  | 173.5642  |
| 8     | 1365.8033 | 47.0566   | -172.7481 | -1420.3174 | -18.9150  | 91.8643   |
| 9     | 1420.2776 | 18.8934   | -92.3431  | -1441.4985 | -1.4828   | 43.3270   |
| 10    | 1441.5281 | 1.4380    | -42.3521  | -1429.2415 | 14.4290   | -3.1848   |
| 11    | 1429.2561 | -14.4038  | 3.0892    | -1383.0256 | 31.6334   | -52.0814  |
| 12    | 1383.0051 | -31.6301  | 52.5580   | -1305.4272 | 59.5950   | -133.4547 |
| 13    | 1305.4268 | -59.5938  | 133.4728  | -1196.4620 | 70.5451   | -164.7550 |
| 14    | 1196.4120 | -70.5824  | 165.1589  | -1053.0641 | 81.3889   | -196.4916 |
| 15    | 1052.9921 | -81.3744  | 196.7822  | -879.0317  | 98.1156   | -245.7156 |
| 16    | 879.1021  | -98.1202  | 245.4726  | -676.9623  | 125.8374  | -326.3563 |
| 17    | 676.8499  | -124.0343 | 318.8105  | -449.9978  | 140.5147  | -367.7943 |
| 18    | 496.1447  | -89.4263  | 236.3656  | -333.7230  | 99.6304   | -267.4147 |
| 19    | 371.1990  | -56.8537  | 159.6716  | -297.8555  | 42.8375   | -134.1952 |
| 20    | 328.5168  | -4.4197   | 33.5802   | -307.6026  | 22.3365   | -73.7019  |
| 21    | 330.1439  | -29.4456  | -23.6359  | -255.9938  | 32.9614   | 25.3542   |
| 22    | 276.7716  | -16.2076  | -69.0097  | -260.9648  | 7.9691    | 66.0137   |
| 23    | 311.1045  | 38.5573   | -192.4312 | -385.5629  | -29.9442  | 167.0137  |
| 24    | 428.4589  | 68.1232   | -271.6427 | -542.3659  | -35.8566  | 178.0685  |
| 25    | 600.4011  | 83.8586   | -321.0521 | -776.3538  | -63.6515  | 262.8413  |
| 26    | 842.0750  | 112.0906  | -296.5987 | -1081.6069 | -102.7776 | 270.8016  |
| 27    | 1081.7504 | 102.7757  | -270.2887 | -1274.9570 | -82.3223  | 212.0618  |
| 28    | 1274.9463 | 82.3288   | -212.0631 | -1417.3640 | -49.6194  | 118.4156  |
| 29    | 1417.3936 | 49.6248   | -118.0375 | -1510.4641 | -29.0565  | 59.7066   |
| 30    | 1510.4755 | 29.0514   | -58.9596  | -1554.4237 | -8.4781   | 0.7532    |
| 31    | 1554.4087 | 8.4836    | -1.1698   | -1549.1365 | 12.0996   | -57.0943  |
| 32    | 1549.0903 | -12.1223  | 58.2971   | -1494.6346 | 32.6808   | -116.6262 |
| 33    | 1494.6509 | -32.6445  | 116.6297  | -1391.4304 | 53.1619   | -174.7816 |
| 34    | 1391.4397 | -53.1168  | 174.7994  | -1238.6562 | 85.7786   | -268.4851 |
| 35    | 1238.5205 | -85.7760  | 269.0960  | -1036.1272 | 106.1560  | -327.4032 |
| 36    | 1035.9736 | -106.1386 | 327.9285  | -788.3658  | 115.3176  | -353.5926 |
| 37    | 807.1278  | -83.9293  | 316.3012  | -585.4337  | 104.0290  | -374.4819 |
| 38    | 625.4484  | -67.3011  | 261.9905  | -440.9164  | 99.4400   | -355.4895 |
| 39    | 499.8654  | -51.0474  | 220.8096  | -410.9599  | 35.4346   | -186.9885 |
| 40    | 460.1722  | 10.8684   | 60.7095   | -464.3757  | 10.6284   | -111.2858 |
| 41    | 500.2724  | -34.2877  | -23.1131  | -417.6290  | 33.6464   | 21.2366   |
| 42    | 439.4133  | -16.9233  | -64.7952  | -414.4380  | 1.6479    | 98.0347   |
| 43    | 468.5919  | 44.7466   | -224.4389 | -532.3792  | -24.8036  | 166.3590  |
| 44    | 581.2057  | 73.4244   | -300.8068 | -707.5379  | -41.1381  | 207.2168  |
| 45    | 749.0922  | 78.2336   | -320.1955 | -912.7147  | -58.0207  | 261.9871  |
| 46    | 988.0135  | 106.0407  | -295.6658 | -1214.2098 | -96.7213  | 269.9147  |
| 47    | 1214.2716 | 96.7377   | -269.6003 | -1393.9729 | -76.2823  | 211.3555  |
| 48    | 1394.0029 | 76.2979   | -211.0590 | -1522.8674 | -43.5857  | 117.3704  |
| 49    | 1522.9163 | 43.5631   | -116.9567 | -1602.2902 | -23.0066  | 58.7420   |
| 50    | 1602.2626 | 22.9768   | -58.7459  | -1632.4131 | -2.3983   | 0.4741    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 51    | 1632.4170 | 2.3776    | 0.3255    | -1613.3182 | 18.2074   | -58.6019  |
| 52    | 1613.3101 | -18.2368  | 58.6124   | -1545.0159 | 38.7862   | -116.8690 |
| 53    | 1544.9261 | -38.7982  | 117.6297  | -1427.7622 | 59.3074   | -175.9378 |
| 54    | 1427.6935 | -59.3088  | 176.3341  | -1260.8823 | 91.9607   | -270.0287 |
| 55    | 1260.8390 | -91.9643  | 270.2920  | -1044.5455 | 112.3309  | -328.4689 |
| 56    | 1044.5454 | -112.3473 | 328.4790  | -782.9166  | 121.4976  | -354.1571 |
| 57    | 810.7087  | -78.2386  | 320.7250  | -601.8745  | 98.3214   | -378.9459 |
| 58    | 643.0621  | -61.2731  | 265.9581  | -472.1621  | 93.3953   | -359.4146 |
| 59    | 531.9287  | -44.8090  | 225.0012  | -457.2585  | 29.1674   | -191.2110 |
| 60    | 507.0162  | 17.2101   | 64.9765   | -525.4886  | 4.2757    | -115.5359 |
| 61    | 561.4918  | -35.9414  | -23.1779  | -481.2859  | 35.4755   | 21.2954   |
| 62    | 503.1794  | -18.7567  | -64.7073  | -468.7737  | 3.3040    | 97.9344   |
| 63    | 523.3268  | 43.0826   | -224.2861 | -583.4292  | -23.1396  | 166.2041  |
| 64    | 632.9576  | 71.7429   | -300.6245 | -755.5475  | -39.4545  | 207.0366  |
| 65    | 797.7727  | 76.5236   | -320.0085 | -957.5561  | -56.3034  | 261.8359  |
| 66    | 1033.3093 | 103.9528  | -295.6318 | -1254.8506 | -94.6207  | 269.8581  |
| 67    | 1255.0060 | 94.6037   | -269.2122 | -1429.9355 | -74.1421  | 210.9707  |
| 68    | 1429.9414 | 74.1337   | -210.9777 | -1553.9435 | -41.4176  | 117.3316  |
| 69    | 1553.9875 | 41.4323   | -116.9946 | -1628.5427 | -20.8908  | 58.7502   |
| 70    | 1628.5626 | 20.8898   | -58.3073  | -1654.0217 | -0.3205   | -0.0207   |
| 71    | 1654.0374 | 0.3300    | 0.8626    | -1630.3264 | 20.2488   | -59.1270  |
| 72    | 1630.3235 | -20.2728  | 59.1310   | -1557.4243 | 40.8231   | -117.3354 |
| 73    | 1557.3872 | -40.8296  | 117.7549  | -1435.5916 | 61.3388   | -176.0758 |
| 74    | 1435.4663 | -61.3165  | 176.7812  | -1264.1599 | 93.9642   | -270.4650 |
| 75    | 1264.1730 | -93.9514  | 270.4103  | -1043.4734 | 114.3120  | -328.5744 |
| 76    | 1043.3618 | -114.3179 | 328.9181  | -777.1624  | 123.4779  | -354.6668 |
| 77    | 807.9270  | -76.7877  | 320.8691  | -602.5314  | 96.8585   | -379.0208 |
| 78    | 643.8929  | -59.7817  | 265.8891  | -476.2852  | 91.9081   | -359.3553 |
| 79    | 536.1077  | -43.3188  | 225.0591  | -464.8141  | 27.6756   | -191.2777 |
| 80    | 514.6451  | 18.7068   | 65.0301   | -536.5078  | -1.1604   | -119.2019 |
| 81    | 572.5436  | -31.9420  | -19.4860  | -492.8384  | 35.4260   | 21.2263   |
| 82    | 514.7382  | -18.7030  | -64.7719  | -480.1235  | 3.2469    | 98.0015   |
| 83    | 534.6833  | 43.1317   | -224.3964 | -594.8855  | -23.1930  | 166.3121  |
| 84    | 644.4392  | 71.7856   | -300.5397 | -767.1256  | -39.4992  | 206.9563  |
| 85    | 809.2649  | 76.5739   | -320.0785 | -969.2003  | -56.3529  | 261.8507  |
| 86    | 1043.6688 | 103.0284  | -295.1845 | -1263.0767 | -93.7044  | 269.4960  |
| 87    | 1263.0304 | 93.7213   | -269.7803 | -1435.9326 | -73.2683  | 211.5616  |
| 88    | 1436.0620 | 73.2766   | -210.8396 | -1558.1448 | -40.5594  | 117.0408  |
| 89    | 1558.2029 | 40.5271   | -116.2500 | -1630.7462 | -19.9618  | 57.9851   |
| 90    | 1630.7549 | 19.9343   | -57.9761  | -1654.0365 | 0.6460    | -0.1791   |
| 91    | 1654.0212 | -0.7028   | 0.1845    | -1627.9686 | 21.2663   | -58.5071  |
| 92    | 1627.9375 | -21.2146  | 59.7688   | -1552.9192 | 41.7658   | -118.0380 |
| 93    | 1552.9698 | -41.7346  | 117.6148  | -1429.1921 | 62.2392   | -175.8013 |
| 94    | 1429.1014 | -62.2350  | 176.5049  | -1255.7780 | 94.8795   | -270.2321 |
| 95    | 1255.7146 | -94.8562  | 270.5832  | -1032.8378 | 115.2209  | -328.8158 |
| 96    | 1032.7797 | -115.2179 | 329.0500  | -764.7682  | 124.3674  | -354.7242 |
| 97    | 796.4203  | -76.7051  | 320.6942  | -591.0952  | 96.7819   | -378.8816 |
| 98    | 632.3305  | -59.7135  | 266.0569  | -464.8582  | 91.8457   | -359.5508 |
| 99    | 524.8708  | -43.2628  | 224.9226  | -453.4044  | 27.6261   | -191.0990 |
| 100   | 503.1624  | 18.7542   | 64.9821   | -525.4841  | -1.2171   | -119.1582 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 561.5175  | -30.4508  | -19.3663  | -485.1672  | 33.9353   | 21.1115   |
| 102   | 507.0513  | -17.2171  | -64.8113  | -475.7713  | 1.7567    | 98.0585   |
| 103   | 530.3347  | 44.6266   | -224.3290 | -593.9103  | -24.6870  | 166.2531  |
| 104   | 643.4020  | 73.2709   | -300.6364 | -769.4569  | -40.9787  | 207.0282  |
| 105   | 811.6638  | 78.0430   | -319.9933 | -974.9212  | -57.8214  | 261.7700  |
| 106   | 1044.3262 | 101.0812  | -295.1977 | -1259.4236 | -91.7547  | 269.4367  |
| 107   | 1259.4780 | 91.7496   | -269.1571 | -1427.8928 | -71.2895  | 210.9284  |
| 108   | 1427.9222 | 71.2624   | -210.5594 | -1545.4634 | -38.5444  | 116.9071  |
| 109   | 1545.4376 | 38.5293   | -116.9107 | -1613.4467 | -17.9711  | 58.6404   |
| 110   | 1613.4929 | 17.9846   | -57.8266  | -1632.4254 | 2.5861    | -0.4350   |
| 111   | 1632.4470 | -2.5912   | 0.4467    | -1602.1597 | 23.1674   | -58.7135  |
| 112   | 1602.1411 | -23.2276  | 59.5184   | -1522.5852 | 43.7819   | -117.7822 |
| 113   | 1522.5713 | -43.7863  | 117.7915  | -1394.1644 | 64.3012   | -176.0398 |
| 114   | 1394.0731 | -64.3266  | 176.7292  | -1216.0332 | 96.9715   | -270.4580 |
| 115   | 1215.9622 | -96.9608  | 270.7975  | -988.3499  | 117.3273  | -329.0299 |
| 116   | 988.2588  | -117.3311 | 329.2325  | -715.5299  | 126.4762  | -354.8781 |
| 117   | 748.2906  | -78.4592  | 320.6828  | -539.1382  | 98.5263   | -378.8305 |
| 118   | 580.9148  | -61.4266  | 266.0028  | -409.6587  | 93.5507   | -359.5183 |
| 119   | 470.1362  | -44.9287  | 225.1868  | -389.1627  | 29.4688   | -191.3796 |
| 120   | 439.4201  | 16.9203   | 64.8585   | -464.1838  | 0.4397    | -119.0399 |
| 121   | 500.2553  | -24.0885  | -15.2634  | -438.1921  | 27.5837   | 16.9981   |
| 122   | 460.1716  | -10.8773  | -60.6873  | -443.3005  | -4.5528   | 93.9216   |
| 123   | 498.2325  | 50.8637   | -220.1928 | -575.8839  | -30.9062  | 162.1367  |
| 124   | 625.8638  | 79.3003   | -296.6708 | -765.4552  | -46.9970  | 203.0638  |
| 125   | 807.9268  | 83.7500   | -315.7432 | -984.0354  | -63.5086  | 257.4780  |
| 126   | 1036.2317 | 94.9469   | -293.9526 | -1237.4513 | -85.5965  | 268.2364  |
| 127   | 1237.4370 | 85.6287   | -268.3017 | -1391.9606 | -65.1699  | 210.0717  |
| 128   | 1392.0743 | 65.1665   | -209.3310 | -1495.8149 | -32.4426  | 115.6287  |
| 129   | 1495.8040 | 32.4416   | -115.6324 | -1549.9951 | -11.8700  | 57.4130   |
| 130   | 1550.0359 | 11.8386   | -57.0588  | -1554.9977 | 8.7508    | -1.2513   |
| 131   | 1554.9885 | -8.7611   | 2.0807    | -1510.7084 | 29.3437   | -60.3678  |
| 132   | 1510.7041 | -29.3555  | 60.3018   | -1417.3412 | 49.9107   | -118.4954 |
| 133   | 1417.2753 | -49.9134  | 118.8592  | -1275.0673 | 70.4196   | -177.1256 |
| 134   | 1274.9940 | -70.4170  | 177.4702  | -1083.2502 | 103.0680  | -271.1739 |
| 135   | 1083.1997 | -103.0820 | 271.4188  | -842.0322  | 123.4409  | -329.6719 |
| 136   | 841.8690  | -123.4338 | 330.0456  | -555.9103  | 132.5601  | -355.7432 |
| 137   | 599.3330  | -84.1019  | 321.6004  | -378.0112  | 104.1549  | -379.7571 |
| 138   | 427.9756  | -56.1234  | 236.8904  | -269.4187  | 88.2239   | -330.3933 |
| 139   | 312.4883  | -50.0311  | 225.8142  | -222.2561  | 30.2928   | -195.5825 |
| 140   | 276.8888  | 16.2339   | 69.0839   | -293.1648  | 5.2876    | -119.6618 |
| 141   | 330.3655  | -5.6561   | 2.5882    | -313.8477  | 9.1755    | -0.8729   |
| 142   | 328.7671  | 4.4122    | -33.3479  | -331.5192  | -24.3385  | 75.8753   |
| 143   | 370.0144  | 62.7514   | -176.7343 | -455.5938  | -46.4342  | 127.9173  |
| 144   | 495.1798  | 89.1870   | -235.4176 | -631.0550  | -61.5492  | 154.5336  |
| 145   | 677.0099  | 112.6176  | -285.8873 | -877.1826  | -96.0287  | 236.9370  |
| 146   | 880.3466  | 97.8337   | -244.8048 | -1054.2469 | -93.2690  | 231.2686  |
| 147   | 1054.2708 | 93.3122   | -231.2688 | -1194.9884 | -76.4037  | 182.2805  |
| 148   | 1195.0433 | 76.4089   | -181.9328 | -1304.0369 | -48.4993  | 101.0154  |
| 149   | 1304.0676 | 48.4813   | -100.5834 | -1383.5524 | -31.3604  | 51.5670   |
| 150   | 1383.5646 | 31.3728   | -51.5571  | -1429.5493 | -14.1181  | 2.5351    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|------------|-----------|-----------|
| 151   | 1429.5669 | 14.0925   | -2.0671  | -1441.3335 | 1.7839    | -43.4680  |
| 152   | 1441.3132 | -1.7978   | 43.8774  | -1419.7999 | 29.8878   | -124.7742 |
| 153   | 1419.7972 | -29.8555  | 124.7829 | -1367.2306 | 35.1129   | -138.2866 |
| 154   | 1367.2383 | -35.1681  | 138.2654 | -1276.0488 | 52.7198   | -187.3302 |
| 155   | 1275.9041 | -52.7398  | 188.0866 | -1150.6696 | 80.9427   | -269.0944 |
| 156   | 1150.5708 | -80.9465  | 269.4596 | -991.3239  | 96.9614   | -314.8670 |
| 157   | 991.4152  | -96.9666  | 314.5485 | -797.2193  | 114.6383  | -363.4658 |
| 158   | 797.0994  | -114.6349 | 363.7206 | -566.5976  | 142.8934  | -444.6156 |
| 159   | 566.4728  | -142.8883 | 444.7772 | -302.3449  | 160.6224  | -493.7278 |
| 160   | 302.1870  | -160.6121 | 493.8216 | -0.0447    | 176.6948  | -539.2124 |

ENVOLVENTE MAXIMOS CORTANTES TREN UIC-71, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 1     | 0.0408     | 178.0767  | -542.0221 | -301.5228  | -160.3146 | 493.1312 |
| 2     | 289.3736   | 160.7630  | -496.2263 | -553.7672  | -143.0290 | 447.2824 |
| 3     | 519.8968   | 144.3807  | -452.0737 | -749.1474  | -126.6824 | 403.0670 |
| 4     | 696.5420   | 128.9092  | -409.7459 | -892.2567  | -111.2719 | 360.7840 |
| 5     | 824.0944   | 114.4059  | -369.5332 | -1002.7010 | -98.4147  | 324.0859 |
| 6     | 922.2646   | 102.4415  | -334.4267 | -1059.8936 | -84.9103  | 285.4077 |
| 7     | 969.9731   | 89.7855   | -297.9786 | -1080.2627 | -72.3277  | 248.8865 |
| 8     | 984.0645   | 78.0217   | -262.8035 | -1069.0779 | -60.6662  | 213.7979 |
| 9     | 969.0604   | 67.2187   | -230.5149 | -1031.0848 | -49.9737  | 181.4846 |
| 10    | 930.3607   | 57.3213   | -199.1785 | -995.9094  | -41.5399  | 153.6604 |
| 11    | 896.5902   | 49.7346   | -173.9668 | -920.7235  | -32.6969  | 124.9771 |
| 12    | 825.4343   | 41.6319   | -146.8495 | -833.3531  | -24.7399  | 97.8416  |
| 13    | 744.0414   | 34.4056   | -121.8911 | -738.0680  | -17.6536  | 72.8867  |
| 14    | 656.7501   | 28.0134   | -98.6393  | -639.3352  | -11.4325  | 49.6152  |
| 15    | 567.6179   | 22.4855   | -77.3540  | -567.5387  | -7.0671   | 31.9778  |
| 16    | 506.8827   | 18.7433   | -61.8816  | -472.8323  | -2.4392   | 13.0315  |
| 17    | 424.3793   | 14.7123   | -44.3256  | -385.3869  | 1.3983    | -4.2100  |
| 18    | 349.9679   | 11.4219   | -29.4658  | -345.4001  | 3.3540    | -26.9814 |
| 19    | 323.5251   | 9.9780    | -8.3815   | -328.5309  | 4.4183    | -33.4596 |
| 20    | 320.4456   | 9.3625    | -3.6548   | -212.5622  | -16.0452  | 29.6937  |
| 21    | -1695.6759 | 229.4870  | -574.5365 | 1206.4751  | -233.1195 | 575.2175 |
| 22    | -1216.2152 | 233.4223  | -578.8347 | 748.6193   | -213.5045 | 520.7651 |
| 23    | -777.3639  | 214.4452  | -526.6462 | 351.4867   | -194.3776 | 468.4963 |
| 24    | -399.1467  | 196.0478  | -476.1849 | 14.6097    | -175.8412 | 418.0420 |
| 25    | -80.0781   | 178.3046  | -428.1602 | -246.7986  | -156.7890 | 366.9901 |
| 26    | 165.1349   | 160.1372  | -379.5406 | -468.5374  | -139.6832 | 321.2418 |
| 27    | 372.4872   | 143.9511  | -336.1756 | -637.2688  | -123.4419 | 277.9499 |
| 28    | 529.1913   | 128.7080  | -295.4614 | -757.1020  | -108.1454 | 237.2413 |
| 29    | 640.1110   | 114.4289  | -257.0668 | -812.1788  | -92.5609  | 195.8023 |
| 30    | 689.3702   | 99.8988   | -217.9821 | -848.2510  | -79.3215  | 159.7757 |
| 31    | 722.8744   | 87.7207   | -184.8610 | -851.4941  | -67.1747  | 126.5827 |
| 32    | 727.3271   | 76.6426   | -153.4842 | -828.4552  | -56.1504  | 95.1857  |
| 33    | 708.6653   | 66.7062   | -125.0785 | -759.7791  | -45.1040  | 63.9757  |
| 34    | 647.8309   | 56.7180   | -96.2976  | -702.0067  | -36.4397  | 38.0516  |
| 35    | 601.0933   | 49.0645   | -72.5686  | -637.1490  | -28.9053  | 14.2917  |
| 36    | 550.1357   | 42.5282   | -51.3137  | -571.4032  | -22.5096  | -6.8115  |
| 37    | 500.7663   | 37.0741   | -33.0219  | -422.8387  | -18.3612  | -45.8163 |
| 38    | 370.5746   | 33.8228   | 3.9872    | -426.4178  | -15.8264  | -56.2710 |
| 39    | 394.0025   | 32.1011   | 11.5627   | -445.9847  | -14.0984  | -63.8683 |
| 40    | 434.1938   | 31.1209   | 17.2136   | -382.4120  | -30.9534  | 1.1954   |
| 41    | -1891.9786 | 235.0919  | -569.2493 | 1388.7883  | -238.6550 | 570.5093 |
| 42    | -1398.7872 | 238.9663  | -574.2095 | 918.0606   | -219.0285 | 516.1610 |
| 43    | -947.6100  | 219.9945  | -521.8962 | 508.6120   | -199.9030 | 463.7194 |
| 44    | -557.1789  | 201.6078  | -471.5977 | 159.7943   | -181.3922 | 413.4435 |
| 45    | -226.4412  | 183.8957  | -423.5731 | -113.2771  | -162.3747 | 362.4158 |
| 46    | 30.3625    | 165.7760  | -375.0756 | -346.4945  | -145.3248 | 316.8168 |
| 47    | 249.1163   | 149.6601  | -331.8510 | -526.8102  | -129.1462 | 273.6017 |
| 48    | 417.5657   | 134.4652  | -291.0708 | -658.3657  | -113.9151 | 232.8260 |
| 49    | 540.2871   | 120.2492  | -252.7075 | -725.2522  | -98.3847  | 191.5506 |
| 50    | 601.3967   | 105.7654  | -213.9959 | -773.3551  | -85.1941  | 155.7172 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 647.2965   | 93.6527   | -180.3802 | -789.1497 | -73.1160  | 122.1209 |
| 52    | 664.2072   | 82.6362   | -149.5123 | -778.6595 | -62.1539  | 91.2411  |
| 53    | 658.4110   | 72.7566   | -120.8371 | -722.9769 | -51.1715  | 59.6145  |
| 54    | 610.7198   | 62.8179   | -91.8209  | -678.5529 | -42.5463  | 33.5865  |
| 55    | 577.4292   | 55.2210   | -68.3046  | -627.2931 | -35.0761  | 10.1335  |
| 56    | 540.1967   | 48.7329   | -47.3953  | -436.4553 | -28.7338  | -37.5098 |
| 57    | 365.8309   | 43.3358   | -1.9269   | -443.1114 | -25.3285  | -50.3867 |
| 58    | 390.9163   | 40.8143   | 8.1723    | -462.4909 | -22.8188  | -60.4560 |
| 59    | 430.1440   | 39.1122   | 16.0106   | -497.8984 | -21.1116  | -68.3223 |
| 60    | 486.1794   | 38.1416   | 21.6983   | -443.8961 | -37.3255  | -3.0627  |
| 61    | -1945.9387 | 236.5323  | -568.7613 | 1439.2395 | -240.0800 | 569.9904 |
| 62    | -1449.1447 | 240.3890  | -574.0957 | 965.1627  | -220.4521 | 516.0459 |
| 63    | -994.7839  | 221.4227  | -521.8028 | 552.5498  | -201.3303 | 463.6249 |
| 64    | -601.2176  | 203.0280  | -471.5249 | 200.6303  | -182.8092 | 413.3741 |
| 65    | -267.3892  | 185.3189  | -423.5126 | -75.5113  | -163.7875 | 362.3881 |
| 66    | -7.6133    | 167.1766  | -375.0165 | -311.7572 | -146.7184 | 316.7297 |
| 67    | 214.3097   | 151.0471  | -331.7629 | -495.1149 | -130.5263 | 273.5274 |
| 68    | 385.7142   | 135.8548  | -291.0514 | -629.6786 | -115.3046 | 232.8405 |
| 69    | 511.4786   | 121.6552  | -252.7366 | -699.5247 | -99.8016  | 191.5399 |
| 70    | 575.7127   | 107.2062  | -213.8590 | -750.8989 | -86.6372  | 155.5379 |
| 71    | 624.8134   | 95.0985   | -180.2261 | -769.9229 | -74.5704  | 121.9691 |
| 72    | 644.9730   | 84.1030   | -149.3799 | -762.7131 | -63.6250  | 91.1680  |
| 73    | 642.4570   | 74.2259   | -120.8932 | -710.3551 | -52.6329  | 59.6462  |
| 74    | 598.0958   | 64.2960   | -91.7552  | -669.2697 | -44.0335  | 33.5353  |
| 75    | 568.1536   | 56.7102   | -68.3935  | -621.3522 | -36.5790  | 10.2287  |
| 76    | 534.2992   | 50.2321   | -47.3120  | -434.0555 | -30.2580  | -37.6083 |
| 77    | 363.4229   | 44.8652   | -1.9214   | -444.1059 | -26.8704  | -50.3526 |
| 78    | 391.9576   | 42.3488   | 8.0798    | -466.9972 | -24.3474  | -60.3807 |
| 79    | 434.6516   | 40.6441   | 16.0462   | -505.8497 | -22.6439  | -68.3591 |
| 80    | 494.1456   | 39.6745   | 21.7364   | -454.9571 | -38.8215  | -3.0956  |
| 81    | -1959.2417 | 236.5656  | -569.0105 | 1452.4799 | -240.1106 | 570.2516 |
| 82    | -1462.5162 | 240.4230  | -573.9668 | 978.3333  | -220.4796 | 515.9032 |
| 83    | -1007.9961 | 221.4527  | -521.5903 | 565.8304  | -201.3665 | 463.4052 |
| 84    | -614.3503  | 203.0653  | -471.5490 | 213.6789  | -182.8489 | 413.4045 |
| 85    | -280.5158  | 185.3620  | -423.4247 | -62.6101  | -163.8322 | 362.2528 |
| 86    | -20.3598   | 167.2257  | -375.0010 | -298.9717 | -146.7743 | 316.8074 |
| 87    | 201.3365   | 151.1171  | -331.8592 | -482.2887 | -130.6026 | 273.6184 |
| 88    | 373.0316   | 135.9306  | -291.0218 | -617.1883 | -115.3688 | 232.6663 |
| 89    | 499.0359   | 121.7054  | -252.5068 | -687.2651 | -99.8416  | 191.3154 |
| 90    | 563.3633   | 107.2409  | -213.7915 | -738.5768 | -86.6733  | 155.6211 |
| 91    | 612.4222   | 95.1278   | -180.5345 | -757.5834 | -74.5960  | 122.2107 |
| 92    | 632.7432   | 84.1510   | -149.2326 | -750.6591 | -63.6719  | 90.9805  |
| 93    | 630.3539   | 74.2775   | -121.0106 | -698.3349 | -52.7020  | 59.8709  |
| 94    | 586.1273   | 64.3512   | -91.9523  | -657.4044 | -44.0917  | 33.6871  |
| 95    | 556.3438   | 56.7674   | -68.3659  | -609.7197 | -36.6213  | 10.1488  |
| 96    | 522.6430   | 50.2852   | -47.3242  | -422.5123 | -30.3231  | -37.5359 |
| 97    | 351.9190   | 44.9209   | -2.0568   | -432.7442 | -26.9190  | -50.2416 |
| 98    | 380.5768   | 42.4017   | 8.1978    | -455.7471 | -24.3955  | -60.5097 |
| 99    | 423.4181   | 40.6961   | 15.8623   | -494.7201 | -22.7011  | -68.1580 |
| 100   | 483.0030   | 39.7268   | 21.6982   | -443.9375 | -38.8738  | -3.0622  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====     | =====     | =====     | =====    |
| 101   | -1945.7712 | 234.8700  | -569.0644 | 1442.8346 | -238.4143 | 570.3221 |
| 102   | -1453.0308 | 238.7260  | -573.5294 | 972.7991  | -218.7872 | 515.4651 |
| 103   | -1002.3008 | 219.7585  | -521.5030 | 563.9374  | -199.6713 | 463.3299 |
| 104   | -612.5540  | 201.3731  | -471.2801 | 215.5650  | -181.1524 | 413.1078 |
| 105   | -282.3368  | 183.6717  | -423.2379 | -56.9780  | -162.1392 | 362.0625 |
| 106   | -26.0831   | 165.5385  | -374.7677 | -289.5933 | -145.0798 | 316.5012 |
| 107   | 192.0611   | 149.4197  | -331.5658 | -469.0833 | -128.9081 | 273.3349 |
| 108   | 359.7840   | 134.2238  | -290.8076 | -600.0721 | -113.6592 | 232.5946 |
| 109   | 481.8255   | 120.0109  | -252.5725 | -666.2251 | -98.1527  | 191.3598 |
| 110   | 542.4372   | 105.5553  | -213.6065 | -713.9065 | -84.9922  | 155.3506 |
| 111   | 587.7792   | 93.4614   | -180.2685 | -729.1848 | -72.9211  | 121.9999 |
| 112   | 604.3284   | 82.4523   | -149.1613 | -718.3674 | -61.9675  | 90.9094  |
| 113   | 598.1451   | 72.5764   | -120.7814 | -662.2951 | -50.9950  | 59.5913  |
| 114   | 550.1375   | 62.6537   | -91.7027  | -617.6040 | -42.3911  | 33.4423  |
| 115   | 516.6166   | 55.0759   | -68.1472  | -566.2230 | -34.9357  | 9.9301   |
| 116   | 479.2362   | 48.6052   | -47.1295  | -375.6651 | -28.6674  | -37.7240 |
| 117   | 305.1777   | 43.2745   | -1.9948   | -382.2799 | -25.2770  | -50.2882 |
| 118   | 330.2170   | 40.7592   | 8.2549    | -401.6811 | -22.7577  | -60.5626 |
| 119   | 369.4268   | 39.0575   | 16.1773   | -437.0567 | -21.0564  | -68.4798 |
| 120   | 425.4284   | 38.0900   | 21.5684   | -382.7158 | -37.2219  | -2.9535  |
| 121   | -1891.6166 | 229.2299  | -568.0332 | 1401.1926 | -232.7370 | 569.2943 |
| 122   | -1411.4059 | 233.0510  | -572.5228 | 943.8281  | -213.0943 | 514.4567 |
| 123   | -973.3893  | 214.0729  | -520.4818 | 547.7760  | -193.9669 | 462.3275 |
| 124   | -596.5653  | 195.6816  | -470.0256 | 212.4658  | -175.4454 | 411.8442 |
| 125   | -279.1181  | 177.9925  | -422.1215 | -47.4436  | -156.4383 | 360.9171 |
| 126   | -35.5757   | 159.8642  | -373.6427 | -267.2872 | -139.3927 | 315.4136 |
| 127   | 169.8186   | 143.7787  | -330.4758 | -434.0219 | -123.2667 | 272.2456 |
| 128   | 325.0955   | 128.6305  | -289.6843 | -552.7396 | -108.0626 | 231.4238 |
| 129   | 434.8859   | 114.4607  | -251.4231 | -606.6537 | -92.5781  | 190.2520 |
| 130   | 483.3669   | 100.0239  | -212.6285 | -642.2931 | -79.4567  | 154.3169 |
| 131   | 517.0019   | 87.9799   | -179.0606 | -646.1225 | -67.4377  | 120.7884 |
| 132   | 522.0723   | 77.0390   | -148.2362 | -623.9167 | -56.5609  | 90.0409  |
| 133   | 504.8204   | 67.2313   | -119.8145 | -557.1454 | -45.6600  | 58.6140  |
| 134   | 446.1931   | 57.3791   | -90.8758  | -502.0855 | -37.1249  | 32.6259  |
| 135   | 402.3945   | 49.8728   | -67.3861  | -440.6732 | -29.7485  | 9.1452   |
| 136   | 355.1020   | 43.4735   | -46.2961  | -244.5512 | -23.7041  | -38.5368 |
| 137   | 175.4532   | 38.3651   | -1.2068   | -241.5218 | -20.3676  | -51.0806 |
| 138   | 190.7662   | 35.8986   | 8.9708    | -251.2966 | -17.8951  | -61.2776 |
| 139   | 220.1522   | 34.2299   | 16.7101   | -276.9104 | -16.2328  | -69.0037 |
| 140   | 266.0408   | 33.2870   | 22.1661   | -213.1543 | -32.4023  | -4.9880  |
| 141   | -1691.6077 | 212.1731  | -461.6083 | 1317.5851 | -220.1487 | 473.5366 |
| 142   | -1324.2532 | 220.3467  | -477.0049 | 975.8721  | -204.0241 | 428.2220 |
| 143   | -995.9637  | 204.6405  | -432.3770 | 673.7898  | -188.1383 | 383.4155 |
| 144   | -706.4402  | 189.2067  | -390.4510 | 395.2025  | -173.6803 | 345.0183 |
| 145   | -440.7969  | 175.2687  | -353.2709 | 172.1667  | -158.5074 | 304.3093 |
| 146   | -229.6539  | 160.6318  | -314.6329 | -12.3884  | -143.7226 | 265.6498 |
| 147   | -56.3162   | 146.4483  | -277.7226 | -158.9921 | -129.3904 | 228.7215 |
| 148   | 80.4268    | 132.7526  | -242.7272 | -268.9941 | -115.5727 | 193.6859 |
| 149   | 182.0270   | 119.5905  | -209.5821 | -364.0410 | -103.7480 | 164.1286 |
| 150   | 270.2907   | 108.4734  | -181.9230 | -408.2422 | -91.1232  | 132.8940 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| ===== | =====    | =====     | =====     | =====     | =====     | =====    |
| 151   | 309.8066 | 96.5910   | -152.5749 | -422.6706 | -79.1101  | 103.4820 |
| 152   | 321.6404 | 85.3455   | -125.0988 | -409.9238 | -67.8090  | 76.0891  |
| 153   | 308.7531 | 74.8223   | -99.6331  | -373.3448 | -57.2038  | 50.6699  |
| 154   | 274.5552 | 65.0492   | -76.1054  | -347.4685 | -49.0151  | 30.6098  |
| 155   | 253.7981 | 57.6857   | -57.9324  | -276.7438 | -39.9829  | 8.8552   |
| 156   | 191.0289 | 49.5042   | -38.1489  | -193.5935 | -31.7632  | -10.7839 |
| 157   | 118.7626 | 42.1585   | -20.4177  | 22.7486   | -25.8438  | -48.6250 |
| 158   | -83.6261 | 37.1060   | 15.5469   | 29.7971   | -22.7008  | -57.3786 |
| 159   | -73.5933 | 34.8541   | 22.3811   | 23.8263   | -20.4559  | -64.2000 |
| 160   | -47.3393 | 33.4992   | 27.3274   | -0.0047   | -19.0961  | -69.1649 |

ENVOLVENTE MAXIMOS TORSORES TREN UIC-71, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 1     | 0.0025    | -1.6677   | 1.8421   | -8.4378   | 2.0911    | -2.7218   |
| 2     | 20.5835   | -2.5435   | 5.8124   | -52.2969  | 3.9841    | -10.6406  |
| 3     | 86.3062   | -5.3346   | 15.6175  | -136.2118 | 7.8712    | -24.6054  |
| 4     | 189.7081  | -9.9688   | 31.4897  | -245.1850 | 13.3365   | -38.6054  |
| 5     | 313.3561  | -16.4704  | 47.3593  | -317.4659 | 18.1395   | -50.9519  |
| 6     | 403.0721  | -21.5844  | 61.6809  | -426.0394 | 24.8958   | -68.8419  |
| 7     | 514.2686  | -29.9347  | 81.4076  | -516.8150 | 33.2095   | -88.6245  |
| 8     | 625.5241  | -37.9641  | 103.3548 | -608.6316 | 41.1773   | -110.5400 |
| 9     | 708.3044  | -47.7724  | 126.7792 | -669.1741 | 50.9203   | -133.9622 |
| 10    | 772.2871  | -58.1671  | 152.6287 | -688.6866 | 59.6981   | -156.3226 |
| 11    | 788.0202  | -67.8676  | 176.5334 | -704.1100 | 70.8679   | -183.7194 |
| 12    | 808.9159  | -79.3184  | 206.0704 | -701.2304 | 82.2128   | -213.2646 |
| 13    | 790.5417  | -91.8774  | 237.3323 | -657.7909 | 94.6532   | -244.5075 |
| 14    | 740.9368  | -104.9704 | 270.6702 | -582.8202 | 107.6208  | -277.8846 |
| 15    | 654.7678  | -118.6474 | 305.9190 | -455.7604 | 119.9190  | -309.4892 |
| 16    | 516.0847  | -131.6146 | 339.1444 | -306.8115 | 134.0372  | -346.2875 |
| 17    | 355.7899  | -146.2853 | 378.1969 | -120.8685 | 148.5462  | -385.3714 |
| 18    | 156.1434  | -161.3691 | 418.9325 | 104.4154  | 163.4557  | -426.0178 |
| 19    | -82.3990  | -176.7635 | 461.4333 | 368.0065  | 178.6653  | -468.3805 |
| 20    | -360.0612 | -192.4526 | 505.4533 | 689.4336  | 169.3482  | -449.6298 |
| 21    | -703.0354 | -4.9680   | 83.5868  | 602.8179  | -17.2731  | -26.2317  |
| 22    | -591.4059 | 16.7728   | 29.2217  | 510.7807  | -15.3776  | -32.4564  |
| 23    | -480.8611 | 14.2706   | 37.5015  | 403.6925  | -12.6951  | -42.3784  |
| 24    | -356.0319 | 11.0245   | 50.0684  | 284.7017  | -9.2754   | -55.6336  |
| 25    | -219.2285 | 6.8082    | 65.7489  | 131.3336  | -3.8762   | -74.4744  |
| 26    | -49.4976  | 0.5577    | 86.8639  | -1.0720   | 1.5823    | -92.8545  |
| 27    | 97.7507   | -5.7161   | 107.7986 | -133.1816 | 7.9815    | -113.7525 |
| 28    | 241.2595  | -13.2379  | 131.2671 | -258.0898 | 15.6003   | -137.1803 |
| 29    | 376.6561  | -21.6862  | 157.1632 | -395.5546 | 25.3883   | -166.1204 |
| 30    | 530.4383  | -31.5447  | 188.6917 | -502.7062 | 34.0858   | -194.6237 |
| 31    | 618.8154  | -43.2305  | 219.4527 | -561.9160 | 45.8020   | -225.4126 |
| 32    | 698.9456  | -54.3997  | 253.1329 | -613.9446 | 56.9842   | -259.1758 |
| 33    | 733.7440  | -67.5197  | 289.0689 | -634.8661 | 71.3620   | -297.8843 |
| 34    | 746.8175  | -82.9495  | 330.2168 | -593.7649 | 85.4688   | -336.1590 |
| 35    | 706.0828  | -97.5578  | 371.2088 | -518.0209 | 100.0230  | -377.2253 |
| 36    | 605.3717  | -113.6117 | 414.7388 | -379.6895 | 115.9945  | -420.6603 |
| 37    | 450.0419  | -130.5845 | 460.3108 | -201.4132 | 133.9681  | -469.1149 |
| 38    | 254.1011  | -149.4084 | 511.3885 | 50.4201   | 151.5013  | -517.2902 |
| 39    | -17.9166  | -167.7763 | 561.9181 | 362.7354  | 169.7189  | -567.6297 |
| 40    | -351.1889 | -186.7452 | 614.3158 | 736.7489  | 164.4973  | -559.1001 |
| 41    | -752.3820 | -3.6995   | 90.3622  | 646.7669  | -18.5121  | -31.3780  |
| 42    | -635.1894 | 18.0150   | 34.3699  | 550.5271  | -16.5802  | -37.5788  |
| 43    | -520.7321 | 15.5903   | 42.7708  | 439.5923  | -13.9812  | -47.6361  |
| 44    | -390.5251 | 12.1469   | 55.2022  | 315.9008  | -10.3680  | -60.7778  |
| 45    | -249.3666 | 7.9934    | 70.9098  | 157.9787  | -5.0304   | -79.6367  |
| 46    | -74.8942  | 1.6488    | 92.0270  | 21.4965   | 0.5017    | -97.9861  |
| 47    | 75.9364   | -4.8319   | 112.9745 | -113.5771 | 7.1034    | -118.9176 |
| 48    | 222.8469  | -12.4197  | 136.4168 | -241.6442 | 14.7932   | -142.3733 |
| 49    | 362.5456  | -20.7820  | 162.3669 | -383.5685 | 24.4935   | -171.2370 |
| 50    | 507.4153  | -31.8935  | 193.6818 | -478.8474 | 34.4319   | -199.6414 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 51    | 619.9528  | -41.7006  | 224.7112 | -566.4305 | 44.2700   | -230.6952 |
| 52    | 691.3620  | -53.8008  | 258.0889 | -607.6587 | 56.3846   | -264.0562 |
| 53    | 729.1271  | -66.9175  | 294.1634 | -631.4847 | 70.7506   | -303.1295 |
| 54    | 753.5288  | -81.8918  | 335.6292 | -602.7558 | 84.4043   | -341.5894 |
| 55    | 704.2941  | -97.0568  | 376.5273 | -517.3944 | 99.5075   | -382.4312 |
| 56    | 604.4894  | -113.1738 | 419.6983 | -379.7577 | 115.5396  | -425.6009 |
| 57    | 450.1798  | -130.1258 | 465.4985 | -202.6130 | 133.4788  | -474.3488 |
| 58    | 254.7747  | -148.9775 | 516.5276 | 48.6946   | 151.0555  | -522.3816 |
| 59    | -16.2786  | -167.3431 | 566.9400 | 360.0035  | 169.2685  | -572.6809 |
| 60    | -348.6058 | -186.3039 | 619.3681 | 732.9548  | 164.0233  | -564.1645 |
| 61    | -755.6006 | -3.0292   | 90.6864  | 648.2184  | -19.1937  | -31.6956  |
| 62    | -632.2548 | 18.1135   | 34.5178  | 547.2556  | -16.6761  | -37.7311  |
| 63    | -516.7321 | 15.5619   | 42.9260  | 435.5610  | -13.9504  | -47.7954  |
| 64    | -386.8071 | 12.2553   | 55.3675  | 311.8670  | -10.4730  | -60.9499  |
| 65    | -245.1081 | 7.9685    | 71.0875  | 153.6946  | -4.9990   | -79.7953  |
| 66    | -70.4982  | 1.6031    | 92.2679  | 17.1937   | 0.5536    | -98.2289  |
| 67    | 80.9025   | -4.7479   | 113.1635 | -118.7540 | 7.0279    | -119.1125 |
| 68    | 228.1531  | -12.3468  | 136.6337 | -247.1171 | 14.7246   | -142.5421 |
| 69    | 366.8873  | -20.8937  | 162.5258 | -387.6727 | 24.5913   | -171.4199 |
| 70    | 523.5158  | -30.8365  | 193.9065 | -497.3170 | 33.3775   | -199.9318 |
| 71    | 634.0492  | -42.6796  | 225.0329 | -578.3309 | 45.2427   | -231.0254 |
| 72    | 703.2807  | -54.7847  | 258.4396 | -617.3781 | 57.3694   | -264.3607 |
| 73    | 738.4751  | -68.0780  | 294.3643 | -638.1644 | 71.9042   | -303.3083 |
| 74    | 758.9016  | -83.3754  | 335.9406 | -604.8029 | 85.8776   | -341.8973 |
| 75    | 705.9316  | -98.5503  | 376.7060 | -515.7355 | 101.0007  | -382.6082 |
| 76    | 602.8998  | -114.6468 | 420.0073 | -374.6960 | 117.0157  | -425.9528 |
| 77    | 445.1841  | -131.6293 | 465.8494 | -194.4566 | 134.9827  | -474.6755 |
| 78    | 246.6594  | -150.4601 | 516.8057 | 60.2364   | 152.5355  | -522.6483 |
| 79    | -27.5978  | -168.7345 | 567.1858 | 374.4400  | 170.6607  | -572.9380 |
| 80    | -360.5097 | -187.3615 | 619.6206 | 747.1970  | 165.0794  | -564.4082 |
| 81    | -771.6519 | -2.5478   | 90.6173  | 663.1526  | -19.6740  | -31.6259  |
| 82    | -651.0487 | 19.1044   | 34.6157  | 563.8083  | -17.6658  | -37.8246  |
| 83    | -533.4686 | 16.5843   | 43.0477  | 450.0160  | -14.9722  | -47.9228  |
| 84    | -400.8138 | 13.1432   | 55.3110  | 323.8805  | -11.3626  | -60.8980  |
| 85    | -257.2027 | 8.8458    | 71.1528  | 163.8216  | -5.8776   | -79.8838  |
| 86    | -80.1662  | 2.5759    | 92.1971  | 24.6447   | -0.4185   | -98.1265  |
| 87    | 72.3419   | -4.0194   | 113.2263 | -111.8293 | 6.2931    | -119.1288 |
| 88    | 229.6018  | -11.7401  | 136.5780 | -249.8978 | 14.1120   | -142.6127 |
| 89    | 375.2993  | -19.6700  | 162.6464 | -398.8214 | 23.3849   | -171.5744 |
| 90    | 522.7196  | -30.7879  | 194.0609 | -496.6541 | 33.3372   | -199.9362 |
| 91    | 622.8040  | -41.8163  | 224.8524 | -568.9997 | 44.3822   | -230.8612 |
| 92    | 710.8971  | -55.5564  | 258.6108 | -623.2251 | 58.1205   | -264.5969 |
| 93    | 742.5063  | -68.5781  | 294.3513 | -641.1322 | 72.4092   | -303.1958 |
| 94    | 754.0156  | -84.1948  | 335.7870 | -598.1228 | 86.7032   | -341.7886 |
| 95    | 699.1049  | -99.3670  | 376.7475 | -506.9312 | 101.8141  | -382.6933 |
| 96    | 593.9333  | -115.4764 | 420.0757 | -364.0812 | 117.8400  | -425.9954 |
| 97    | 434.5524  | -132.4304 | 465.7966 | -181.9070 | 135.7843  | -474.6231 |
| 98    | 233.9269  | -151.2649 | 516.8279 | 74.8511   | 153.3405  | -522.6957 |
| 99    | -42.4956  | -169.6490 | 567.3260 | 391.2684  | 171.5752  | -573.0464 |
| 100   | -376.6231 | -188.1519 | 619.5728 | 765.1189  | 165.8707  | -564.3589 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====     |
| 101   | -781.5955 | -1.8545   | 90.5592  | 671.5341  | -20.3671  | -31.5739  |
| 102   | -661.3383 | 20.0519   | 34.7910  | 571.9969  | -18.6131  | -37.9930  |
| 103   | -542.2296 | 17.6390   | 43.0049  | 456.4073  | -16.0266  | -47.8785  |
| 104   | -407.6302 | 14.3247   | 55.3996  | 328.0244  | -12.5433  | -60.9828  |
| 105   | -261.2571 | 10.0265   | 71.1198  | 165.2061  | -7.0573   | -79.8525  |
| 106   | -81.6530  | 3.6382    | 92.2453  | 23.7410   | -1.4814   | -98.2020  |
| 107   | 76.3166   | -2.9670   | 113.2041 | -118.1718 | 5.2491    | -119.1547 |
| 108   | 237.1700  | -11.0701  | 136.6494 | -259.0011 | 13.4467   | -142.5674 |
| 109   | 377.2399  | -19.7941  | 162.5447 | -400.4363 | 23.5019   | -171.4372 |
| 110   | 524.4661  | -30.9230  | 193.9870 | -498.1088 | 33.4557   | -199.9679 |
| 111   | 624.2418  | -41.9270  | 224.8957 | -570.1937 | 44.4982   | -230.8593 |
| 112   | 709.3390  | -55.4218  | 258.4734 | -621.9695 | 58.0064   | -264.4631 |
| 113   | 742.1850  | -68.6175  | 294.3359 | -640.6944 | 72.4499   | -303.2304 |
| 114   | 753.6096  | -84.2667  | 335.8328 | -597.5291 | 86.7841   | -341.8423 |
| 115   | 698.9180  | -99.5973  | 376.8142 | -506.2331 | 102.0431  | -382.7537 |
| 116   | 593.1232  | -115.7171 | 420.1407 | -362.7297 | 118.0775  | -426.0323 |
| 117   | 433.2115  | -132.6672 | 465.7541 | -180.1674 | 136.0164  | -474.5465 |
| 118   | 232.0832  | -151.5074 | 516.7290 | 77.1413   | 153.5795  | -522.6155 |
| 119   | -44.4538  | -169.7428 | 567.1487 | 393.4598  | 171.6644  | -572.9131 |
| 120   | -381.8345 | -188.6948 | 619.8237 | 771.4683  | 166.3972  | -564.5887 |
| 121   | -785.2113 | -1.6146   | 90.5066  | 674.4845  | -20.6020  | -31.5177  |
| 122   | -664.2670 | 20.2888   | 34.7274  | 574.3183  | -18.8365  | -37.9366  |
| 123   | -544.5269 | 17.8553   | 42.9526  | 458.1558  | -16.2265  | -47.8190  |
| 124   | -409.3603 | 14.5090   | 55.5177  | 329.3489  | -12.7125  | -61.0978  |
| 125   | -262.5179 | 10.1659   | 71.0892  | 166.2002  | -7.1737   | -79.8532  |
| 126   | -82.5265  | 3.7172    | 92.2582  | 24.4971   | -1.5443   | -98.1888  |
| 127   | 72.8613   | -2.8277   | 113.2622 | -114.9365 | 5.1116    | -119.1988 |
| 128   | 236.7891  | -11.1439  | 136.6641 | -258.2958 | 13.5365   | -142.6373 |
| 129   | 376.1407  | -19.9297  | 162.6341 | -398.8278 | 23.6584   | -171.4890 |
| 130   | 522.2072  | -31.1229  | 193.9865 | -495.2202 | 33.6825   | -200.0091 |
| 131   | 635.5739  | -43.4160  | 225.1271 | -577.9854 | 45.9949   | -231.1194 |
| 132   | 702.0341  | -55.5978  | 258.5314 | -614.1885 | 58.1820   | -264.4505 |
| 133   | 734.6342  | -69.0320  | 294.4465 | -632.0754 | 72.8772   | -303.3635 |
| 134   | 743.7975  | -84.7454  | 335.8609 | -586.5896 | 87.2512   | -341.8144 |
| 135   | 686.2453  | -100.0076 | 376.7624 | -492.7398 | 102.4516  | -382.7322 |
| 136   | 578.1228  | -116.1796 | 420.2238 | -346.8538 | 118.5421  | -426.1654 |
| 137   | 415.9506  | -133.2118 | 465.9091 | -162.2282 | 136.5400  | -474.7194 |
| 138   | 212.8729  | -152.0549 | 516.9200 | 97.0044   | 154.1064  | -522.7961 |
| 139   | -65.9714  | -170.4344 | 567.3806 | 415.6351  | 172.3332  | -573.1247 |
| 140   | -402.4192 | -189.0665 | 619.9052 | 791.8582  | 166.7040  | -565.2274 |
| 141   | -809.1130 | -1.6134   | 95.9946  | 728.1753  | -21.2965  | -36.7637  |
| 142   | -721.3694 | 21.0973   | 39.3733  | 639.1649  | -19.7330  | -42.1956  |
| 143   | -619.1925 | 19.1172   | 47.0639  | 537.4176  | -17.5702  | -52.0155  |
| 144   | -504.2872 | 16.4869   | 57.8967  | 424.6140  | -14.7511  | -64.6574  |
| 145   | -379.1858 | 13.1798   | 72.9673  | 330.1516  | -12.2429  | -76.4483  |
| 146   | -272.3745 | 10.0981   | 86.4425  | 203.4072  | -8.0908   | -93.5461  |
| 147   | -134.6943 | 5.3548    | 105.6128 | 73.6685   | -3.1585   | -112.7544 |
| 148   | 5.7963    | -0.2335   | 126.6358 | -56.4127  | 2.5953    | -133.8413 |
| 149   | 157.2629  | -7.2575   | 149.6601 | -194.0693 | 9.7729    | -156.8425 |
| 150   | 287.8198  | -14.5116  | 174.6422 | -285.3348 | 15.8212   | -178.2620 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| ===== | =====    | =====     | =====    | =====     | =====     | =====     |
| 151   | 383.8718 | -21.2886  | 197.9937 | -389.6826 | 24.0166   | -205.2388 |
| 152   | 501.6044 | -30.9134  | 226.9360 | -486.9840 | 33.7624   | -234.1307 |
| 153   | 589.2862 | -40.8596  | 257.6791 | -553.0607 | 43.8278   | -264.8080 |
| 154   | 648.1358 | -51.3782  | 290.2375 | -588.6475 | 54.4431   | -297.4613 |
| 155   | 694.1760 | -64.2315  | 325.0962 | -592.5772 | 65.7961   | -328.8343 |
| 156   | 679.4331 | -75.4554  | 358.2954 | -566.4850 | 78.6353   | -365.4360 |
| 157   | 640.4431 | -88.8885  | 396.4772 | -498.0061 | 92.1332   | -403.5739 |
| 158   | 559.4877 | -103.5347 | 436.7852 | -384.9267 | 106.8314  | -443.9449 |
| 159   | 428.5836 | -118.9859 | 479.0339 | -220.4247 | 122.3227  | -486.1613 |
| 160   | 243.7601 | -135.3605 | 523.0868 | -0.0438   | 137.0407  | -526.6384 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -2082.9351 | 199.5415  | -456.5854 | 1613.3118 | -199.7240 | 445.4448  |
| 102   | -1635.1995 | 183.0058  | -401.7410 | 1223.4532 | -183.0051 | 401.7920  |
| 103   | -1277.7512 | 136.6234  | -275.9309 | 970.3798  | -136.6240 | 276.0089  |
| 104   | -1019.7428 | 88.0367   | -141.7531 | 821.6261  | -88.0369  | 141.7797  |
| 105   | -863.8338  | 50.9752   | -28.8104  | 749.1207  | -50.9730  | 28.8474   |
| 106   | -818.3632  | 7.7119    | 4.6628    | 801.0085  | -7.7121   | -4.6048   |
| 107   | -801.0024  | 7.7201    | 4.4101    | 783.6353  | -7.7235   | -4.3778   |
| 108   | -783.6235  | 7.7375    | 4.1577    | 766.2065  | -7.7388   | -4.1376   |
| 109   | -766.1907  | 7.7561    | 4.1417    | 748.7469  | -7.7561   | -4.1134   |
| 110   | -748.7545  | 7.7380    | 3.6919    | 731.3428  | -7.7394   | -3.6649   |
| 111   | -731.3554  | 7.7454    | 3.6624    | 737.9239  | 3.1216    | 3.5085    |
| 112   | -737.9347  | -3.0769   | -3.9224   | 744.8543  | 3.0742    | 3.9478    |
| 113   | -744.8482  | -3.0709   | -3.9547   | 751.7623  | 3.0697    | 3.9893    |
| 114   | -751.7652  | -3.0552   | -4.3953   | 758.6429  | 3.0557    | 4.4478    |
| 115   | -758.6435  | -3.0605   | -4.6767   | 765.5323  | 3.0606    | 4.7148    |
| 116   | -765.5212  | -3.0612   | -4.8844   | 772.4020  | 3.0625    | 4.9036    |
| 117   | -805.1657  | -51.0695  | 29.2937   | 920.0560  | 51.0709   | -29.2674  |
| 118   | -961.9658  | -88.1759  | 141.9739  | 1160.3800 | 88.1752   | -141.8956 |
| 119   | -1221.1201 | -136.7981 | 275.8136  | 1528.9308 | 136.7984  | -275.7615 |
| 120   | -1579.1892 | -183.1840 | 402.2785  | 1993.3649 | 190.4888  | -451.3108 |
| 121   | -2029.4937 | 193.9233  | -455.5447 | 1572.4387 | -194.1430 | 444.4493  |
| 122   | -1594.4139 | 177.4359  | -400.7690 | 1195.1807 | -177.4361 | 400.8205  |
| 123   | -1249.8582 | 131.1249  | -274.9634 | 954.8481  | -131.1262 | 275.0146  |
| 124   | -1004.8220 | 82.7259   | -140.4802 | 818.7009  | -82.7255  | 140.5036  |
| 125   | -861.0647  | 45.9779   | -27.8566  | 757.5958  | -45.9756  | 27.9222   |
| 126   | -809.6340  | 14.5364   | 8.6349    | 776.9199  | -14.5346  | -8.5984   |
| 127   | -776.9088  | 14.5182   | 8.6427    | 744.2595  | -14.5168  | -8.6105   |
| 128   | -744.2662  | 14.5165   | 8.1811    | 711.5964  | -14.5171  | -8.1456   |
| 129   | -711.5911  | 14.5223   | 8.1482    | 678.9191  | -14.5245  | -8.1341   |
| 130   | -678.9373  | 14.5411   | 7.9606    | 646.2293  | -14.5426  | -7.9271   |
| 131   | -646.2262  | 14.5533   | 7.5397    | 628.4385  | -4.2877   | -0.5708   |
| 132   | -628.4428  | 4.2951    | 0.5996    | 618.7779  | -4.2964   | -0.5862   |
| 133   | -618.7653  | 4.2961    | 0.4097    | 609.0955  | -4.2945   | -0.3808   |
| 134   | -609.0846  | 4.2901    | 0.1993    | 599.4338  | -4.2910   | -0.1680   |
| 135   | -599.4381  | 4.3052    | 0.0195    | 589.7507  | -4.3062   | -0.0295   |
| 136   | -589.7560  | 4.3020    | -0.3138   | 580.0837  | -4.3010   | 0.3472    |
| 137   | -623.5087  | -44.1634  | 33.7913   | 722.8656  | 44.1633   | -33.7680  |
| 138   | -772.9589  | -92.1927  | 176.5229  | 980.4297  | 92.1933   | -176.4794 |
| 139   | -1023.6229 | -130.3834 | 280.8716  | 1316.9351 | 130.3835  | -280.8250 |
| 140   | -1371.7339 | -176.9128 | 406.9887  | 1800.5665 | 184.9464  | -456.1523 |
| 141   | -1837.6311 | 176.7553  | -350.1803 | 1499.5554 | -180.6647 | 349.1989  |
| 142   | -1514.3236 | 167.0758  | -315.4264 | 1213.5450 | -167.0757 | 315.4280  |
| 143   | -1252.1709 | 128.6632  | -214.2446 | 1020.6376 | -128.6634 | 214.2788  |
| 144   | -1059.9913 | 85.9041   | -107.2008 | 905.2908  | -85.9055  | 107.2692  |
| 145   | -951.2604  | 34.8425   | 24.0959   | 888.5565  | -34.8411  | -24.0736  |
| 146   | -891.6488  | 33.0299   | 31.9197   | 832.1901  | -33.0229  | -31.8919  |
| 147   | -832.1979  | 32.9966   | 31.8890   | 772.7978  | -32.9937  | -31.8643  |
| 148   | -772.8105  | 32.9946   | 31.6306   | 713.4347  | -32.9960  | -31.5812  |
| 149   | -713.4417  | 33.0036   | 31.3275   | 654.0238  | -33.0015  | -31.3039  |
| 150   | -654.0297  | 32.9886   | 31.3016   | 594.6446  | -32.9895  | -31.2823  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|---------|----------|-----------|----------|
| 151   | -594.6559 | 33.0054   | 31.0730 | 535.2149 | -33.0099  | -31.0337 |
| 152   | -535.2192 | 33.0232   | 30.8687 | 475.7749 | -33.0252  | -30.8516 |
| 153   | -475.7728 | 33.0059   | 30.8495 | 416.3690 | -33.0090  | -30.8501 |
| 154   | -416.3710 | 33.0370   | 30.8577 | 356.9049 | -33.0420  | -30.8332 |
| 155   | -356.9218 | 33.0504   | 30.6059 | 297.4446 | -33.0519  | -30.5723 |
| 156   | -297.4497 | 33.0543   | 30.4703 | 237.9423 | -33.0544  | -30.4694 |
| 157   | -237.9242 | 33.0587   | 30.5509 | 178.4358 | -33.0564  | -30.5527 |
| 158   | -178.4488 | 33.0545   | 30.4901 | 118.9489 | -33.0527  | -30.4799 |
| 159   | -118.9560 | 33.0495   | 30.4437 | 59.4816  | -33.0486  | -30.4386 |
| 160   | -59.4914  | 33.0461   | 30.4174 | -0.0016  | -33.0455  | -30.4157 |



ENVOLVENTE MINIMOS CORTANTES TREN UIC-71, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | 0.0049     | -19.1143  | -69.2485 | 47.3496   | 33.5124   | 27.4219   |
| 2     | -23.8614   | -20.4615  | -64.2885 | 73.6382   | 34.8607   | 22.4660   |
| 3     | -29.8504   | -22.7046  | -57.4778 | 83.6940   | 37.1081   | 15.6446   |
| 4     | -22.8321   | -25.8345  | -48.7338 | -126.0252 | 42.4871   | -20.9946  |
| 5     | 200.8253   | -32.1014  | -10.1960 | -163.8489 | 48.1676   | -35.2201  |
| 6     | 249.5862   | -38.6496  | 5.9356   | -228.8649 | 56.3630   | -54.9332  |
| 7     | 322.5567   | -47.6955  | 27.5514  | -280.1673 | 65.3723   | -76.6059  |
| 8     | 378.9374   | -57.5179  | 51.2032  | -313.8841 | 75.1317   | -100.2255 |
| 9     | 415.0659   | -68.1122  | 76.6529  | -326.3819 | 85.6557   | -125.6560 |
| 10    | 427.3866   | -79.4150  | 104.0838 | -292.5528 | 95.3515   | -149.6261 |
| 11    | 391.0045   | -89.8954  | 129.9280 | -254.5079 | 107.2900  | -178.9293 |
| 12    | 348.2140   | -102.5703 | 161.1472 | -185.7225 | 119.8639  | -210.1724 |
| 13    | 272.7846   | -115.8348 | 194.2886 | -83.9570  | 133.0098  | -243.2964 |
| 14    | 162.5347   | -129.6516 | 229.2622 | 52.9891   | 146.7061  | -278.3213 |
| 15    | 15.6454    | -143.9864 | 266.1805 | 241.9278  | 159.6558  | -311.5762 |
| 16    | -184.2368  | -157.5267 | 301.5291 | 453.1333  | 174.3534  | -350.5146 |
| 17    | -407.8832  | -172.7763 | 341.6178 | 703.4340  | 189.4336  | -390.6128 |
| 18    | -670.4261  | -188.3614 | 384.5042 | 992.5497  | 204.8507  | -433.4302 |
| 19    | -972.7244  | -204.2325 | 428.4861 | 1320.7233 | 220.5307  | -477.2554 |
| 20    | -1314.0699 | -220.3325 | 473.7734 | 1706.6017 | 211.6295  | -459.7852 |
| 21    | 198.0902   | -31.8436  | -6.3646  | -265.8940 | 33.2639   | 22.1596   |
| 22    | 276.7716   | -16.2076  | -69.0097 | -220.0472 | 34.2097   | 16.6965   |
| 23    | 251.2150   | -17.8734  | -61.1811 | -190.7461 | 35.8739   | 8.8803    |
| 24    | 241.5177   | -20.3418  | -51.0581 | -175.4949 | 38.3431   | -1.2344   |
| 25    | 244.6096   | -23.6846  | -38.5205 | -360.3520 | 43.6733   | -46.8707  |
| 26    | 445.9245   | -29.9500  | 9.7109   | -407.6091 | 50.0895   | -67.9903  |
| 27    | 507.2547   | -37.3531  | 33.3391  | -451.2635 | 57.6167   | -91.5769  |
| 28    | 562.2036   | -45.8958  | 59.2376  | -485.3124 | 66.2564   | -117.4358 |
| 29    | 604.4246   | -55.5864  | 87.6403  | -526.7748 | 77.2916   | -148.8942 |
| 30    | 650.6908   | -67.7017  | 121.6907 | -521.3441 | 88.2445   | -179.9178 |
| 31    | 646.7236   | -79.7224  | 154.8806 | -487.4958 | 100.2907  | -213.1249 |
| 32    | 610.6387   | -92.8355  | 190.9145 | -418.9035 | 113.4204  | -249.2518 |
| 33    | 536.7065   | -107.0141 | 229.2832 | -328.7129 | 128.8568  | -290.3889 |
| 34    | 437.8101   | -123.4782 | 272.8602 | -173.3088 | 143.9979  | -331.0946 |
| 35    | 270.5879   | -139.6258 | 316.0218 | 32.3708   | 160.0901  | -374.3240 |
| 36    | 50.6144    | -156.6481 | 361.6306 | 292.1365  | 177.0287  | -419.8348 |
| 37    | -225.2501  | -174.4902 | 409.8060 | 592.9476  | 195.8778  | -470.9123 |
| 38    | -544.4853  | -194.1604 | 462.6022 | 969.9214  | 214.2498  | -520.7823 |
| 39    | -939.9732  | -213.2679 | 515.6705 | 1407.4197 | 233.2133  | -573.6826 |
| 40    | -1397.4839 | -232.9008 | 569.5927 | 1907.1522 | 228.6543  | -566.6706 |
| 41    | 367.0459   | -36.6752  | -4.1282  | -425.4436 | 38.0931   | 21.6269   |
| 42    | 437.0693   | -21.0598  | -68.3978 | -369.4342 | 39.0598   | 16.0944   |
| 43    | 401.6718   | -22.7579  | -60.5851 | -330.1927 | 40.7629   | 8.2725    |
| 44    | 382.2425   | -25.2766  | -50.3417 | -305.1295 | 43.2743   | -1.9470   |
| 45    | 375.6118   | -28.6698  | -37.7875 | -484.3200 | 48.8213   | -47.6450  |
| 46    | 571.2662   | -35.1531  | 10.5826  | -521.6229 | 55.3012   | -68.8257  |
| 47    | 622.6142   | -42.6098  | 34.1370  | -554.9789 | 62.8838   | -92.3767  |
| 48    | 667.1149   | -51.2256  | 60.1488  | -578.3698 | 71.5953   | -118.3842 |
| 49    | 698.5707   | -60.9858  | 88.6433  | -608.8733 | 82.6986   | -149.8050 |
| 50    | 733.7832   | -73.1602  | 122.3889 | -592.1022 | 93.6999   | -180.6402 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 718.1622   | -85.2314  | 155.9217 | -546.4440 | 105.8008  | -214.1962 |
| 52    | 670.3247   | -98.4012  | 191.7353 | -466.0251 | 118.9849  | -249.9921 |
| 53    | 584.1375   | -112.6415 | 230.1573 | -363.3732 | 134.4734  | -291.4092 |
| 54    | 472.7038   | -129.1477 | 273.9542 | -195.3256 | 149.6638  | -332.2161 |
| 55    | 292.8431   | -145.3196 | 317.1786 | 22.8774   | 165.7678  | -375.3637 |
| 56    | 60.3501    | -162.3738 | 362.7704 | 295.3079  | 182.7370  | -420.9566 |
| 57    | -228.7486  | -180.2123 | 410.5283 | 609.3229  | 201.5727  | -471.6891 |
| 58    | -560.5583  | -199.8720 | 464.0363 | 998.7534  | 219.9462  | -522.1696 |
| 59    | -969.1160  | -218.9803 | 516.4216 | 1449.2800 | 238.9069  | -574.4574 |
| 60    | -1439.3710 | -238.5965 | 570.3392 | 1961.6298 | 234.3159  | -567.4266 |
| 61    | 428.1912   | -38.3298  | -4.1920  | -482.9678 | 39.7381   | 21.6983   |
| 62    | 494.6752   | -22.7086  | -68.3223 | -423.3394 | 40.7075   | 16.0186   |
| 63    | 455.6825   | -24.4069  | -60.4800 | -380.4987 | 42.4099   | 8.1713    |
| 64    | 432.6749   | -26.9277  | -50.2153 | -351.8557 | 44.9238   | -2.0697   |
| 65    | 422.4696   | -30.3232  | -37.6494 | -527.8984 | 50.4923   | -47.7841  |
| 66    | 615.0069   | -36.8268  | 10.6263  | -561.5772 | 56.9860   | -68.8854  |
| 67    | 662.6924   | -44.3129  | 34.3296  | -591.2566 | 64.5942   | -92.5738  |
| 68    | 703.5536   | -52.9430  | 60.2324  | -610.9151 | 73.3221   | -118.4344 |
| 69    | 731.1643   | -62.7242  | 88.6690  | -637.6093 | 84.4169   | -149.8381 |
| 70    | 762.5405   | -74.8820  | 122.5628 | -616.9879 | 95.4231   | -180.8765 |
| 71    | 743.0725   | -86.9530  | 156.1975 | -567.4990 | 107.5150  | -214.4769 |
| 72    | 691.3841   | -100.1277 | 192.0380 | -483.2201 | 120.7114  | -250.2472 |
| 73    | 601.4254   | -114.3642 | 230.3470 | -376.6895 | 136.1944  | -291.5953 |
| 74    | 485.9389   | -130.8648 | 274.1916 | -204.7146 | 151.3698  | -332.4478 |
| 75    | 302.2659   | -147.0283 | 317.4188 | 17.1854   | 167.4702  | -375.5870 |
| 76    | 65.9506    | -164.0736 | 362.9192 | 293.7794  | 184.4503  | -421.1747 |
| 77    | -227.2234  | -181.9388 | 410.8188 | 611.3565  | 203.2876  | -471.9218 |
| 78    | -562.5003  | -201.5788 | 464.4167 | 1004.6768 | 221.6558  | -522.5539 |
| 79    | -975.1658  | -220.6849 | 516.5037 | 1459.1506 | 240.6114  | -574.5479 |
| 80    | -1449.2542 | -240.3000 | 570.4286 | 1975.2939 | 236.0172  | -567.5045 |
| 81    | 439.2459   | -38.2690  | -4.1201  | -494.1585 | 39.6721   | 21.6229   |
| 82    | 505.8647   | -22.6377  | -68.3822 | -434.6585 | 40.6422   | 16.0680   |
| 83    | 466.9976   | -24.3491  | -60.5495 | -391.9725 | 42.3472   | 8.2559    |
| 84    | 444.1496   | -26.8661  | -50.1536 | -363.4674 | 44.8626   | -2.1317   |
| 85    | 434.0981   | -30.2594  | -37.7121 | -539.6042 | 50.4366   | -47.7615  |
| 86    | 626.6792   | -36.7805  | 10.8651  | -573.4288 | 56.9336   | -69.0722  |
| 87    | 674.5617   | -44.2510  | 34.1380  | -603.2573 | 64.5267   | -92.3343  |
| 88    | 715.5165   | -52.8719  | 60.2361  | -623.0066 | 73.2446   | -118.5618 |
| 89    | 743.2588   | -62.6466  | 88.9775  | -649.8324 | 84.3612   | -150.1984 |
| 90    | 774.7917   | -74.8349  | 122.8254 | -629.3694 | 95.3839   | -180.9904 |
| 91    | 755.5188   | -86.9418  | 156.0541 | -579.9362 | 107.5074  | -214.3508 |
| 92    | 703.7057   | -100.0999 | 192.2458 | -495.5335 | 120.6676  | -250.5312 |
| 93    | 613.8179   | -114.3139 | 230.4663 | -389.3053 | 136.1436  | -291.5954 |
| 94    | 498.5261   | -130.8116 | 274.1766 | -217.5155 | 151.3175  | -332.4615 |
| 95    | 315.0068   | -146.9755 | 317.4319 | 4.5536    | 167.4250  | -375.6755 |
| 96    | 78.5627    | -164.0232 | 363.0471 | 280.7444  | 184.3831  | -421.2435 |
| 97    | -214.1018  | -181.8611 | 410.9718 | 598.2289  | 203.2164  | -472.0929 |
| 98    | -549.6024  | -201.5108 | 464.1570 | 991.7396  | 221.5929  | -522.3323 |
| 99    | -961.9574  | -220.6250 | 517.0071 | 1445.6348 | 240.5466  | -575.0053 |
| 100   | -1435.8950 | -240.2375 | 570.4037 | 1961.8207 | 235.9555  | -567.4778 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | 428.2074   | -36.7771  | -4.0052  | -486.2149 | 38.1459   | 21.4895   |
| 102   | 497.9054   | -21.1163  | -68.4033 | -430.1468 | 39.1158   | 16.1067   |
| 103   | 462.4881   | -22.8227  | -60.4470 | -390.8978 | 40.8209   | 8.1508    |
| 104   | 443.0803   | -25.3364  | -50.1817 | -365.8082 | 43.3392   | -2.1206   |
| 105   | 436.4375   | -28.7334  | -37.6204 | -545.3189 | 48.9474   | -47.8308  |
| 106   | 632.4180   | -35.2857  | 10.8066  | -582.4834 | 55.4446   | -69.0594  |
| 107   | 683.5700   | -42.7714  | 34.3846  | -615.6454 | 63.0495   | -92.6125  |
| 108   | 727.9024   | -51.4009  | 60.4142  | -638.7371 | 71.7785   | -118.6269 |
| 109   | 759.0130   | -61.1818  | 88.7446  | -668.8254 | 82.8908   | -149.9318 |
| 110   | 793.7059   | -73.3630  | 122.7966 | -651.6104 | 93.8957   | -181.0665 |
| 111   | 777.7458   | -85.4341  | 156.1381 | -605.5541 | 106.0053  | -214.3916 |
| 112   | 729.3106   | -98.6227  | 192.1724 | -524.4959 | 119.2062  | -250.4495 |
| 113   | 642.6631   | -112.8689 | 230.4687 | -421.3601 | 134.7002  | -291.6501 |
| 114   | 530.5216   | -129.3956 | 274.2623 | -252.6639 | 149.9109  | -332.5581 |
| 115   | 350.0836   | -145.5765 | 317.5496 | -33.6739  | 166.0254  | -375.7889 |
| 116   | 116.6910   | -162.6361 | 363.1768 | 239.4920  | 182.9933  | -421.3481 |
| 117   | -172.8449  | -180.4714 | 411.2115 | 553.6700  | 201.8175  | -472.2860 |
| 118   | -505.1288  | -200.1183 | 464.3583 | 943.9944  | 220.1924  | -522.5404 |
| 119   | -914.5453  | -219.2258 | 516.5347 | 1395.1453 | 239.1484  | -574.5922 |
| 120   | -1384.9728 | -238.8344 | 571.3715 | 1907.6736 | 234.5377  | -568.4286 |
| 121   | 366.6545   | -30.4066  | 0.1037   | -434.1958 | 31.1294   | 17.1862   |
| 122   | 445.9587   | -14.1086  | -64.0908 | -393.9661 | 32.1083   | 11.7930   |
| 123   | 426.3908   | -15.8309  | -56.1497 | -370.5267 | 33.8292   | 3.8555    |
| 124   | 422.7609   | -18.3716  | -46.0214 | -361.1795 | 36.3710   | -6.2675   |
| 125   | 431.8249   | -21.7969  | -33.3368 | -555.2542 | 42.7317   | -51.9580  |
| 126   | 642.2967   | -29.1012  | 14.9550  | -606.2105 | 49.2772   | -73.1829  |
| 127   | 707.1136   | -36.6435  | 38.3701  | -652.9099 | 56.9192   | -96.5735  |
| 128   | 764.8611   | -45.3170  | 64.5500  | -689.2151 | 65.7116   | -122.8188 |
| 129   | 809.0613   | -55.1617  | 92.9558  | -732.2187 | 76.8925   | -154.1066 |
| 130   | 856.5020   | -67.4266  | 126.8497 | -727.6080 | 87.9821   | -185.1487 |
| 131   | 852.9153   | -79.5791  | 160.5669 | -693.6669 | 100.1642  | -218.8676 |
| 132   | 816.5446   | -92.8408  | 196.4139 | -624.6971 | 113.4198  | -254.6096 |
| 133   | 741.7131   | -107.1427 | 234.7635 | -533.1522 | 128.9880  | -295.9715 |
| 134   | 641.1959   | -123.7296 | 278.5742 | -375.9848 | 144.2406  | -336.8331 |
| 135   | 472.1346   | -139.9711 | 321.8533 | -168.4693 | 160.4143  | -380.1092 |
| 136   | 250.1226   | -157.0697 | 367.5463 | 93.3880   | 177.4303  | -425.7732 |
| 137   | -27.9387   | -174.9717 | 415.6511 | 395.8565  | 196.2980  | -476.7462 |
| 138   | -348.3389  | -194.6296 | 468.8996 | 774.2825  | 214.6844  | -527.0755 |
| 139   | -745.4180  | -213.7353 | 521.4652 | 1212.7386 | 233.6312  | -579.4915 |
| 140   | -1203.0024 | -233.3328 | 575.8847 | 1712.3083 | 228.9726  | -573.5048 |
| 141   | 196.4945   | -15.5124  | 28.6762  | -320.6683 | 9.3745    | -3.7780   |
| 142   | 328.7671   | 4.4122    | -33.3479 | -323.7468 | 9.9895    | -8.4907   |
| 143   | 345.6254   | 3.3322    | -27.0853 | -355.1475 | 11.6007   | -30.0000  |
| 144   | 390.5902   | 1.2237    | -3.3199  | -429.8056 | 14.9192   | -45.2936  |
| 145   | 478.2620   | -2.6561   | 13.6095  | -485.8413 | 17.9888   | -58.9081  |
| 146   | 546.4840   | -6.3113   | 29.2881  | -572.9486 | 22.7196   | -78.2261  |
| 147   | 644.6609   | -11.6576  | 50.3467  | -662.0918 | 28.2549   | -99.3227  |
| 148   | 743.3859   | -17.8863  | 73.5358  | -749.2937 | 34.6430   | -122.5569 |
| 149   | 838.5625   | -24.9770  | 98.7328  | -830.5111 | 41.8925   | -147.7467 |
| 150   | 925.8676   | -32.9517  | 125.6081 | -877.2293 | 48.6613   | -171.0578 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 151   | 976.5007  | -40.5009  | 151.0905 | -934.7452 | 57.6341   | -200.1833 |
| 152   | 1035.5453 | -50.2584  | 182.1329 | -973.1525 | 67.5065   | -231.1571 |
| 153   | 1073.0691 | -60.9175  | 214.7681 | -987.7785 | 78.2849   | -263.7269 |
| 154   | 1084.1155 | -72.5965  | 249.2062 | -973.4794 | 90.0606   | -298.2626 |
| 155   | 1063.2029 | -85.1983  | 286.2494 | -910.9098 | 101.1611  | -331.8134 |
| 156   | 991.3751  | -97.1498  | 321.4594 | -826.4027 | 114.7331  | -370.4418 |
| 157   | 894.6912  | -111.6052 | 361.4182 | -698.4154 | 129.2481  | -410.3422 |
| 158   | 751.0014  | -126.9980 | 403.6932 | -521.2375 | 144.6981  | -452.6952 |
| 159   | 555.1373  | -143.3413 | 447.8723 | -290.1941 | 161.0754  | -496.8230 |
| 160   | 302.1870  | -160.6121 | 493.8216 | -0.0447   | 176.6948  | -539.2124 |

ENVOLVENTE MINIMOS TORSORES TREN UIC-71, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 1     | 0.0398    | 138.2748  | -529.5590 | -242.8472 | -134.9112 | 522.4966 |
| 2     | 219.3587  | 121.8619  | -485.6306 | -426.7001 | -118.5265 | 478.5158 |
| 3     | 383.0751  | 106.3696  | -443.4034 | -556.8524 | -103.0748 | 436.2377 |
| 4     | 495.2927  | 91.6509   | -403.0411 | -636.9146 | -88.4107  | 395.9031 |
| 5     | 562.1093  | 78.0251   | -364.7139 | -688.1977 | -76.4310  | 361.0893 |
| 6     | 599.1571  | 66.5350   | -331.6265 | -685.1051 | -63.4058  | 324.4461 |
| 7     | 591.3776  | 54.7303   | -297.0623 | -651.5169 | -51.6745  | 289.8099 |
| 8     | 539.7755  | 42.7895   | -264.1291 | -574.3314 | -39.8346  | 256.9544 |
| 9     | 473.0833  | 32.8147   | -233.5168 | -486.1501 | -29.9653  | 226.3078 |
| 10    | 384.7164  | 23.6989   | -204.5358 | -402.6925 | -22.3230  | 200.8666 |
| 11    | 304.6750  | 16.8882   | -181.1784 | -282.6618 | -14.2447  | 174.0052 |
| 12    | 176.2472  | 8.8691    | -156.2277 | -138.1560 | -6.3763   | 149.0486 |
| 13    | 51.0961   | 2.3485    | -133.1691 | -0.3813   | 0.0043    | 125.9929 |
| 14    | -79.1744  | -3.3864   | -112.1202 | 140.1623  | 5.5632    | 104.9382 |
| 15    | -208.9788 | -8.3000   | -92.9994  | 251.5128  | 9.3206    | 89.4475  |
| 16    | -308.9086 | -11.4389  | -79.1172  | 384.3349  | 13.3389   | 72.1122  |
| 17    | -430.1383 | -14.9276  | -64.4159  | 509.5198  | 16.6418   | 57.7031  |
| 18    | -542.4402 | -17.7181  | -51.1283  | 623.8927  | 19.2455   | 46.5100  |
| 19    | -643.8151 | -19.8664  | -42.1389  | 725.6179  | 21.2117   | 39.4804  |
| 20    | -732.4156 | -21.4063  | -36.8768  | 792.7252  | -2.1774   | 97.4005  |
| 21    | -775.3265 | 167.2319  | -566.3129 | 405.9330  | -188.8617 | 619.2756 |
| 22    | -419.1572 | 172.1303  | -572.4880 | 69.2300   | -170.2147 | 566.7145 |
| 23    | -100.9288 | 154.0232  | -522.1827 | -209.2445 | -151.9565 | 516.3246 |
| 24    | 158.4679  | 136.4308  | -474.1464 | -429.1131 | -134.2251 | 468.2960 |
| 25    | 359.9937  | 119.5560  | -428.5434 | -574.9376 | -116.0413 | 419.6662 |
| 26    | 489.3887  | 102.1838  | -382.1519 | -682.6524 | -99.7293  | 376.1424 |
| 27    | 583.1432  | 86.9781   | -341.0920 | -739.9973 | -84.4671  | 335.1497 |
| 28    | 629.0552  | 72.7529   | -302.8089 | -751.3249 | -70.1885  | 296.8747 |
| 29    | 630.9129  | 59.3577   | -266.8449 | -699.3038 | -55.4928  | 257.8798 |
| 30    | 561.4818  | 44.5249   | -230.2784 | -616.0135 | -41.9493  | 224.3681 |
| 31    | 503.2684  | 34.4374   | -199.5170 | -532.2673 | -31.8882  | 193.5193 |
| 32    | 393.4453  | 23.3730   | -170.9048 | -394.9671 | -20.8812  | 164.8953 |
| 33    | 276.7571  | 14.4578   | -144.9320 | -230.5596 | -10.8560  | 136.1195 |
| 34    | 121.4555  | 5.4866    | -118.5868 | -80.6045  | -3.2087   | 112.6344 |
| 35    | -29.8272  | -1.7839   | -97.6862  | 87.9294   | 3.9440    | 91.6998  |
| 36    | -171.2910 | -7.3860   | -79.3219  | 242.0746  | 9.4068    | 73.4816  |
| 37    | -308.8458 | -11.9450  | -63.2220  | 414.0431  | 14.6796   | 54.8046  |
| 38    | -462.8812 | -16.4011  | -47.5721  | 549.0836  | 18.0126   | 42.8547  |
| 39    | -578.9255 | -18.9916  | -37.3009  | 668.6570  | 20.4271   | 34.2182  |
| 40    | -678.8586 | -20.7385  | -31.4136  | 769.4069  | -2.1683   | 91.7849  |
| 41    | -754.4171 | 166.8105  | -565.6123 | 384.5831  | -188.3688 | 619.1494 |
| 42    | -397.1374 | 171.4827  | -572.3767 | 48.0005   | -169.5450 | 566.6187 |
| 43    | -80.0848  | 153.2429  | -522.0477 | -228.9424 | -151.1564 | 516.1747 |
| 44    | 176.5897  | 135.8057  | -473.9877 | -446.1791 | -133.5889 | 468.1195 |
| 45    | 375.6939  | 118.9696  | -428.3858 | -589.5852 | -115.4474 | 419.5143 |
| 46    | 502.6499  | 101.6609  | -382.0234 | -694.7829 | -99.2073  | 376.0479 |
| 47    | 593.8760  | 86.5300   | -341.1015 | -749.7585 | -84.0186  | 335.1504 |
| 48    | 637.6622  | 72.3588   | -302.7048 | -758.9895 | -69.8049  | 296.7389 |
| 49    | 636.2126  | 58.8681   | -266.7341 | -703.3162 | -55.0049  | 257.8727 |
| 50    | 578.3915  | 45.4572   | -230.4588 | -634.8927 | -42.8872  | 224.4743 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 51    | 493.6384  | 33.2161   | -199.3740 | -519.7538 | -30.6794  | 193.4062 |
| 52    | 395.8673  | 23.2691   | -170.9428 | -396.9917 | -20.7867  | 164.9636 |
| 53    | 271.6215  | 14.0198   | -144.9436 | -224.2847 | -10.4335  | 136.0072 |
| 54    | 111.1595  | 4.9120    | -118.5296 | -68.9325  | -2.6440   | 112.5949 |
| 55    | -29.0278  | -1.7119   | -97.6136  | 87.0051   | 3.8593    | 91.7264  |
| 56    | -170.2328 | -7.2564   | -79.1352  | 240.7463  | 9.2588    | 73.2580  |
| 57    | -307.8378 | -11.7964  | -63.4003  | 412.6138  | 14.5022   | 54.9868  |
| 58    | -461.3658 | -16.2029  | -47.2561  | 547.0514  | 17.7998   | 42.5404  |
| 59    | -576.8188 | -18.7676  | -37.3495  | 665.9387  | 20.1891   | 34.2616  |
| 60    | -676.1437 | -20.4988  | -31.4598  | 766.0387  | -2.4114   | 91.8302  |
| 61    | -746.0315 | 166.1198  | -565.4841 | 377.5104  | -187.6676 | 619.0033 |
| 62    | -392.8176 | 171.1559  | -572.3348 | 44.3512   | -169.2178 | 566.5722 |
| 63    | -77.3122  | 153.0673  | -522.0079 | -231.3487 | -150.9787 | 516.1290 |
| 64    | 179.2831  | 135.4836  | -473.9547 | -448.1632 | -133.2621 | 468.0878 |
| 65    | 377.5468  | 118.6457  | -428.3657 | -590.7005 | -115.1119 | 419.5244 |
| 66    | 503.6949  | 101.4397  | -382.1110 | -695.3945 | -98.9839  | 376.1207 |
| 67    | 593.9011  | 86.1495   | -341.0532 | -748.9266 | -83.6300  | 335.1105 |
| 68    | 636.6392  | 71.9752   | -302.7699 | -757.1154 | -69.4263  | 296.8542 |
| 69    | 635.5024  | 58.6600   | -266.8658 | -702.0797 | -54.8015  | 257.9451 |
| 70    | 566.0139  | 44.2026   | -230.4150 | -619.6951 | -41.6337  | 224.3863 |
| 71    | 483.0971  | 33.7571   | -199.3121 | -510.4427 | -31.2279  | 193.3436 |
| 72    | 386.5521  | 23.8282   | -170.9023 | -388.9291 | -21.3492  | 164.9745 |
| 73    | 264.4735  | 14.9632   | -144.9712 | -219.2596 | -11.3742  | 136.0246 |
| 74    | 106.7092  | 6.0462    | -118.5769 | -67.0569  | -3.7865   | 112.6535 |
| 75    | -30.4829  | -0.5512   | -97.6118  | 85.8362   | 2.6909    | 91.7126  |
| 76    | -169.0621 | -6.0938   | -79.2413  | 236.9603  | 8.0971    | 73.3504  |
| 77    | -303.7473 | -10.6141  | -63.4527  | 405.8423  | 13.3210   | 55.0639  |
| 78    | -454.3059 | -14.9317  | -47.2217  | 537.1443  | 16.5285   | 42.5058  |
| 79    | -567.9547 | -17.6948  | -37.4809  | 654.6486  | 19.1161   | 34.3977  |
| 80    | -667.7109 | -19.8145  | -31.5884  | 756.0266  | -3.0947   | 91.9628  |
| 81    | -731.2610 | 165.6345  | -565.5995 | 363.8385  | -187.1788 | 619.1279 |
| 82    | -377.1272 | 170.3713  | -572.3338 | 30.3409   | -168.4322 | 566.5735 |
| 83    | -62.5482  | 152.1451  | -522.0011 | -243.9390 | -150.0569 | 516.1009 |
| 84    | 191.6414  | 134.6729  | -473.8866 | -458.6988 | -132.4535 | 468.0243 |
| 85    | 387.9810  | 117.8502  | -428.3584 | -599.4364 | -114.3235 | 419.4851 |
| 86    | 508.4873  | 100.8262  | -381.9003 | -698.6937 | -98.3705  | 375.9834 |
| 87    | 601.0494  | 85.5421   | -341.2824 | -754.6884 | -83.0296  | 335.3382 |
| 88    | 633.8830  | 71.5458   | -302.7121 | -753.4175 | -68.9848  | 296.6526 |
| 89    | 626.3600  | 57.5309   | -266.5560 | -690.4411 | -53.6668  | 257.6521 |
| 90    | 565.4845  | 44.1302   | -230.2753 | -618.9515 | -41.5623  | 224.3939 |
| 91    | 492.7989  | 33.0922   | -199.4507 | -518.6309 | -30.5601  | 193.4165 |
| 92    | 379.3565  | 24.6625   | -170.8296 | -383.6614 | -22.1870  | 164.8796 |
| 93    | 266.6049  | 15.6833   | -144.9154 | -223.0115 | -12.1064  | 136.0607 |
| 94    | 111.9530  | 7.0880    | -118.5895 | -74.6469  | -4.8260   | 112.6096 |
| 95    | -22.9045  | 0.4811    | -97.6331  | 75.9342   | 1.6626    | 91.7107  |
| 96    | -159.1088 | -5.0602   | -79.2167  | 224.6619  | 7.0614    | 73.3539  |
| 97    | -291.3968 | -9.5828   | -63.3493  | 391.1822  | 12.2915   | 54.9374  |
| 98    | -439.9159 | -14.0010  | -47.4095  | 520.6636  | 15.5980   | 42.7017  |
| 99    | -550.4216 | -16.5602  | -37.2780  | 634.5477  | 17.9818   | 34.1956  |
| 100   | -648.3840 | -18.7772  | -31.5926  | 734.3550  | -4.1319   | 91.9758  |
| 101   | -717.2396 | 164.5710  | -565.4810 | 352.2230  | -186.1146 | 619.0275 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 102   | -363.9203 | 169.0885  | -572.1154 | 20.1111   | -167.1489 | 566.3384 |
| 103   | -52.3274  | 150.8664  | -521.7910 | -251.2916 | -148.7774 | 515.9023 |
| 104   | 199.2005  | 133.2864  | -473.6973 | -463.2232 | -131.0689 | 467.8240 |
| 105   | 392.5963  | 116.4658  | -428.0813 | -600.9305 | -112.9365 | 419.2072 |
| 106   | 513.4979  | 99.2990   | -381.7056 | -700.3709 | -96.8424  | 375.7356 |
| 107   | 596.3796  | 84.3064   | -340.8285 | -747.1699 | -81.7908  | 334.8785 |
| 108   | 627.7712  | 70.4941   | -302.4044 | -744.9146 | -67.9305  | 296.4845 |
| 109   | 624.6268  | 57.3339   | -266.6006 | -688.2449 | -53.4769  | 257.6810 |
| 110   | 562.0358  | 44.0364   | -230.0643 | -615.3409 | -41.4733  | 224.0966 |
| 111   | 489.2178  | 33.0156   | -199.1597 | -514.8725 | -30.4753  | 193.1811 |
| 112   | 376.9018  | 24.4413   | -170.6327 | -380.6779 | -21.9554  | 164.6682 |
| 113   | 262.5019  | 15.6181   | -144.6834 | -218.7465 | -12.0356  | 135.7816 |
| 114   | 108.6174  | 6.8710    | -118.3180 | -70.8316  | -4.6063   | 112.3403 |
| 115   | -27.2104  | 0.4331    | -97.3776  | 80.3118   | 1.7040    | 91.4585  |
| 116   | -163.3926 | -5.0976   | -78.9682  | 228.9787  | 7.0942    | 73.1342  |
| 117   | -295.6258 | -9.6135   | -62.9964  | 395.3791  | 12.3165   | 54.5892  |
| 118   | -444.4495 | -14.1513  | -47.0531  | 525.4207  | 15.7433   | 42.3195  |
| 119   | -556.0131 | -16.8828  | -37.2891  | 640.7580  | 18.2999   | 34.2091  |
| 120   | -650.9291 | -18.6101  | -30.9959  | 736.4179  | -4.2901   | 91.3634  |
| 121   | -721.1666 | 165.0688  | -560.2870 | 354.8532  | -186.5759 | 613.8372 |
| 122   | -366.6115 | 169.5529  | -566.9316 | 21.6497   | -167.5961 | 561.1556 |
| 123   | -54.1251  | 151.3315  | -516.6179 | -250.5749 | -149.2244 | 510.7502 |
| 124   | 198.3463  | 133.7572  | -468.5842 | -463.3714 | -131.5199 | 462.6914 |
| 125   | 392.4919  | 116.9664  | -422.8660 | -601.9699 | -113.4163 | 413.9639 |
| 126   | 514.3135  | 99.8264   | -376.4753 | -702.3216 | -97.3580  | 370.5463 |
| 127   | 601.4074  | 84.7472   | -335.7867 | -753.0846 | -82.2270  | 329.8221 |
| 128   | 631.3430  | 71.1340   | -297.2026 | -749.8586 | -68.5681  | 291.2387 |
| 129   | 630.0090  | 58.0218   | -261.3754 | -695.0281 | -54.1413  | 252.5012 |
| 130   | 568.9684  | 44.7818   | -225.0039 | -623.8652 | -42.2105  | 218.9705 |
| 131   | 483.6808  | 35.0026   | -193.8790 | -513.8219 | -32.4666  | 187.9142 |
| 132   | 392.5476  | 24.9776   | -165.4991 | -397.5284 | -22.4943  | 159.5774 |
| 133   | 277.6701  | 16.5648   | -139.5791 | -236.2465 | -12.9936  | 130.6694 |
| 134   | 127.2926  | 7.8835    | -113.1815 | -92.0472  | -5.6345   | 107.2349 |
| 135   | -4.1453   | 1.3648    | -92.2500  | 54.7576   | 0.7603    | 86.2958  |
| 136   | -136.5799 | -4.0795   | -73.8948  | 199.2967  | 6.0581    | 68.0310  |
| 137   | -264.7495 | -8.5204   | -57.9177  | 360.8067  | 11.1793   | 49.5156  |
| 138   | -408.5102 | -12.8714  | -41.9835  | 485.5022  | 14.4277   | 37.2529  |
| 139   | -515.2963 | -15.5218  | -32.0333  | 595.6181  | 16.8979   | 28.9287  |
| 140   | -607.0250 | -17.3929  | -25.9346  | 688.0416  | -5.5237   | 84.9372  |
| 141   | -674.1847 | 169.8714  | -451.0919 | 363.3467  | -192.2437 | 504.8425 |
| 142   | -371.5538 | 178.4638  | -467.7545 | 85.6058   | -176.5431 | 460.8097 |
| 143   | -107.3680 | 163.2136  | -425.2982 | -153.2100 | -161.1081 | 418.1592 |
| 144   | 117.5552  | 148.2921  | -384.5296 | -368.0853 | -147.1728 | 380.9493 |
| 145   | 319.6606  | 134.9069  | -349.2997 | -528.6064 | -132.5414 | 342.1605 |
| 146   | 467.4748  | 120.8848  | -312.2545 | -650.9277 | -118.3766 | 305.1082 |
| 147   | 579.0732  | 107.3650  | -277.2289 | -736.9844 | -104.7081 | 270.0600 |
| 148   | 654.2352  | 94.4090   | -243.9208 | -786.7600 | -91.6240  | 236.6961 |
| 149   | 687.1187  | 82.4212   | -212.4380 | -815.1761 | -80.9788  | 208.8150 |
| 150   | 719.8318  | 72.0504   | -186.6665 | -805.1818 | -69.1002  | 179.4708 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 703.4620 | 61.0512   | -159.0369 | -765.2999 | -57.9755  | 151.7913 |
| 152   | 662.4188 | 50.7129   | -133.3325 | -701.3285 | -47.5755  | 126.1541 |
| 153   | 601.2154 | 41.0321   | -109.7563 | -617.9471 | -37.8128  | 102.6231 |
| 154   | 523.2814 | 31.9375   | -88.1235  | -549.5545 | -30.3026  | 84.4565  |
| 155   | 443.2780 | 26.9395   | -71.6974  | -423.8432 | -23.6349  | 64.4475  |
| 156   | 341.8721 | 19.7762   | -53.7345  | -303.8818 | -16.4386  | 46.6445  |
| 157   | 236.8105 | 13.1494   | -37.9345  | -83.6661  | -6.1164   | 15.0017  |
| 158   | 30.8456  | 3.8909    | -8.1015   | -37.8177  | -3.9000   | 8.1023   |
| 159   | 3.3070   | 2.6833    | -3.1201   | -8.1527   | -2.6742   | 3.1205   |
| 160   | -3.9980  | 2.2210    | -0.0268   | 0.0000    | -2.2101   | 0.0270   |

ENVOLVENTE DE MAX. FLECTORES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|-----------|-----------|---------|
| 1     | 0.0000   | 0.0000    | 0.0000  | 0.0000    | 0.0000    | 0.0000  |
| 2     | 45.5291  | 23.8575   | -0.3404 | -85.8749  | -20.9778  | 0.3401  |
| 3     | 85.8742  | 20.9774   | -0.3013 | -121.0516 | -18.0967  | 0.3017  |
| 4     | 121.0502 | 18.0938   | -0.2604 | -151.0189 | -15.2144  | 0.2599  |
| 5     | 151.0199 | 15.2138   | -0.2586 | -175.8100 | -12.3344  | 0.2589  |
| 6     | 175.8092 | 12.3372   | -0.1809 | -195.4287 | -9.4568   | 0.1806  |
| 7     | 195.4308 | 9.4588    | -0.1817 | -209.8657 | -6.5784   | 0.1820  |
| 8     | 209.8657 | 6.5682    | -0.0183 | -219.0950 | -3.6881   | 0.0190  |
| 9     | 219.0938 | 3.6807    | -0.1147 | -223.1269 | -0.8016   | 0.1148  |
| 10    | 223.1277 | 0.7944    | 0.0802  | -221.9625 | 2.0867    | -0.0796 |
| 11    | 221.9675 | -2.0840   | 0.0612  | -215.6270 | 4.9629    | -0.0616 |
| 12    | 215.6279 | -4.9593   | 0.1556  | -204.1115 | 7.8391    | -0.1551 |
| 13    | 204.1097 | -7.8383   | 0.1580  | -187.4092 | 10.7182   | -0.1586 |
| 14    | 187.4103 | -10.7264  | 0.2389  | -165.5050 | 13.6072   | -0.2396 |
| 15    | 165.5017 | -13.6041  | 0.2977  | -138.4288 | 16.4836   | -0.2981 |
| 16    | 138.4279 | -16.4850  | 0.2490  | -106.1519 | 19.3658   | -0.2485 |
| 17    | 106.1844 | -19.0050  | 0.3619  | -69.3935  | 21.8843   | -0.3620 |
| 18    | 78.5702  | -11.6677  | 0.1877  | -54.9725  | 14.5483   | -0.1873 |
| 19    | 62.4570  | -5.9942   | 0.1248  | -49.0796  | 8.8735    | -0.1246 |
| 20    | 55.2015  | -1.1908   | 0.1079  | -50.4660  | 4.0711    | -0.1080 |
| 21    | 54.9635  | -5.4865   | 0.0909  | -42.6196  | 5.4865    | -0.0909 |
| 22    | 46.7759  | -2.1360   | 0.0935  | -37.9180  | 5.7365    | -0.0934 |
| 23    | 47.9422  | 3.5680    | 0.0703  | -51.9201  | 0.0322    | -0.0704 |
| 24    | 60.5107  | 7.6036    | -0.0132 | -73.5688  | -4.0034   | 0.0135  |
| 25    | 85.2067  | 13.6050   | -0.1666 | -111.7688 | -10.0048  | 0.1665  |
| 26    | 124.8837 | 19.6849   | -0.2994 | -165.1232 | -16.0850  | 0.2998  |
| 27    | 165.1258 | 16.0875   | -0.1973 | -197.2683 | -12.4879  | 0.1965  |
| 28    | 197.2654 | 12.4871   | -0.1980 | -221.3114 | -8.8874   | 0.1984  |
| 29    | 221.3084 | 8.8901    | -0.1222 | -237.2616 | -5.2895   | 0.1231  |
| 30    | 237.2574 | 5.2875    | 0.0264  | -245.1039 | -1.6871   | -0.0250 |
| 31    | 245.1035 | 1.6884    | -0.0558 | -244.8520 | 1.9109    | 0.0554  |
| 32    | 244.8539 | -1.9161   | 0.1834  | -236.4920 | 5.5162    | -0.1832 |
| 33    | 236.4950 | -5.5089   | 0.1851  | -220.0498 | 9.1090    | -0.1848 |
| 34    | 220.0522 | -9.1001   | 0.1881  | -195.5253 | 12.7001   | -0.1883 |
| 35    | 195.5263 | -12.6995  | 0.3098  | -162.9043 | 16.2993   | -0.3099 |
| 36    | 162.9086 | -16.2964  | 0.4146  | -122.1967 | 19.8960   | -0.4141 |
| 37    | 125.9211 | -13.6200  | 0.2223  | -91.2173  | 17.2209   | -0.2222 |
| 38    | 99.2393  | -9.8754   | 0.1789  | -72.9762  | 13.4747   | -0.1792 |
| 39    | 84.7248  | -3.7964   | 0.0372  | -72.1299  | 7.3970    | -0.0371 |
| 40    | 81.9721  | 1.8632    | 0.0272  | -82.1134  | 1.7371    | -0.0272 |
| 41    | 89.2838  | -6.4586   | 0.0373  | -74.7557  | 6.4586    | -0.0373 |
| 42    | 79.1153  | -3.1143   | 0.0512  | -68.0570  | 6.7144    | -0.0514 |
| 43    | 78.8926  | 2.5645    | 0.0211  | -80.6108  | 1.0365    | -0.0214 |
| 44    | 90.3884  | 8.6864    | -0.0683 | -105.8817 | -5.0866   | 0.0687  |
| 45    | 114.2195 | 12.5074   | -0.1965 | -138.3089 | -8.9077   | 0.1961  |
| 46    | 153.3377 | 18.5061   | -0.3159 | -190.9238 | -14.9065  | 0.3152  |
| 47    | 190.9217 | 14.9075   | -0.2520 | -220.4159 | -11.3070  | 0.2524  |
| 48    | 220.4147 | 11.3112   | -0.1941 | -241.8123 | -7.7120   | 0.1937  |
| 49    | 241.8138 | 7.7069    | -0.1094 | -255.1070 | -4.1066   | 0.1093  |
| 50    | 255.1017 | 4.1015    | -0.1101 | -260.2802 | -0.5012   | 0.1100  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|-----------|-----------|---------|
| 51    | 260.2810 | 0.4973    | 0.0496  | -257.3505 | 3.1027    | -0.0487 |
| 52    | 257.3488 | -3.1094   | 0.0540  | -246.3028 | 6.7094    | -0.0537 |
| 53    | 246.3014 | -6.7116   | 0.2056  | -227.1506 | 10.3114   | -0.2054 |
| 54    | 227.1478 | -10.3117  | 0.2837  | -199.8909 | 13.9124   | -0.2831 |
| 55    | 199.8933 | -13.9128  | 0.3373  | -164.5442 | 17.5123   | -0.3373 |
| 56    | 164.5454 | -17.5155  | 0.3397  | -121.0895 | 21.1150   | -0.3393 |
| 57    | 126.6783 | -12.4686  | 0.2401  | -94.5575  | 16.0701   | -0.2402 |
| 58    | 102.7635 | -8.6593   | 0.1096  | -79.2347  | 12.2585   | -0.1094 |
| 59    | 91.1778  | -2.5421   | 0.0273  | -81.4063  | 6.1423    | -0.0273 |
| 60    | 91.3536  | 3.1330    | 0.0291  | -94.3529  | 0.4670    | -0.0291 |
| 61    | 101.5433 | -6.7880   | -0.0095 | -86.2704  | 6.7880    | 0.0095  |
| 62    | 90.6506  | -3.4444   | 0.0331  | -78.8518  | 7.0441    | -0.0332 |
| 63    | 89.7655  | 2.2327    | 0.0112  | -90.7382  | 1.3680    | -0.0112 |
| 64    | 100.6515 | 8.3522    | -0.0711 | -115.3917 | -4.7527   | 0.0714  |
| 65    | 123.8597 | 12.1669   | -0.1979 | -147.1839 | -8.5674   | 0.1977  |
| 66    | 162.3175 | 18.0908   | -0.3423 | -198.9763 | -14.4903  | 0.3418  |
| 67    | 198.9824 | 14.4890   | -0.2128 | -227.5345 | -10.8887  | 0.2132  |
| 68    | 227.5344 | 10.8864   | -0.2150 | -247.9814 | -7.2862   | 0.2149  |
| 69    | 247.9829 | 7.2895    | -0.1481 | -260.3331 | -3.6905   | 0.1484  |
| 70    | 260.3316 | 3.6897    | -0.0594 | -264.5837 | -0.0897   | 0.0591  |
| 71    | 264.5874 | 0.0893    | 0.1105  | -260.7395 | 3.5105    | -0.1102 |
| 72    | 260.7407 | -3.5132   | 0.1110  | -248.7866 | 7.1130    | -0.1108 |
| 73    | 248.7856 | -7.1129   | 0.1928  | -228.7251 | 10.7137   | -0.1936 |
| 74    | 228.7189 | -10.7107  | 0.3351  | -200.5620 | 14.3113   | -0.3342 |
| 75    | 200.5634 | -14.3083  | 0.3238  | -164.3370 | 17.9066   | -0.3238 |
| 76    | 164.3374 | -17.9073  | 0.3924  | -119.9744 | 21.5089   | -0.3927 |
| 77    | 126.1444 | -12.1765  | 0.2493  | -94.7064  | 15.7756   | -0.2495 |
| 78    | 102.9329 | -8.3601   | 0.0898  | -80.0698  | 11.9604   | -0.0901 |
| 79    | 92.0338  | -2.2436   | 0.0297  | -82.9363  | 5.8437    | -0.0295 |
| 80    | 92.8926  | 3.4324    | 0.0307  | -96.5652  | 0.1675    | -0.0308 |
| 81    | 103.7564 | -6.7757   | 0.0013  | -88.5123  | 6.7757    | -0.0012 |
| 82    | 92.8931  | -3.4316   | 0.0198  | -81.1184  | 7.0325    | -0.0195 |
| 83    | 92.0361  | 2.2432    | -0.0112 | -93.0336  | 1.3564    | 0.0116  |
| 84    | 102.9411 | 8.3614    | -0.0568 | -117.7021 | -4.7620   | 0.0566  |
| 85    | 126.1635 | 12.1788   | -0.2147 | -149.5180 | -8.5782   | 0.2148  |
| 86    | 164.3641 | 17.9071   | -0.2646 | -200.5984 | -14.3079  | 0.2647  |
| 87    | 200.6017 | 14.3113   | -0.3215 | -228.7549 | -10.7109  | 0.3210  |
| 88    | 228.7612 | 10.7122   | -0.1761 | -248.8136 | -7.1121   | 0.1761  |
| 89    | 248.8117 | 7.1070    | -0.0181 | -260.7533 | -3.5070   | 0.0176  |
| 90    | 260.7550 | 3.4999    | -0.0167 | -264.5779 | 0.1000    | 0.0158  |
| 91    | 264.5753 | -0.1102   | -0.0159 | -260.2773 | 3.7102    | 0.0158  |
| 92    | 260.2827 | -3.7000   | 0.2346  | -247.9021 | 7.3007    | -0.2340 |
| 93    | 247.9009 | -7.2945   | 0.1493  | -227.4429 | 10.8942   | -0.1497 |
| 94    | 227.4418 | -10.8936  | 0.2897  | -198.8848 | 14.4931   | -0.2892 |
| 95    | 198.8864 | -14.4879  | 0.3601  | -162.2316 | 18.0884   | -0.3593 |
| 96    | 162.2336 | -18.0877  | 0.4074  | -117.4962 | 21.6870   | -0.4069 |
| 97    | 123.8330 | -12.1617  | 0.2154  | -92.4167  | 15.7620   | -0.2150 |
| 98    | 100.6516 | -8.3477   | 0.1177  | -77.8110  | 11.9490   | -0.1179 |
| 99    | 89.7826  | -2.2324   | -0.0057 | -80.7125  | 5.8315    | 0.0057  |
| 100   | 90.6678  | 3.4439    | 0.0223  | -94.3666  | 0.1560    | -0.0224 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|-----------|-----------|---------|
| 101   | 101.5567 | -6.4785   | 0.0175  | -86.9820  | 6.4785    | -0.0175 |
| 102   | 91.3626  | -3.1352   | 0.0030  | -80.2599  | 6.7350    | -0.0028 |
| 103   | 91.1763  | 2.5415    | 0.0001  | -92.8448  | 1.0581    | -0.0003 |
| 104   | 102.7500 | 8.6585    | -0.0764 | -118.1847 | -5.0578   | 0.0765  |
| 105   | 126.6496 | 12.4712   | -0.2035 | -150.6626 | -8.8705   | 0.2028  |
| 106   | 164.5128 | 17.5169   | -0.2995 | -199.8816 | -13.9165  | 0.2992  |
| 107   | 199.8799 | 13.9148   | -0.2427 | -227.1349 | -10.3156  | 0.2431  |
| 108   | 227.1336 | 10.3111   | -0.1683 | -246.2818 | -6.7109   | 0.1690  |
| 109   | 246.2780 | 6.7078    | -0.1695 | -257.3234 | -3.1076   | 0.1697  |
| 110   | 257.3242 | 3.1123    | -0.0057 | -260.2780 | 0.4877    | 0.0070  |
| 111   | 260.2808 | -0.4904   | -0.0045 | -255.1268 | 4.0904    | 0.0045  |
| 112   | 255.1306 | -4.1040   | 0.1570  | -241.8488 | 7.7038    | -0.1558 |
| 113   | 241.8476 | -7.7031   | 0.1582  | -220.4658 | 11.3029   | -0.1580 |
| 114   | 220.4695 | -11.3088  | 0.2960  | -190.9787 | 14.9084   | -0.2964 |
| 115   | 190.9817 | -14.9066  | 0.3645  | -153.3850 | 18.5072   | -0.3646 |
| 116   | 153.3822 | -18.5076  | 0.4045  | -107.7004 | 22.1070   | -0.4047 |
| 117   | 114.2397 | -12.5084  | 0.1837  | -82.0517  | 16.1078   | -0.1839 |
| 118   | 90.4022  | -8.6871   | 0.0848  | -66.8033  | 12.2875   | -0.0845 |
| 119   | 78.8960  | -2.5632   | 0.0190  | -69.0780  | 6.1634    | -0.0192 |
| 120   | 79.1083  | 3.1139    | -0.0381 | -82.0639  | 0.4862    | 0.0381  |
| 121   | 89.2749  | -5.2055   | -0.0089 | -77.5635  | 5.2055    | 0.0090  |
| 122   | 81.9638  | -1.8646   | -0.0222 | -73.7184  | 5.4646    | 0.0226  |
| 123   | 84.7077  | 3.7970    | -0.0292 | -89.2016  | -0.1972   | 0.0291  |
| 124   | 99.2174  | 9.8771    | -0.1421 | -117.3909 | -6.2772   | 0.1417  |
| 125   | 125.8956 | 13.6271   | -0.2202 | -152.5118 | -10.0263  | 0.2206  |
| 126   | 162.9259 | 16.3116   | -0.2503 | -195.5809 | -12.7110  | 0.2491  |
| 127   | 195.5790 | 12.7162   | -0.2628 | -220.1322 | -9.1178   | 0.2627  |
| 128   | 220.1343 | 9.1176    | -0.1147 | -236.5994 | -5.5172   | 0.1154  |
| 129   | 236.5988 | 5.5175    | -0.1158 | -244.9628 | -1.9171   | 0.1163  |
| 130   | 244.9672 | 1.9120    | -0.0449 | -245.2195 | 1.6872    | 0.0440  |
| 131   | 245.2162 | -1.6912   | 0.1201  | -237.3589 | 5.2924    | -0.1200 |
| 132   | 237.3575 | -5.2951   | 0.1063  | -221.4009 | 8.8941    | -0.1070 |
| 133   | 221.3963 | -8.8952   | 0.1809  | -197.3325 | 12.4952   | -0.1820 |
| 134   | 197.3286 | -12.4933  | 0.2495  | -165.1607 | 16.0944   | -0.2511 |
| 135   | 165.1619 | -16.0977  | 0.2989  | -124.8956 | 19.6975   | -0.2986 |
| 136   | 124.8962 | -19.6961  | 0.3727  | -76.5334  | 23.2957   | -0.3726 |
| 137   | 85.2025  | -13.6087  | 0.1642  | -50.5374  | 17.2084   | -0.1648 |
| 138   | 60.5112  | -7.6033   | 0.0322  | -39.3497  | 11.2040   | -0.0322 |
| 139   | 47.9523  | -3.5653   | -0.0382 | -35.8830  | 7.1648    | 0.0383  |
| 140   | 46.7978  | 2.1404    | -0.0793 | -47.5631  | 1.4601    | 0.0794  |
| 141   | 54.9955  | -1.5275   | -0.0784 | -52.2461  | 1.5275    | 0.0785  |
| 142   | 55.2307  | 1.1896    | -0.0629 | -54.7797  | 1.6908    | 0.0629  |
| 143   | 62.4891  | 5.9916    | -0.1300 | -70.6800  | -3.1123   | 0.1301  |
| 144   | 78.5925  | 11.6622   | -0.1449 | -97.0019  | -8.7808   | 0.1450  |
| 145   | 106.2139 | 18.9918   | -0.3001 | -137.7974 | -16.1126  | 0.3001  |
| 146   | 138.4154 | 16.4748   | -0.2511 | -165.4783 | -13.5946  | 0.2510  |
| 147   | 165.4817 | 13.6038   | -0.2502 | -187.3747 | -10.7236  | 0.2512  |
| 148   | 187.3753 | 10.7233   | -0.1821 | -204.0795 | -7.8443   | 0.1813  |
| 149   | 204.0787 | 7.8406    | -0.0945 | -215.5996 | -4.9606   | 0.0952  |
| 150   | 215.6012 | 4.9649    | -0.0950 | -221.9469 | -2.0849   | 0.0943  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|-----------|-----------|---------|
| 151   | 221.9488 | 2.0781    | -0.0015 | -223.0966 | 0.8029    | 0.0016  |
| 152   | 223.0969 | -0.8046   | 0.0805  | -219.0548 | 3.6844    | -0.0806 |
| 153   | 219.0549 | -3.6775   | 0.0808  | -209.8439 | 6.5573    | -0.0812 |
| 154   | 209.8434 | -6.5705   | 0.0773  | -195.4261 | 9.4503    | -0.0772 |
| 155   | 195.4260 | -9.4555   | 0.2299  | -175.8190 | 12.3351   | -0.2294 |
| 156   | 175.8173 | -12.3338  | 0.3028  | -151.0171 | 15.2145   | -0.3022 |
| 157   | 151.0155 | -15.2162  | 0.2393  | -121.0408 | 18.0958   | -0.2392 |
| 158   | 121.0408 | -18.0939  | 0.2901  | -85.8730  | 20.9745   | -0.2905 |
| 159   | 85.8717  | -20.9742  | 0.3222  | -45.5353  | 23.8537   | -0.3215 |
| 160   | 45.5348  | -23.8523  | 0.3412  | 0.0003    | 26.7328   | -0.3411 |
| 161   | 25.5665  | -13.4586  | 0.0000  | 0.0000    | 13.4586   | 0.0000  |
| 162   | 25.2263  | -13.2793  | 0.0000  | 0.0000    | 13.2793   | 0.0000  |
| 163   | 75.2926  | -39.6285  | 0.0000  | 0.0000    | 39.6285   | 0.0000  |
| 164   | 75.3211  | -39.6429  | 0.0000  | 0.0000    | 39.6429   | 0.0000  |
| 165   | 79.6077  | -41.9018  | 0.0000  | 0.0000    | 41.9018   | 0.0000  |
| 166   | 79.6563  | -41.9102  | 0.0000  | 0.0000    | 41.9102   | 0.0000  |
| 167   | 80.9248  | -42.5917  | 0.0000  | 0.0000    | 42.5917   | 0.0000  |
| 168   | 81.0100  | -42.6367  | 0.0000  | 0.0000    | 42.6367   | 0.0000  |
| 169   | 81.2797  | -42.7739  | 0.0000  | 0.0000    | 42.7739   | 0.0000  |
| 170   | 81.3314  | -42.8015  | 0.0000  | 0.0000    | 42.8015   | 0.0000  |
| 171   | 80.9405  | -42.6063  | 0.0000  | 0.0000    | 42.6063   | 0.0000  |
| 172   | 80.9598  | -42.6169  | 0.0000  | 0.0000    | 42.6169   | 0.0000  |
| 173   | 79.5919  | -41.9061  | 0.0000  | 0.0000    | 41.9061   | 0.0000  |
| 174   | 79.6600  | -41.9106  | 0.0000  | 0.0000    | 41.9106   | 0.0000  |
| 175   | 75.3071  | -39.6413  | 0.0000  | 0.0000    | 39.6413   | 0.0000  |
| 176   | 75.3530  | -39.6356  | 0.0000  | 0.0000    | 39.6356   | 0.0000  |
| 177   | 25.5710  | -13.4558  | 0.0000  | 0.0000    | 13.4558   | 0.0000  |
| 178   | 25.2295  | -13.2760  | 0.0000  | 0.0000    | 13.2760   | 0.0000  |

ENVOLVENTE DE MIN. FLECTORES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol  | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| ===== | =====     | =====     | =====   | =====    | =====     | =====   |
| 1     | 0.0000    | 21.2356   | -0.1990 | -35.6269 | -18.3559  | 0.1989  |
| 2     | -9.9029   | -5.5021   | 0.1410  | 19.8062  | 5.5021    | -0.1407 |
| 3     | -19.8061  | -5.5023   | 0.1319  | 29.7131  | 5.5023    | -0.1316 |
| 4     | -29.7122  | -5.5003   | 0.1216  | 39.6120  | 5.5003    | -0.1215 |
| 5     | -39.6123  | -5.5009   | 0.1208  | 49.5129  | 5.5009    | -0.1208 |
| 6     | -49.5129  | -5.5027   | 0.0983  | 59.4198  | 5.5027    | -0.0985 |
| 7     | -59.4205  | -5.5024   | 0.0988  | 69.3269  | 5.5024    | -0.0991 |
| 8     | -69.3270  | -5.4966   | 0.0457  | 79.2228  | 5.4966    | -0.0455 |
| 9     | -79.2234  | -5.4934   | 0.0803  | 89.1099  | 5.4934    | -0.0801 |
| 10    | -89.1098  | -5.4907   | 0.0022  | 98.9962  | 5.4907    | -0.0027 |
| 11    | -98.9985  | -5.4916   | 0.0107  | 108.8803 | 5.4916    | -0.0114 |
| 12    | -108.8807 | -5.4937   | -0.0366 | 118.7700 | 5.4937    | 0.0367  |
| 13    | -118.7697 | -5.4931   | -0.0382 | 128.6581 | 5.4931    | 0.0385  |
| 14    | -128.6599 | -5.4887   | -0.0939 | 138.5430 | 5.4887    | 0.0941  |
| 15    | -138.5428 | -5.4911   | -0.1428 | 148.4266 | 5.4911    | 0.1428  |
| 16    | -148.4257 | -5.4913   | -0.0901 | 158.3125 | 5.4913    | 0.0901  |
| 17    | -158.3426 | -5.8515   | -0.2627 | 168.8744 | 5.8515    | 0.2629  |
| 18    | -178.0505 | -16.0677  | -0.0544 | 206.9788 | 16.0677   | 0.0540  |
| 19    | -214.4638 | -24.6205  | -0.0430 | 258.7706 | 24.6205   | 0.0433  |
| 20    | -264.8932 | -32.3044  | -0.1180 | 323.0471 | 32.3044   | 0.1181  |
| 21    | -327.5439 | 41.3706   | -0.0960 | 238.5241 | -37.7711  | 0.0960  |
| 22    | -242.6806 | 34.4204   | -0.1679 | 165.2254 | -34.4204  | 0.1680  |
| 23    | -175.2500 | 25.1149   | -0.2234 | 118.7377 | -25.1149  | 0.2233  |
| 24    | -127.3291 | 17.4802   | -0.1395 | 87.9972  | -17.4802  | 0.1394  |
| 25    | -99.6362  | 7.8784    | 0.0126  | 81.9093  | -7.8784   | -0.0123 |
| 26    | -95.0236  | -1.8034   | 0.1651  | 99.0809  | 1.8034    | -0.1651 |
| 27    | -99.0821  | -1.8038   | 0.1036  | 103.1407 | 1.8038    | -0.1028 |
| 28    | -103.1388 | -1.8041   | 0.1039  | 107.1975 | 1.8041    | -0.1042 |
| 29    | -107.1965 | -1.8038   | 0.0677  | 111.2573 | 1.8038    | -0.0672 |
| 30    | -111.2558 | -1.8045   | -0.0025 | 115.3167 | 1.8045    | 0.0028  |
| 31    | -115.3152 | -1.8048   | 0.0365  | 119.3753 | 1.8048    | -0.0368 |
| 32    | -119.3756 | -1.8022   | -0.0807 | 123.4310 | 1.8022    | 0.0807  |
| 33    | -123.4321 | -1.8070   | -0.0822 | 127.4974 | 1.8070    | 0.0819  |
| 34    | -127.4994 | -1.8123   | -0.0835 | 131.5775 | 1.8123    | 0.0838  |
| 35    | -131.5775 | -1.8127   | -0.1655 | 135.6566 | 1.8127    | 0.1645  |
| 36    | -135.6593 | -1.8151   | -0.2526 | 139.7429 | 1.8151    | 0.2520  |
| 37    | -143.4666 | -8.0915   | -0.0560 | 161.6771 | 8.0915    | 0.0554  |
| 38    | -169.6998 | -15.4378  | -0.0765 | 204.4268 | 15.4378   | 0.0766  |
| 39    | -216.1756 | -25.1153  | 0.1011  | 272.6942 | 25.1153   | -0.1014 |
| 40    | -282.5365 | -34.3762  | -0.0131 | 359.8888 | 34.3762   | 0.0132  |
| 41    | -367.0824 | 42.4938   | -0.0527 | 275.5456 | -38.8947  | 0.0531  |
| 42    | -279.9051 | 35.5507   | -0.1374 | 199.9158 | -35.5507  | 0.1377  |
| 43    | -210.7512 | 26.2716   | -0.1532 | 151.6235 | -26.2716  | 0.1532  |
| 44    | -161.4009 | 16.5485   | -0.0828 | 124.1708 | -16.5485  | 0.0829  |
| 45    | -132.5085 | 9.1264    | 0.0447  | 111.9750 | -9.1264   | -0.0448 |
| 46    | -127.0021 | -0.4704   | 0.1801  | 128.0617 | 0.4704    | -0.1802 |
| 47    | -128.0592 | -0.4710   | 0.1381  | 129.1193 | 0.4710    | -0.1378 |
| 48    | -129.1171 | -0.4749   | 0.1045  | 130.1847 | 0.4749    | -0.1039 |
| 49    | -130.1855 | -0.4706   | 0.0585  | 131.2445 | 0.4706    | -0.0587 |
| 50    | -131.2416 | -0.4660   | 0.0592  | 132.2915 | 0.4660    | -0.0589 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol  | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| ===== | =====     | =====     | =====   | =====    | =====     | =====   |
| 51    | -132.2919 | -0.4638   | -0.0216 | 133.3365 | 0.4638    | 0.0217  |
| 52    | -133.3361 | -0.4588   | -0.0234 | 134.3703 | 0.4588    | 0.0235  |
| 53    | -134.3690 | -0.4582   | -0.1056 | 135.3993 | 0.4582    | 0.1063  |
| 54    | -135.3964 | -0.4584   | -0.1532 | 136.4293 | 0.4584    | 0.1527  |
| 55    | -136.4303 | -0.4574   | -0.1896 | 137.4594 | 0.4574    | 0.1895  |
| 56    | -137.4589 | -0.4550   | -0.1908 | 138.4824 | 0.4550    | 0.1910  |
| 57    | -144.0700 | -9.1009   | -0.1039 | 164.5552 | 9.1009    | 0.1042  |
| 58    | -172.7603 | -16.5123  | 0.0315  | 209.9054 | 16.5123   | -0.0311 |
| 59    | -221.8485 | -26.2289  | 0.0683  | 280.8660 | 26.2289   | -0.0682 |
| 60    | -290.8130 | -35.5045  | -0.0586 | 370.6973 | 35.5045   | 0.0585  |
| 61    | -377.8885 | 42.7804   | 0.0386  | 285.6826 | -39.1804  | -0.0386 |
| 62    | -290.0627 | 35.8364   | -0.1270 | 209.4359 | -35.8364  | 0.1270  |
| 63    | -220.3492 | 26.5606   | -0.1513 | 160.5752 | -26.5606  | 0.1510  |
| 64    | -170.4892 | 16.8393   | -0.0876 | 132.6059 | -16.8393  | 0.0876  |
| 65    | -141.0751 | 9.4238    | 0.0385  | 119.8740 | -9.4238   | -0.0381 |
| 66    | -135.0095 | -0.1020   | 0.1926  | 135.2386 | 0.1020    | -0.1924 |
| 67    | -135.2421 | -0.1014   | 0.1049  | 135.4696 | 0.1014    | -0.1050 |
| 68    | -135.4689 | -0.0993   | 0.1059  | 135.6930 | 0.0993    | -0.1060 |
| 69    | -135.6929 | -0.1021   | 0.0697  | 135.9232 | 0.1021    | -0.0696 |
| 70    | -135.9200 | -0.1011   | 0.0239  | 136.1496 | 0.1011    | -0.0238 |
| 71    | -136.1503 | -0.1018   | -0.0639 | 136.3784 | 0.1018    | 0.0637  |
| 72    | -136.3780 | -0.0985   | -0.0643 | 136.6008 | 0.0985    | 0.0645  |
| 73    | -136.5998 | -0.0971   | -0.1092 | 136.8201 | 0.0971    | 0.1092  |
| 74    | -136.8166 | -0.1002   | -0.1944 | 137.0414 | 0.1002    | 0.1939  |
| 75    | -137.0435 | -0.1015   | -0.1862 | 137.2732 | 0.1015    | 0.1861  |
| 76    | -137.2740 | -0.1017   | -0.2438 | 137.5030 | 0.1017    | 0.2442  |
| 77    | -143.6742 | -9.4350   | -0.1115 | 164.8980 | 9.4350    | 0.1112  |
| 78    | -173.1260 | -16.8506  | 0.0690  | 211.0433 | 16.8506   | -0.0689 |
| 79    | -223.0072 | -26.5677  | 0.0474  | 282.7859 | 26.5677   | -0.0471 |
| 80    | -292.7423 | -35.8431  | -0.0794 | 373.3882 | 35.8431   | 0.0792  |
| 81    | -380.5798 | 42.7875   | -0.0119 | 288.3606 | -39.1876  | 0.0116  |
| 82    | -292.7416 | 35.8438   | -0.0995 | 212.0738 | -35.8438  | 0.0996  |
| 83    | -222.9910 | 26.5681   | -0.1056 | 163.2190 | -26.5681  | 0.1053  |
| 84    | -173.1260 | 16.8501   | -0.1033 | 135.2188 | -16.8501  | 0.1033  |
| 85    | -143.6801 | 9.4346    | 0.0590  | 122.4478 | -9.4346   | -0.0591 |
| 86    | -137.2943 | 0.1026    | 0.1338  | 137.0639 | -0.1026   | -0.1333 |
| 87    | -137.0648 | 0.1005    | 0.1722  | 136.8388 | -0.1005   | -0.1721 |
| 88    | -136.8429 | 0.0998    | 0.0858  | 136.6172 | -0.0998   | -0.0858 |
| 89    | -136.6178 | 0.1032    | -0.0020 | 136.3834 | -0.1032   | 0.0017  |
| 90    | -136.3858 | 0.1083    | -0.0028 | 136.1404 | -0.1083   | 0.0030  |
| 91    | -136.1384 | 0.1149    | -0.0031 | 135.8796 | -0.1149   | 0.0029  |
| 92    | -135.8825 | 0.1090    | -0.1340 | 135.6362 | -0.1090   | 0.1341  |
| 93    | -135.6376 | 0.1037    | -0.0873 | 135.4034 | -0.1037   | 0.0871  |
| 94    | -135.4039 | 0.1034    | -0.1709 | 135.1706 | -0.1034   | 0.1709  |
| 95    | -135.1713 | 0.0992    | -0.2181 | 134.9460 | -0.0992   | 0.2180  |
| 96    | -134.9459 | 0.0992    | -0.2577 | 134.7233 | -0.0992   | 0.2571  |
| 97    | -141.0596 | -9.4265   | -0.0724 | 162.2723 | 9.4265    | 0.0721  |
| 98    | -170.5063 | -16.8398  | -0.0001 | 208.4094 | 16.8398   | 0.0005  |
| 99    | -220.3818 | -26.5571  | 0.1319  | 280.1197 | 26.5571   | -0.1318 |
| 100   | -290.0739 | -35.8324  | -0.0879 | 370.6944 | 35.8324   | 0.0879  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| 101   | -377.8851 | 42.4481   | -0.0566 | 286.4301 | -38.8482  | 0.0565  |
| 102   | -290.8110 | 35.5049   | -0.0407 | 210.9275 | -35.5049  | 0.0412  |
| 103   | -221.8432 | 26.2287   | -0.1194 | 162.8338 | -26.2287  | 0.1194  |
| 104   | -172.7381 | 16.5120   | -0.0684 | 135.5806 | -16.5120  | 0.0683  |
| 105   | -144.0448 | 9.0993    | 0.0590  | 123.5674 | -9.0993   | -0.0591 |
| 106   | -137.4192 | 0.4522    | 0.1725  | 136.4019 | -0.4522   | -0.1720 |
| 107   | -136.4001 | 0.4536    | 0.1344  | 135.3798 | -0.4536   | -0.1342 |
| 108   | -135.3783 | 0.4567    | 0.0906  | 134.3515 | -0.4567   | -0.0908 |
| 109   | -134.3488 | 0.4594    | 0.0911  | 133.3135 | -0.4594   | -0.0915 |
| 110   | -133.3163 | 0.4568    | 0.0063  | 132.2905 | -0.4568   | -0.0067 |
| 111   | -132.2930 | 0.4574    | 0.0060  | 131.2622 | -0.4574   | -0.0055 |
| 112   | -131.2643 | 0.4662    | -0.0776 | 130.2159 | -0.4662   | 0.0773  |
| 113   | -130.2144 | 0.4671    | -0.0786 | 129.1648 | -0.4671   | 0.0782  |
| 114   | -129.1663 | 0.4696    | -0.1591 | 128.1096 | -0.4696   | 0.1595  |
| 115   | -128.1105 | 0.4696    | -0.2054 | 127.0545 | -0.4696   | 0.2053  |
| 116   | -127.0528 | 0.4684    | -0.2386 | 125.9979 | -0.4684   | 0.2392  |
| 117   | -132.5372 | -9.1278   | -0.0175 | 153.0710 | 9.1278    | 0.0171  |
| 118   | -161.4195 | -16.5489  | 0.0570  | 198.6598 | 16.5489   | -0.0568 |
| 119   | -210.7507 | -26.2726  | 0.0403  | 269.8675 | 26.2726   | -0.0398 |
| 120   | -279.8981 | -35.5499  | 0.0964  | 359.8890 | 35.5499   | -0.0961 |
| 121   | -367.0961 | 41.3224   | -0.0488 | 278.1708 | -37.7224  | 0.0487  |
| 122   | -282.5707 | 34.3808   | -0.0380 | 205.2137 | -34.3808  | 0.0378  |
| 123   | -216.2029 | 25.1200   | -0.1133 | 159.6866 | -25.1200  | 0.1136  |
| 124   | -169.7036 | 15.4402   | -0.0007 | 134.9648 | -15.4402  | -0.0001 |
| 125   | -143.4703 | 8.0896    | 0.0726  | 125.2643 | -8.0896   | -0.0731 |
| 126   | -135.6771 | 1.8062    | 0.1188  | 131.6128 | -1.8062   | -0.1188 |
| 127   | -131.6117 | 1.8012    | 0.1275  | 127.5594 | -1.8012   | -0.1276 |
| 128   | -127.5593 | 1.8023    | 0.0421  | 123.5047 | -1.8023   | -0.0417 |
| 129   | -123.5030 | 1.8024    | 0.0429  | 119.4485 | -1.8024   | -0.0428 |
| 130   | -119.4509 | 1.8050    | 0.0088  | 115.3884 | -1.8050   | -0.0088 |
| 131   | -115.3866 | 1.8079    | -0.0688 | 111.3177 | -1.8079   | 0.0691  |
| 132   | -111.3181 | 1.8093    | -0.0632 | 107.2473 | -1.8093   | 0.0634  |
| 133   | -107.2448 | 1.8097    | -0.0984 | 103.1716 | -1.8097   | 0.0984  |
| 134   | -103.1697 | 1.8084    | -0.1347 | 99.0993  | -1.8084   | 0.1348  |
| 135   | -99.0995  | 1.8106    | -0.1643 | 95.0258  | -1.8106   | 0.1642  |
| 136   | -95.0251  | 1.8106    | -0.2207 | 90.9518  | -1.8106   | 0.2210  |
| 137   | -99.6197  | -7.8777   | -0.0129 | 117.3420 | 7.8777    | 0.0130  |
| 138   | -127.3163 | -17.4821  | 0.0974  | 166.6579 | 17.4821   | -0.0976 |
| 139   | -175.2610 | -25.1205  | 0.1313  | 231.7728 | 25.1205   | -0.1313 |
| 140   | -242.6878 | -34.4261  | 0.1053  | 320.1548 | 34.4261   | -0.1054 |
| 141   | -327.5824 | 37.9004   | 0.0208  | 261.9662 | -35.0211  | -0.0207 |
| 142   | -264.9515 | 32.3034   | -0.0836 | 206.7960 | -32.3034  | 0.0838  |
| 143   | -214.5052 | 24.6218   | 0.0475  | 170.1947 | -24.6218  | -0.0474 |
| 144   | -178.1082 | 16.0714   | -0.0222 | 149.1651 | -16.0714  | 0.0219  |
| 145   | -158.3781 | 5.8603    | 0.1360  | 147.8306 | -5.8603   | -0.1361 |
| 146   | -148.4490 | 5.4986    | 0.0820  | 138.5497 | -5.4986   | -0.0826 |
| 147   | -138.5520 | 5.4933    | 0.0816  | 128.6626 | -5.4933   | -0.0820 |
| 148   | -128.6622 | 5.4918    | 0.0359  | 118.7802 | -5.4918   | -0.0353 |
| 149   | -118.7784 | 5.4941    | -0.0153 | 108.8876 | -5.4941   | 0.0158  |
| 150   | -108.8879 | 5.4909    | -0.0159 | 99.0029  | -5.4909   | 0.0158  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | -99.0023 | 5.4944    | -0.0566 | 89.1068  | -5.4944   | 0.0566  |
| 152   | -89.1063 | 5.4977    | -0.0901 | 79.2108  | -5.4977   | 0.0900  |
| 153   | -79.2113 | 5.4940    | -0.0904 | 69.3211  | -5.4940   | 0.0902  |
| 154   | -69.3222 | 5.4995    | -0.0887 | 59.4227  | -5.4995   | 0.0892  |
| 155   | -59.4228 | 5.5018    | -0.1345 | 49.5208  | -5.5018   | 0.1347  |
| 156   | -49.5192 | 5.5009    | -0.1550 | 39.6141  | -5.5009   | 0.1553  |
| 157   | -39.6124 | 5.5019    | -0.1391 | 29.7100  | -5.5019   | 0.1389  |
| 158   | -29.7101 | 5.5017    | -0.1512 | 19.8060  | -5.5017   | 0.1510  |
| 159   | -19.8054 | 5.5011    | -0.1588 | 9.9037   | -5.5011   | 0.1588  |
| 160   | -9.9030  | 5.5007    | -0.1628 | 0.0000   | -5.5007   | 0.1628  |
| 161   | -5.2973  | 2.7890    | 0.0000  | 0.0000   | -2.7890   | 0.0000  |
| 162   | -5.1565  | 2.7148    | 0.0000  | 0.0000   | -2.7148   | 0.0000  |
| 163   | -6.6566  | 3.5038    | 0.0000  | 0.0000   | -3.5038   | 0.0000  |
| 164   | -6.6673  | 3.5092    | 0.0000  | 0.0000   | -3.5092   | 0.0000  |
| 165   | -11.0818 | 5.8325    | 0.0000  | 0.0000   | -5.8325   | 0.0000  |
| 166   | -11.0824 | 5.8306    | 0.0000  | 0.0000   | -5.8306   | 0.0000  |
| 167   | -12.5889 | 6.6253    | 0.0000  | 0.0000   | -6.6253   | 0.0000  |
| 168   | -12.6139 | 6.6388    | 0.0000  | 0.0000   | -6.6388   | 0.0000  |
| 169   | -12.8684 | 6.7721    | 0.0000  | 0.0000   | -6.7721   | 0.0000  |
| 170   | -12.8828 | 6.7802    | 0.0000  | 0.0000   | -6.7802   | 0.0000  |
| 171   | -12.6044 | 6.6348    | 0.0000  | 0.0000   | -6.6348   | 0.0000  |
| 172   | -12.5950 | 6.6299    | 0.0000  | 0.0000   | -6.6299   | 0.0000  |
| 173   | -11.0742 | 5.8304    | 0.0000  | 0.0000   | -5.8304   | 0.0000  |
| 174   | -11.0858 | 5.8324    | 0.0000  | 0.0000   | -5.8324   | 0.0000  |
| 175   | -6.6639  | 3.5078    | 0.0000  | 0.0000   | -3.5078   | 0.0000  |
| 176   | -6.6729  | 3.5102    | 0.0000  | 0.0000   | -3.5102   | 0.0000  |
| 177   | -5.3081  | 2.7935    | 0.0000  | 0.0000   | -2.7935   | 0.0000  |
| 178   | -5.1458  | 2.7082    | 0.0000  | 0.0000   | -2.7082   | 0.0000  |



ENVOLVENTE DE MAX. CORTANTES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 1     | 0.0000    | 26.7386   | -0.3397 | -45.5299  | -23.8589  | 0.3393  |
| 2     | 43.1005   | 23.9481   | -0.3372 | -83.6093  | -21.0684  | 0.3369  |
| 3     | 76.8068   | 21.3382   | -0.2929 | -112.6335 | -18.4575  | 0.2933  |
| 4     | 102.0954  | 18.9039   | -0.2478 | -133.5222 | -16.0245  | 0.2473  |
| 5     | 119.8940  | 16.6507   | -0.2358 | -147.2694 | -13.7713  | 0.2360  |
| 6     | 131.1656  | 14.5757   | -0.1640 | -154.8147 | -11.6953  | 0.1639  |
| 7     | 136.8375  | 12.6726   | -0.1561 | -157.0582 | -9.7922   | 0.1563  |
| 8     | 137.7949  | 10.9299   | -0.0374 | -154.8765 | -8.0498   | 0.0380  |
| 9     | 134.8937  | 9.3582    | -0.0997 | -149.1431 | -6.4791   | 0.0992  |
| 10    | 128.9818  | 7.9501    | 0.0218  | -140.7031 | -5.0690   | -0.0217 |
| 11    | 120.8478  | 6.7060    | 0.0035  | -130.3235 | -3.8271   | -0.0042 |
| 12    | 111.2636  | 5.6153    | 0.0482  | -118.7788 | -2.7355   | -0.0480 |
| 13    | 100.9204  | 4.6691    | 0.0386  | -106.7323 | -1.7892   | -0.0389 |
| 14    | 90.4671   | 3.8600    | 0.0697  | -94.8243  | -0.9792   | -0.0701 |
| 15    | 80.4800   | 3.1900    | 0.0845  | -83.6305  | -0.3105   | -0.0847 |
| 16    | 71.5021   | 2.6454    | 0.0445  | -73.6710  | 0.2354    | -0.0441 |
| 17    | 63.9771   | 2.2190    | 0.1088  | -65.3791  | 0.6603    | -0.1089 |
| 18    | 58.2939   | 1.9033    | 0.0737  | -59.1281  | 0.9773    | -0.0735 |
| 19    | 54.7516   | 1.6890    | 0.0841  | -55.2003  | 1.1903    | -0.0838 |
| 20    | 53.5808   | 1.5655    | 0.1010  | -53.8069  | 1.3148    | -0.1011 |
| 21    | -327.5436 | 41.3706   | -0.0960 | 238.5238  | -37.7711  | 0.0960  |
| 22    | -240.5054 | 37.8318   | -0.1769 | 159.4247  | -34.2313  | 0.1770  |
| 23    | -165.2254 | 34.4190   | -0.2708 | 91.8279   | -30.8188  | 0.2705  |
| 24    | -101.3591 | 31.1534   | -0.2602 | 35.3114   | -27.5532  | 0.2604  |
| 25    | -48.4051  | 28.0469   | -0.2460 | -10.6533  | -24.4467  | 0.2462  |
| 26    | -5.7141   | 25.1135   | -0.2269 | -46.7399  | -21.5136  | 0.2271  |
| 27    | 27.5022   | 22.3714   | -0.1941 | -73.7819  | -18.7718  | 0.1942  |
| 28    | 52.1697   | 19.8227   | -0.1874 | -92.7197  | -16.2230  | 0.1880  |
| 29    | 69.3117   | 17.4812   | -0.1523 | -104.5985 | -13.8806  | 0.1530  |
| 30    | 80.0224   | 15.3464   | -0.0962 | -110.5043 | -11.7460  | 0.0971  |
| 31    | 85.4442   | 13.4276   | -0.1307 | -111.6012 | -9.8283   | 0.1302  |
| 32    | 86.7532   | 11.7208   | -0.0399 | -109.0755 | -8.1207   | 0.0400  |
| 33    | 85.1211   | 10.2325   | -0.0554 | -104.0951 | -6.6324   | 0.0552  |
| 34    | 81.7098   | 8.9533    | -0.0662 | -97.8049  | -5.3533   | 0.0661  |
| 35    | 77.6235   | 7.8796    | -0.0258 | -91.3013  | -4.2798   | 0.0252  |
| 36    | 73.8990   | 7.0044    | 0.0043  | -85.6068  | -3.4048   | -0.0043 |
| 37    | 71.4802   | 6.3174    | -0.0381 | -81.6451  | -2.7165   | 0.0379  |
| 38    | 71.1939   | 5.8082    | 0.0132  | -80.2124  | -2.2089   | -0.0134 |
| 39    | 73.7269   | 5.4640    | -0.0244 | -81.9712  | -1.8634   | 0.0244  |
| 40    | 79.6145   | 5.2677    | 0.0178  | -87.4165  | -1.6674   | -0.0178 |
| 41    | -367.0824 | 42.4938   | -0.0527 | 275.5456  | -38.8947  | 0.0531  |
| 42    | -277.5797 | 38.9572   | -0.1466 | 193.9758  | -35.3571  | 0.1468  |
| 43    | -199.9156 | 35.5504   | -0.2074 | 123.9570  | -31.9494  | 0.2073  |
| 44    | -133.6900 | 32.2900   | -0.2309 | 65.0938   | -28.6902  | 0.2314  |
| 45    | -78.4218  | 29.1915   | -0.2161 | 16.7946   | -25.5918  | 0.2155  |
| 46    | -33.4113  | 26.2726   | -0.2161 | -21.6466  | -22.6730  | 0.2154  |
| 47    | 2.1571    | 23.5393   | -0.2007 | -51.0751  | -19.9388  | 0.2012  |
| 48    | 29.2204   | 21.0031   | -0.1813 | -72.4193  | -17.4039  | 0.1818  |
| 49    | 48.7959   | 18.6707   | -0.1547 | -86.7581  | -15.0704  | 0.1543  |
| 50    | 61.9911   | 16.5472   | -0.1492 | -95.1742  | -12.9469  | 0.1493  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 51    | 69.9525   | 14.6376   | -0.0983 | -98.8375  | -11.0376  | 0.0982  |
| 52    | 73.8547   | 12.9426   | -0.1011 | -98.9241  | -9.3426   | 0.1011  |
| 53    | 74.8723   | 11.4618   | -0.0563 | -96.6089  | -7.8620   | 0.0561  |
| 54    | 74.1595   | 10.1917   | -0.0436 | -93.0438  | -6.5910   | 0.0430  |
| 55    | 72.8204   | 9.1261    | -0.0405 | -89.3016  | -5.5266   | 0.0407  |
| 56    | 71.8851   | 8.2582    | -0.0583 | -86.4144  | -4.6587   | 0.0582  |
| 57    | 72.2915   | 7.5787    | -0.0207 | -85.2963  | -3.9772   | 0.0208  |
| 58    | 74.8569   | 7.0743    | -0.0439 | -86.7219  | -3.4751   | 0.0439  |
| 59    | 80.2540   | 6.7331    | -0.0276 | -91.3534  | -3.1329   | 0.0276  |
| 60    | 89.0115   | 6.5392    | 0.0194  | -99.6746  | -2.9392   | -0.0194 |
| 61    | -377.8885 | 42.7804   | 0.0386  | 285.6826  | -39.1804  | -0.0386 |
| 62    | -287.7227 | 39.2423   | -0.1354 | 203.4824  | -35.6426  | 0.1354  |
| 63    | -209.4358 | 35.8374   | -0.2007 | 132.8364  | -32.2367  | 0.2003  |
| 64    | -142.5896 | 32.5762   | -0.2284 | 73.3527   | -28.9767  | 0.2287  |
| 65    | -86.7046  | 29.4787   | -0.2153 | 24.4342   | -25.8792  | 0.2156  |
| 66    | -41.0783  | 26.5565   | -0.2098 | -14.6313  | -22.9560  | 0.2097  |
| 67    | -4.8854   | 23.8235   | -0.1934 | -44.6709  | -20.2232  | 0.1938  |
| 68    | 22.7949   | 21.2885   | -0.1856 | -66.6473  | -17.6883  | 0.1861  |
| 69    | 43.0011   | 18.9583   | -0.1612 | -81.5984  | -15.3593  | 0.1615  |
| 70    | 56.8311   | 16.8391   | -0.1315 | -90.6677  | -13.2391  | 0.1314  |
| 71    | 65.4422   | 14.9309   | -0.0848 | -94.9873  | -11.3311  | 0.0848  |
| 72    | 70.0031   | 13.2383   | -0.0943 | -95.7383  | -9.6385   | 0.0937  |
| 73    | 71.6866   | 11.7597   | -0.0754 | -94.0988  | -8.1589   | 0.0745  |
| 74    | 71.6450   | 10.4902   | -0.0402 | -91.1992  | -6.8896   | 0.0405  |
| 75    | 70.9801   | 9.4255    | -0.0650 | -88.1302  | -5.8272   | 0.0645  |
| 76    | 70.7218   | 8.5578    | -0.0502 | -85.9305  | -4.9562   | 0.0503  |
| 77    | 71.8039   | 7.8774    | -0.0274 | -85.4762  | -4.2783   | 0.0275  |
| 78    | 75.0444   | 7.3740    | -0.0678 | -87.5862  | -3.7737   | 0.0676  |
| 79    | 81.1188   | 7.0325    | -0.0271 | -92.8928  | -3.4324   | 0.0272  |
| 80    | 90.5518   | 6.8384    | 0.0200  | -101.8876 | -3.2385   | -0.0200 |
| 81    | -380.5798 | 42.7875   | -0.0119 | 288.3606  | -39.1876  | 0.0116  |
| 82    | -290.4008 | 39.2506   | -0.1086 | 206.1180  | -35.6497  | 0.1087  |
| 83    | -212.0735 | 35.8437   | -0.1595 | 135.4827  | -32.2441  | 0.1592  |
| 84    | -145.2316 | 32.5848   | -0.2367 | 75.9761   | -28.9854  | 0.2365  |
| 85    | -89.3251  | 29.4900   | -0.2005 | 27.0129   | -25.8894  | 0.2007  |
| 86    | -43.6597  | 26.5669   | -0.2181 | -12.0545  | -22.9677  | 0.2189  |
| 87    | -7.4544   | 23.8358   | -0.2069 | -42.1319  | -20.2354  | 0.2070  |
| 88    | 20.2579   | 21.3007   | -0.1721 | -64.1372  | -17.7006  | 0.1716  |
| 89    | 40.4888   | 18.9692   | -0.1377 | -79.1208  | -15.3692  | 0.1373  |
| 90    | 54.3452   | 16.8483   | -0.1396 | -88.2036  | -13.2484  | 0.1394  |
| 91    | 62.9772   | 14.9400   | -0.1382 | -92.5411  | -11.3400  | 0.1379  |
| 92    | 67.5605   | 13.2495   | -0.0682 | -93.3266  | -9.6488   | 0.0690  |
| 93    | 69.2738   | 11.7702   | -0.1092 | -91.7069  | -8.1705   | 0.1094  |
| 94    | 69.2625   | 10.5012   | -0.0709 | -88.8378  | -6.9017   | 0.0708  |
| 95    | 68.6266   | 9.4362    | -0.0613 | -85.8105  | -5.8357   | 0.0617  |
| 96    | 68.3965   | 8.5684    | -0.0606 | -83.6237  | -4.9691   | 0.0606  |
| 97    | 69.5050   | 7.8882    | -0.0544 | -83.2049  | -4.2879   | 0.0544  |
| 98    | 72.7717   | 7.3842    | -0.0460 | -85.3399  | -3.7829   | 0.0460  |
| 99    | 78.8726   | 7.0432    | -0.0650 | -90.6671  | -3.4441   | 0.0650  |
| 100   | 88.3274   | 6.8489    | 0.0123  | -99.6872  | -3.2490   | -0.0124 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| 101   | -377.8851 | 42.4481   | -0.0566 | 286.4301 | -38.8482  | 0.0565  |
| 102   | -288.4702 | 38.9106   | -0.0514 | 204.9737 | -35.3108  | 0.0519  |
| 103   | -210.9272 | 35.5048   | -0.1727 | 135.0976 | -31.9052  | 0.1726  |
| 104   | -144.8455 | 32.2468   | -0.2116 | 76.3301  | -28.6461  | 0.2117  |
| 105   | -89.6824  | 29.1500   | -0.1962 | 28.1358  | -25.5493  | 0.1956  |
| 106   | -44.7832  | 26.2292   | -0.2036 | -10.1898 | -22.6288  | 0.2036  |
| 107   | -9.3274   | 23.4961   | -0.1930 | -39.4790 | -19.8969  | 0.1940  |
| 108   | 17.6116   | 20.9605   | -0.1749 | -60.7220 | -17.3603  | 0.1751  |
| 109   | 37.0785   | 18.6305   | -0.1675 | -74.9521 | -15.0303  | 0.1667  |
| 110   | 50.1798   | 16.5124   | -0.1229 | -83.2841 | -12.9124  | 0.1237  |
| 111   | 58.0612   | 14.6046   | -0.1232 | -86.8730 | -11.0046  | 0.1235  |
| 112   | 61.8961   | 12.9111   | -0.0815 | -86.8948 | -9.3113   | 0.0819  |
| 113   | 62.8552   | 11.4332   | -0.0917 | -84.5275 | -7.8334   | 0.0913  |
| 114   | 62.0952   | 10.1645   | -0.0592 | -80.9136 | -6.5649   | 0.0595  |
| 115   | 60.7179   | 9.1020    | -0.0558 | -77.1493 | -5.5014   | 0.0556  |
| 116   | 59.7533   | 8.2353    | -0.0580 | -74.2318 | -4.6359   | 0.0577  |
| 117   | 60.1359   | 7.5577    | -0.0771 | -73.0882 | -3.9583   | 0.0770  |
| 118   | 62.6777   | 7.0543    | -0.0697 | -74.5004 | -3.4539   | 0.0697  |
| 119   | 68.0517   | 6.7140    | -0.0386 | -79.1087 | -3.1138   | 0.0385  |
| 120   | 76.7805   | 6.5204    | -0.0486 | -87.4013 | -2.9203   | 0.0486  |
| 121   | -367.0961 | 41.3224   | -0.0488 | 278.1708 | -37.7224  | 0.0487  |
| 122   | -280.2156 | 37.7848   | -0.0483 | 199.2496 | -34.1848  | 0.0482  |
| 123   | -205.2139 | 34.3815   | -0.1661 | 131.9098 | -30.7817  | 0.1662  |
| 124   | -141.6692 | 31.1262   | -0.1542 | 75.6883  | -27.5263  | 0.1529  |
| 125   | -89.0420  | 28.0339   | -0.1657 | 30.0028  | -24.4331  | 0.1653  |
| 126   | -46.6388  | 25.1208   | -0.1775 | -5.8398  | -21.5202  | 0.1767  |
| 127   | -13.6505  | 22.3949   | -0.1651 | -32.6705 | -18.7965  | 0.1648  |
| 128   | 10.8613   | 19.8701   | -0.1398 | -51.5210 | -16.2697  | 0.1411  |
| 129   | 27.9574   | 17.5489   | -0.1351 | -63.3951 | -13.9485  | 0.1353  |
| 130   | 38.7341   | 15.4387   | -0.1145 | -69.4163 | -11.8395  | 0.1141  |
| 131   | 44.3449   | 13.5438   | -0.0792 | -70.7762 | -9.9426   | 0.0795  |
| 132   | 45.9727   | 11.8627   | -0.0917 | -68.6090 | -8.2637   | 0.0913  |
| 133   | 44.7892   | 10.3969   | -0.0807 | -64.1342 | -6.7969   | 0.0804  |
| 134   | 41.9435   | 9.1405    | -0.0749 | -58.4644 | -5.5394   | 0.0746  |
| 135   | 38.5280   | 8.0890    | -0.0776 | -52.6786 | -4.4892   | 0.0776  |
| 136   | 35.5653   | 7.2348    | -0.0700 | -47.7924 | -3.6352   | 0.0703  |
| 137   | 33.9725   | 6.5672    | -0.0909 | -44.6987 | -2.9675   | 0.0909  |
| 138   | 34.5480   | 6.0730    | -0.0941 | -44.1636 | -2.4723   | 0.0940  |
| 139   | 37.9347   | 5.7393    | -0.0957 | -46.7974 | -2.1398   | 0.0958  |
| 140   | 44.6231   | 5.5509    | -0.0891 | -53.0629 | -1.9504   | 0.0891  |
| 141   | -327.5775 | 37.9004   | 0.0208  | 261.9615 | -35.0211  | -0.0207 |
| 142   | -263.3270 | 35.0606   | -0.0887 | 202.8008 | -32.1802  | 0.0889  |
| 143   | -206.7917 | 32.3037   | 0.0038  | 151.2476 | -29.4244  | -0.0036 |
| 144   | -157.8286 | 29.6394   | -0.1189 | 107.0452 | -26.7580  | 0.1186  |
| 145   | -116.1601 | 27.0752   | -0.1030 | 70.0287  | -24.1960  | 0.1028  |
| 146   | -81.5425  | 24.6222   | -0.1240 | 39.8117  | -21.7420  | 0.1231  |
| 147   | -53.5515  | 22.2881   | -0.1127 | 16.0243  | -19.4079  | 0.1126  |
| 148   | -31.7460  | 20.0773   | -0.1084 | -1.7902  | -17.1983  | 0.1083  |
| 149   | -15.6087  | 18.0030   | -0.1041 | -14.2058 | -15.1230  | 0.1045  |
| 150   | -4.5372   | 16.0689   | -0.0998 | -21.7960 | -13.1889  | 0.0997  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 2.1073   | 14.2823   | -0.0898 | -25.2324 | -11.4013  | 0.0900  |
| 152   | 5.0287   | 12.6493   | -0.0870 | -25.2035 | -9.7695   | 0.0870  |
| 153   | 4.9765   | 11.1727   | -0.0921 | -22.4963 | -8.2929   | 0.0916  |
| 154   | 2.7451   | 9.8609    | -0.0942 | -17.9036 | -6.9811   | 0.0950  |
| 155   | -0.8252  | 8.7164    | -0.0944 | -12.2706 | -5.8368   | 0.0947  |
| 156   | -4.8665  | 7.7402    | -0.1095 | -6.4771  | -4.8595   | 0.1097  |
| 157   | -8.4839  | 6.9386    | -0.1238 | -1.4129  | -4.0590   | 0.1237  |
| 158   | -10.7541 | 6.3120    | -0.1352 | 1.9841   | -3.4314   | 0.1350  |
| 159   | -10.7364 | 5.8620    | -0.1484 | 2.7765   | -2.9825   | 0.1484  |
| 160   | -7.4731  | 5.5914    | -0.1592 | 0.0000   | -2.7109   | 0.1592  |
| 161   | -5.2968  | 2.7890    | 0.0000  | 0.0000   | -2.7890   | 0.0000  |
| 162   | -5.1559  | 2.7148    | 0.0000  | 0.0000   | -2.7148   | 0.0000  |
| 163   | -6.6566  | 3.5038    | 0.0000  | 0.0000   | -3.5038   | 0.0000  |
| 164   | -6.6673  | 3.5092    | 0.0000  | 0.0000   | -3.5092   | 0.0000  |
| 165   | -11.0818 | 5.8325    | 0.0000  | 0.0000   | -5.8325   | 0.0000  |
| 166   | -11.0824 | 5.8306    | 0.0000  | 0.0000   | -5.8306   | 0.0000  |
| 167   | -12.5889 | 6.6253    | 0.0000  | 0.0000   | -6.6253   | 0.0000  |
| 168   | -12.6139 | 6.6388    | 0.0000  | 0.0000   | -6.6388   | 0.0000  |
| 169   | -12.8684 | 6.7721    | 0.0000  | 0.0000   | -6.7721   | 0.0000  |
| 170   | -12.8828 | 6.7802    | 0.0000  | 0.0000   | -6.7802   | 0.0000  |
| 171   | -12.6044 | 6.6348    | 0.0000  | 0.0000   | -6.6348   | 0.0000  |
| 172   | -12.5950 | 6.6299    | 0.0000  | 0.0000   | -6.6299   | 0.0000  |
| 173   | -11.0742 | 5.8304    | 0.0000  | 0.0000   | -5.8304   | 0.0000  |
| 174   | -11.0858 | 5.8324    | 0.0000  | 0.0000   | -5.8324   | 0.0000  |
| 175   | -6.6639  | 3.5078    | 0.0000  | 0.0000   | -3.5078   | 0.0000  |
| 176   | -6.6729  | 3.5102    | 0.0000  | 0.0000   | -3.5102   | 0.0000  |
| 177   | -5.3076  | 2.7935    | 0.0000  | 0.0000   | -2.7935   | 0.0000  |
| 178   | -5.1452  | 2.7082    | 0.0000  | 0.0000   | -2.7082   | 0.0000  |

ENVOLVENTE DE MIN. CORTANTES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| 1     | 0.0000    | -2.7138   | 0.1376  | 7.4745   | 5.5935    | -0.1373 |
| 2     | -2.7776   | -2.9832   | 0.1284  | 10.7383  | 5.8629    | -0.1281 |
| 3     | -1.9858   | -3.4316   | 0.1129  | 10.7577  | 6.3123    | -0.1125 |
| 4     | 1.4090    | -4.0576   | 0.0986  | 8.4854   | 6.9370    | -0.0986 |
| 5     | 6.4705    | -4.8605   | 0.0844  | 4.8679   | 7.7399    | -0.0842 |
| 6     | 12.2735   | -5.8364   | 0.0725  | 0.8258   | 8.7168    | -0.0730 |
| 7     | 17.9072   | -6.9814   | 0.0619  | -2.7453  | 9.8618    | -0.0622 |
| 8     | 22.4986   | -8.2914   | 0.0676  | -4.9793  | 11.1715   | -0.0671 |
| 9     | 25.2044   | -9.7671   | 0.0565  | -5.0372  | 12.6462   | -0.0557 |
| 10    | 25.2452   | -11.4007  | 0.0684  | -2.1221  | 14.2818   | -0.0686 |
| 11    | 21.8078   | -13.1891  | 0.0725  | 4.5147   | 16.0680   | -0.0729 |
| 12    | 14.2319   | -15.1220  | 0.0814  | 15.5770  | 18.0018   | -0.0807 |
| 13    | 1.8303    | -17.1953  | 0.0895  | 31.7127  | 20.0752   | -0.0897 |
| 14    | -15.9861  | -19.4041  | 0.0884  | 53.5163  | 22.2849   | -0.0886 |
| 15    | -39.7793  | -21.7405  | 0.0856  | 81.4971  | 24.6200   | -0.0857 |
| 16    | -69.9768  | -24.1955  | 0.1218  | 116.1346 | 27.0763   | -0.1217 |
| 17    | -107.0249 | -26.7597  | 0.0060  | 157.7718 | 29.6390   | -0.0058 |
| 18    | -151.1883 | -29.4238  | 0.0681  | 206.7544 | 32.3044   | -0.0682 |
| 19    | -202.7660 | -32.1806  | 0.0039  | 263.2679 | 35.0599   | -0.0037 |
| 20    | -261.9035 | -35.0208  | -0.1085 | 327.5397 | 37.9011   | 0.1086  |
| 21    | 53.0323   | -1.9476   | 0.0873  | -44.6009 | 5.5471    | -0.0874 |
| 22    | 46.7759   | -2.1360   | 0.0935  | -37.9180 | 5.7365    | -0.0934 |
| 23    | 44.1480   | -2.4695   | 0.1076  | -34.5405 | 6.0697    | -0.1076 |
| 24    | 44.6944   | -2.9634   | 0.0920  | -33.9754 | 6.5636    | -0.0920 |
| 25    | 47.7979   | -3.6320   | 0.0701  | -35.5743 | 7.2322    | -0.0702 |
| 26    | 52.6885   | -4.4875   | 0.0766  | -38.5417 | 8.0874    | -0.0766 |
| 27    | 58.4695   | -5.5400   | 0.0934  | -41.9565 | 9.1396    | -0.0933 |
| 28    | 64.1409   | -6.7965   | 0.0819  | -44.8006 | 10.3962   | -0.0824 |
| 29    | 68.6234   | -8.2608   | 0.0910  | -45.9800 | 11.8614   | -0.0901 |
| 30    | 70.7692   | -9.9434   | 0.1261  | -44.3423 | 13.5438   | -0.1254 |
| 31    | 69.4061   | -11.8393  | 0.1048  | -38.7235 | 15.4386   | -0.1048 |
| 32    | 63.3761   | -13.9486  | 0.1580  | -27.9397 | 17.5487   | -0.1578 |
| 33    | 51.4964   | -16.2685  | 0.1696  | -10.8420 | 19.8686   | -0.1695 |
| 34    | 32.6576   | -18.7912  | 0.1782  | 13.6753  | 22.3912   | -0.1781 |
| 35    | 5.8071    | -21.5163  | 0.1867  | 46.6515  | 25.1161   | -0.1872 |
| 36    | -30.0194  | -24.4292  | 0.1805  | 89.0272  | 28.0288   | -0.1806 |
| 37    | -75.6687  | -27.5201  | 0.2170  | 141.6548 | 31.1210   | -0.2174 |
| 38    | -131.8964 | -30.7769  | 0.1062  | 205.1786 | 34.3762   | -0.1061 |
| 39    | -199.2121 | -34.1796  | 0.1707  | 280.1800 | 37.7802   | -0.1709 |
| 40    | -278.1340 | -37.7177  | 0.0002  | 367.0558 | 41.3180   | -0.0001 |
| 41    | 87.4098   | -2.9217   | 0.0336  | -76.7897 | 6.5208    | -0.0336 |
| 42    | 79.1153   | -3.1143   | 0.0512  | -68.0570 | 6.7144    | -0.0514 |
| 43    | 74.5042   | -3.4538   | 0.0626  | -62.6774 | 7.0548    | -0.0628 |
| 44    | 73.0868   | -3.9580   | 0.0645  | -60.1326 | 7.5578    | -0.0645 |
| 45    | 74.2286   | -4.6367   | 0.0430  | -59.7466 | 8.2364    | -0.0429 |
| 46    | 77.1355   | -5.5036   | 0.0654  | -60.7044 | 9.1032    | -0.0656 |
| 47    | 80.9029   | -6.5656   | 0.0745  | -62.0769 | 10.1661   | -0.0742 |
| 48    | 84.5038   | -7.8351   | 0.0820  | -62.8321 | 11.4343   | -0.0823 |
| 49    | 86.8729   | -9.3123   | 0.0991  | -61.8697 | 12.9126   | -0.0987 |
| 50    | 86.8465   | -11.0028  | 0.0895  | -58.0371 | 14.6031   | -0.0896 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| 51    | 83.2583   | -12.9106  | 0.1309  | -50.1589 | 16.5106   | -0.1297 |
| 52    | 74.9300   | -15.0305  | 0.1328  | -37.0610 | 18.6305   | -0.1324 |
| 53    | 60.7023   | -17.3618  | 0.1693  | -17.5923 | 20.9616   | -0.1685 |
| 54    | 39.4691   | -19.8962  | 0.1909  | 9.3582   | 23.4969   | -0.1901 |
| 55    | 10.1556   | -22.6281  | 0.2060  | 44.7998  | 26.2276   | -0.2063 |
| 56    | -28.1556  | -25.5488  | 0.2202  | 89.6838  | 29.1483   | -0.2195 |
| 57    | -76.3253  | -28.6441  | 0.1752  | 144.8548 | 32.2456   | -0.1750 |
| 58    | -135.1046 | -31.9047  | 0.1964  | 210.9243 | 35.5039   | -0.1957 |
| 59    | -204.9688 | -35.3100  | 0.1314  | 288.4710 | 38.9102   | -0.1313 |
| 60    | -286.4302 | -38.8483  | -0.0450 | 377.8879 | 42.4483   | 0.0449  |
| 61    | 99.6735   | -3.2503   | -0.0134 | -88.3104 | 6.8503    | 0.0134  |
| 62    | 90.6506   | -3.4444   | 0.0331  | -78.8518 | 7.0441    | -0.0332 |
| 63    | 85.3197   | -3.7842   | 0.0491  | -72.7516 | 7.3849    | -0.0490 |
| 64    | 83.1859   | -4.2887   | 0.0561  | -69.4888 | 7.8882    | -0.0561 |
| 65    | 83.6116   | -4.9681   | 0.0367  | -68.3864 | 8.5676    | -0.0367 |
| 66    | 85.8070   | -5.8352   | 0.0420  | -68.6252 | 9.4357    | -0.0422 |
| 67    | 88.8484   | -6.9011   | 0.0770  | -69.2699 | 10.5014   | -0.0770 |
| 68    | 91.7249   | -8.1712   | 0.0636  | -69.2881 | 11.7714   | -0.0644 |
| 69    | 93.3374   | -9.6511   | 0.0728  | -67.5805 | 13.2501   | -0.0728 |
| 70    | 92.5671   | -11.3438  | 0.0914  | -62.9935 | 14.9438   | -0.0917 |
| 71    | 88.2209   | -13.2508  | 0.1402  | -54.3586 | 16.8506   | -0.1404 |
| 72    | 79.1327   | -15.3705  | 0.1461  | -40.4995 | 18.9703   | -0.1451 |
| 73    | 64.1478   | -17.7001  | 0.1689  | -20.2601 | 21.3009   | -0.1690 |
| 74    | 42.1314   | -20.2360  | 0.2012  | 7.4590   | 23.8366   | -0.2009 |
| 75    | 12.0441   | -22.9678  | 0.2170  | 43.6577  | 26.5661   | -0.2164 |
| 76    | -27.0093  | -25.8865  | 0.2159  | 89.3324  | 29.4881   | -0.2159 |
| 77    | -75.9869  | -28.9854  | 0.1848  | 145.2363 | 32.5845   | -0.1855 |
| 78    | -135.4872 | -32.2434  | 0.2369  | 212.0921 | 35.8437   | -0.2369 |
| 79    | -206.1380 | -35.6497  | 0.1135  | 290.4016 | 39.2498   | -0.1131 |
| 80    | -288.3614 | -39.1867  | -0.0645 | 380.5799 | 42.7866   | 0.0642  |
| 81    | 101.8872  | -3.2382   | -0.0023 | -90.5524 | 6.8381    | 0.0024  |
| 82    | 92.8931   | -3.4316   | 0.0198  | -81.1184 | 7.0325    | -0.0195 |
| 83    | 87.5859   | -3.7738   | 0.0293  | -75.0466 | 7.3734    | -0.0289 |
| 84    | 85.4795   | -4.2773   | 0.0650  | -71.8082 | 7.8767    | -0.0650 |
| 85    | 85.9332   | -4.9558   | 0.0233  | -70.7292 | 8.5564    | -0.0234 |
| 86    | 88.1433   | -5.8258   | 0.0776  | -70.9903 | 9.4250    | -0.0779 |
| 87    | 91.2127   | -6.8887   | 0.0372  | -71.6600 | 10.4891   | -0.0379 |
| 88    | 94.1135   | -8.1583   | 0.0722  | -71.7056 | 11.7584   | -0.0717 |
| 89    | 95.7596   | -9.6387   | 0.1202  | -70.0243 | 13.2387   | -0.1206 |
| 90    | 95.0105   | -11.3336  | 0.1191  | -65.4601 | 14.9335   | -0.1199 |
| 91    | 90.6858   | -13.2437  | 0.1145  | -56.8387 | 16.8437   | -0.1144 |
| 92    | 81.6146   | -15.3609  | 0.1862  | -42.9919 | 18.9616   | -0.1863 |
| 93    | 66.6269   | -17.6916  | 0.1758  | -22.7769 | 21.2913   | -0.1765 |
| 94    | 44.6405   | -20.2268  | 0.2050  | 4.9122   | 23.8263   | -0.2042 |
| 95    | 14.6011   | -22.9569  | 0.2212  | 41.1101  | 26.5574   | -0.2208 |
| 96    | -24.4722  | -25.8767  | 0.2280  | 86.7326  | 29.4760   | -0.2281 |
| 97    | -73.3816  | -28.9725  | 0.2145  | 142.6271 | 32.5728   | -0.2144 |
| 98    | -132.8748 | -32.2302  | 0.1781  | 209.4710 | 35.8315   | -0.1779 |
| 99    | -203.5200 | -35.6386  | 0.1989  | 287.7339 | 39.2377   | -0.1988 |
| 100   | -285.6935 | -39.1750  | -0.0735 | 377.8842 | 42.7749   | 0.0735  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | 99.6876   | -2.9410   | 0.0140  | -89.0222  | 6.5409    | -0.0140 |
| 102   | 91.3626   | -3.1352   | 0.0030  | -80.2599  | 6.7350    | -0.0028 |
| 103   | 86.7269   | -3.4761   | 0.0408  | -74.8571  | 7.0757    | -0.0409 |
| 104   | 85.2926   | -3.9795   | 0.0525  | -72.2871  | 7.5802    | -0.0525 |
| 105   | 86.4123   | -4.6589   | 0.0315  | -71.8769  | 8.2596    | -0.0318 |
| 106   | 89.2962   | -5.5278   | 0.0630  | -72.8069  | 9.1282    | -0.0629 |
| 107   | 93.0225   | -6.5936   | 0.0727  | -74.1441  | 10.1928   | -0.0733 |
| 108   | 96.5955   | -7.8630   | 0.0891  | -74.8512  | 11.4632   | -0.0888 |
| 109   | 98.9027   | -9.3435   | 0.0766  | -73.8296  | 12.9437   | -0.0760 |
| 110   | 98.8093   | -11.0370  | 0.1243  | -69.9242  | 14.6370   | -0.1241 |
| 111   | 95.1470   | -12.9455  | 0.1220  | -61.9694  | 16.5455   | -0.1214 |
| 112   | 86.7344   | -15.0711  | 0.1711  | -48.7782  | 18.6709   | -0.1707 |
| 113   | 72.4084   | -17.4011  | 0.1776  | -29.2067  | 21.0009   | -0.1774 |
| 114   | 51.0622   | -19.9406  | 0.2132  | -2.1518   | 23.5402   | -0.2134 |
| 115   | 21.6512   | -22.6725  | 0.2342  | 33.4226   | 26.2731   | -0.2344 |
| 116   | -16.8051  | -25.5961  | 0.2430  | 78.4332   | 29.1955   | -0.2423 |
| 117   | -65.1053  | -28.6911  | 0.2569  | 133.6971  | 32.2905   | -0.2575 |
| 118   | -123.9616 | -31.9498  | 0.2236  | 199.9081  | 35.5502   | -0.2231 |
| 119   | -193.9639 | -35.3561  | 0.1084  | 277.5704  | 38.9563   | -0.1080 |
| 120   | -275.5344 | -38.8942  | 0.1104  | 367.1009  | 42.4943   | -0.1101 |
| 121   | 87.4106   | -1.6685   | -0.0124 | -79.6074  | 5.2685    | 0.0125  |
| 122   | 81.9627   | -1.8646   | -0.0222 | -73.7174  | 5.4646    | 0.0226  |
| 123   | 80.2015   | -2.2091   | 0.0118  | -71.1825  | 5.8089    | -0.0118 |
| 124   | 81.6291   | -2.7174   | -0.0063 | -71.4664  | 6.3173    | 0.0064  |
| 125   | 85.5953   | -3.4025   | -0.0003 | -73.8860  | 7.0033    | 0.0006  |
| 126   | 91.2945   | -4.2774   | 0.0344  | -77.6172  | 7.8780    | -0.0350 |
| 127   | 97.7944   | -5.3517   | 0.0124  | -81.7129  | 8.9501    | -0.0122 |
| 128   | 104.1061  | -6.6291   | 0.0620  | -85.1383  | 10.2295   | -0.0619 |
| 129   | 109.1034  | -8.1193   | 0.0531  | -86.7807  | 11.7197   | -0.0526 |
| 130   | 111.6379  | -9.8266   | 0.0732  | -85.4850  | 13.4258   | -0.0735 |
| 131   | 110.5587  | -11.7469  | 0.1400  | -80.0683  | 15.3481   | -0.1400 |
| 132   | 104.6376  | -13.8829  | 0.1390  | -69.3643  | 17.4819   | -0.1392 |
| 133   | 92.7767   | -16.2265  | 0.1719  | -52.2172  | 19.8265   | -0.1731 |
| 134   | 73.8373   | -18.7735  | 0.2029  | -27.5344  | 22.3746   | -0.2042 |
| 135   | 46.7751   | -21.5213  | 0.2270  | 5.6944    | 25.1211   | -0.2268 |
| 136   | 10.6718   | -24.4521  | 0.2427  | 48.3909   | 28.0517   | -0.2425 |
| 137   | -35.2996  | -27.5600  | 0.2573  | 101.3519  | 31.1597   | -0.2577 |
| 138   | -91.8227  | -30.8249  | 0.2368  | 165.2425  | 34.4256   | -0.2368 |
| 139   | -159.4449 | -34.2361  | 0.1978  | 240.5121  | 37.8356   | -0.1978 |
| 140   | -238.5309 | -37.7760  | 0.1188  | 327.5871  | 41.3765   | -0.1188 |
| 141   | 53.8403   | 1.3119    | -0.0808 | -53.6100  | 1.5674    | 0.0809  |
| 142   | 55.2297   | 1.1896    | -0.0629 | -54.7788  | 1.6908    | 0.0629  |
| 143   | 59.1555   | 0.9740    | -0.0980 | -58.3165  | 1.9053    | 0.0980  |
| 144   | 65.4058   | 0.6589    | -0.0572 | -63.9993  | 2.2225    | 0.0572  |
| 145   | 73.6891   | 0.2296    | -0.0743 | -71.5116  | 2.6496    | 0.0744  |
| 146   | 83.6407   | -0.3139   | -0.0564 | -80.4830  | 3.1941    | 0.0565  |
| 147   | 94.8222   | -0.9821   | -0.0703 | -90.4608  | 3.8623    | 0.0710  |
| 148   | 106.7199  | -1.7882   | -0.0489 | -100.9119 | 4.6672    | 0.0485  |
| 149   | 118.7669  | -2.7346   | -0.0108 | -111.2522 | 5.6146    | 0.0120  |
| 150   | 130.3172  | -3.8255   | -0.0189 | -120.8397 | 6.7055    | 0.0183  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|-----------|-----------|---------|
| 151   | 140.6961 | -5.0752   | 0.0309  | -128.9630 | 7.9562    | -0.0307 |
| 152   | 149.1270 | -6.4808   | 0.0823  | -134.8689 | 9.3606    | -0.0827 |
| 153   | 154.8458 | -8.0427   | 0.0852  | -137.7774 | 10.9225   | -0.0854 |
| 154   | 157.0354 | -9.7857   | 0.0830  | -136.8303 | 12.6655   | -0.0830 |
| 155   | 154.8039 | -11.6943  | 0.2029  | -131.1672 | 14.5739   | -0.2024 |
| 156   | 147.2764 | -13.7708  | 0.2745  | -119.8889 | 16.6515   | -0.2737 |
| 157   | 133.5179 | -16.0265  | 0.2311  | -102.0849 | 18.9061   | -0.2311 |
| 158   | 112.6220 | -18.4548  | 0.2831  | -76.8044  | 21.3354   | -0.2835 |
| 159   | 83.6050  | -21.0648  | 0.3196  | -43.1055  | 23.9443   | -0.3189 |
| 160   | 45.5347  | -23.8523  | 0.3412  | 0.0003    | 26.7328   | -0.3411 |
| 161   | 25.5663  | -13.4586  | 0.0000  | 0.0000    | 13.4586   | 0.0000  |
| 162   | 25.2261  | -13.2793  | 0.0000  | 0.0000    | 13.2793   | 0.0000  |
| 163   | 75.2925  | -39.6285  | 0.0000  | 0.0000    | 39.6285   | 0.0000  |
| 164   | 75.3210  | -39.6429  | 0.0000  | 0.0000    | 39.6429   | 0.0000  |
| 165   | 79.6077  | -41.9018  | 0.0000  | 0.0000    | 41.9018   | 0.0000  |
| 166   | 79.6563  | -41.9102  | 0.0000  | 0.0000    | 41.9102   | 0.0000  |
| 167   | 80.9248  | -42.5917  | 0.0000  | 0.0000    | 42.5917   | 0.0000  |
| 168   | 81.0100  | -42.6367  | 0.0000  | 0.0000    | 42.6367   | 0.0000  |
| 169   | 81.2797  | -42.7739  | 0.0000  | 0.0000    | 42.7739   | 0.0000  |
| 170   | 81.3314  | -42.8015  | 0.0000  | 0.0000    | 42.8015   | 0.0000  |
| 171   | 80.9405  | -42.6063  | 0.0000  | 0.0000    | 42.6063   | 0.0000  |
| 172   | 80.9598  | -42.6169  | 0.0000  | 0.0000    | 42.6169   | 0.0000  |
| 173   | 79.5919  | -41.9061  | 0.0000  | 0.0000    | 41.9061   | 0.0000  |
| 174   | 79.6600  | -41.9106  | 0.0000  | 0.0000    | 41.9106   | 0.0000  |
| 175   | 75.3070  | -39.6413  | 0.0000  | 0.0000    | 39.6413   | 0.0000  |
| 176   | 75.3529  | -39.6356  | 0.0000  | 0.0000    | 39.6356   | 0.0000  |
| 177   | 25.5708  | -13.4558  | 0.0000  | 0.0000    | 13.4558   | 0.0000  |
| 178   | 25.2293  | -13.2760  | 0.0000  | 0.0000    | 13.2760   | 0.0000  |

ENVOLVENTE DE MAX. TORSORES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|----------|-----------|-----------|
| 1     | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000    |
| 2     | 1.2149   | -0.0452   | 0.6454   | -1.1335  | 0.0452    | -0.6454   |
| 3     | 4.5345   | -0.1802   | 1.6853   | -4.2101  | 0.1802    | -1.6853   |
| 4     | 9.4810   | -0.4050   | 3.1219   | -8.7521  | 0.4050    | -3.1219   |
| 5     | 15.5719  | -0.7184   | 4.9505   | -14.2792 | 0.7184    | -4.9506   |
| 6     | 22.3329  | -1.1195   | 7.1830   | -20.3177 | 1.1195    | -7.1831   |
| 7     | 29.3135  | -1.6071   | 9.8043   | -26.4207 | 1.6071    | -9.8044   |
| 8     | 36.0483  | -2.1816   | 12.8484  | -32.1215 | 2.1816    | -12.8485  |
| 9     | 42.1266  | -2.8392   | 16.2483  | -37.0178 | 2.8392    | -16.2483  |
| 10    | 47.0867  | -3.5784   | 20.0967  | -40.6428 | 3.5784    | -20.0965  |
| 11    | 50.5806  | -4.3957   | 24.3060  | -42.6716 | 4.3957    | -24.3060  |
| 12    | 52.1941  | -5.2886   | 28.9335  | -42.6756 | 5.2886    | -28.9337  |
| 13    | 51.6081  | -6.2551   | 33.9388  | -40.3495 | 6.2551    | -33.9389  |
| 14    | 48.7741  | -7.2824   | 39.3591  | -35.6626 | 7.2824    | -39.3588  |
| 15    | 43.6199  | -8.3543   | 45.1750  | -28.5849 | 8.3543    | -45.1751  |
| 16    | 33.4585  | -9.5672   | 51.3551  | -16.2323 | 9.5672    | -51.3551  |
| 17    | 22.4766  | -10.7443  | 57.9694  | -3.1421  | 10.7443   | -57.9692  |
| 18    | 6.6590   | -12.0275  | 64.9518  | 14.9947  | 12.0275   | -64.9517  |
| 19    | -12.7839 | -13.3580  | 72.3272  | 36.8218  | 13.3580   | -72.3272  |
| 20    | -35.9582 | -14.7340  | 80.0622  | 62.4817  | 14.7340   | -80.0622  |
| 21    | -64.9572 | 1.8448    | 3.8493   | 60.8075  | -1.8448   | -3.8491   |
| 22    | -59.8197 | 1.8142    | 4.4955   | 55.7373  | -1.8142   | -4.4955   |
| 23    | -52.8407 | 1.7203    | 5.5855   | 48.9703  | -1.7203   | -5.5856   |
| 24    | -44.2033 | 1.5536    | 7.1924   | 40.7076  | -1.5536   | -7.1924   |
| 25    | -34.1597 | 1.3070    | 9.3074   | 31.2199  | -1.3070   | -9.3073   |
| 26    | -23.0419 | 0.9726    | 11.9154  | 20.8535  | -0.9726   | -11.9156  |
| 27    | -11.2400 | 0.5451    | 15.0448  | 10.0134  | -0.5451   | -15.0448  |
| 28    | 0.7961   | 0.0190    | 18.6957  | -0.8391  | -0.0190   | -18.6960  |
| 29    | 12.5396  | -0.6086   | 22.8601  | -11.1697 | 0.6086    | -22.8601  |
| 30    | 23.4440  | -1.3421   | 27.5490  | -20.4239 | 1.3421    | -27.5490  |
| 31    | 32.9703  | -2.1825   | 32.7291  | -28.0603 | 2.1825    | -32.7290  |
| 32    | 40.4534  | -3.1306   | 38.4624  | -33.4089 | 3.1306    | -38.4619  |
| 33    | 45.3921  | -4.1836   | 44.6796  | -35.9769 | 4.1836    | -44.6795  |
| 34    | 47.1746  | -5.3432   | 51.4061  | -35.1523 | 5.3432    | -51.4059  |
| 35    | 45.2113  | -6.6051   | 58.6690  | -30.3503 | 6.6051    | -58.6689  |
| 36    | 40.0739  | -7.9221   | 66.4447  | -22.2507 | 7.9221    | -66.4443  |
| 37    | 29.1130  | -9.3886   | 74.6988  | -7.9846  | 9.3886    | -74.6987  |
| 38    | 13.5459  | -10.9211  | 83.4827  | 11.0216  | 10.9211   | -83.4824  |
| 39    | -7.7552  | -12.5487  | 92.7650  | 35.9935  | 12.5487   | -92.7647  |
| 40    | -34.7920 | -14.2485  | 102.5074 | 66.8547  | 14.2485   | -102.5074 |
| 41    | -69.6771 | 1.9781    | 4.8989   | 65.2274  | -1.9781   | -4.8991   |
| 42    | -64.2143 | 1.9473    | 5.5476   | 59.8338  | -1.9473   | -5.5477   |
| 43    | -56.8673 | 1.8502    | 6.6546   | 52.7029  | -1.8502   | -6.6545   |
| 44    | -47.8384 | 1.6808    | 8.2507   | 44.0571  | -1.6808   | -8.2508   |
| 45    | -37.3924 | 1.4297    | 10.3694  | 34.1763  | -1.4297   | -10.3692  |
| 46    | -25.8746 | 1.0902    | 12.9790  | 23.4224  | -1.0902   | -12.9789  |
| 47    | -13.6804 | 0.6568    | 16.1135  | 12.2028  | -0.6568   | -16.1135  |
| 48    | -1.2764  | 0.1254    | 19.7655  | 0.9945   | -0.1254   | -19.7655  |
| 49    | 10.8135  | -0.5082   | 23.9323  | -9.6698  | 0.5082    | -23.9324  |
| 50    | 22.0568  | -1.2474   | 28.6090  | -19.2498 | 1.2474    | -28.6087  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|----------|-----------|-----------|
| 51    | 31.8448  | -2.0936   | 33.8148  | -27.1346 | 2.0936    | -33.8142  |
| 52    | 39.6307  | -3.0477   | 39.5173  | -32.7736 | 3.0477    | -39.5174  |
| 53    | 44.7771  | -4.1077   | 45.7563  | -35.5355 | 4.1077    | -45.7563  |
| 54    | 46.7457  | -5.2724   | 52.5002  | -34.8807 | 5.2724    | -52.5004  |
| 55    | 44.9797  | -6.5408   | 59.7539  | -30.2654 | 6.5408    | -59.7548  |
| 56    | 38.9764  | -7.9073   | 67.5052  | -21.1881 | 7.9073    | -67.5058  |
| 57    | 29.4656  | -9.3179   | 75.7846  | -8.4928  | 9.3179    | -75.7844  |
| 58    | 13.5918  | -10.8715  | 84.5603  | 10.8649  | 10.8715   | -84.5600  |
| 59    | -7.4835  | -12.4952  | 93.8359  | 35.6000  | 12.4952   | -93.8358  |
| 60    | -34.4087 | -14.1963  | 103.5776 | 66.3496  | 14.1963   | -103.5775 |
| 61    | -69.1318 | 1.9613    | 4.9551   | 64.7193  | -1.9613   | -4.9551   |
| 62    | -63.7058 | 1.9299    | 5.5863   | 59.3636  | -1.9299   | -5.5863   |
| 63    | -56.3901 | 1.8333    | 6.6934   | 52.2638  | -1.8333   | -6.6933   |
| 64    | -47.3896 | 1.6634    | 8.2911   | 43.6479  | -1.6634   | -8.2910   |
| 65    | -36.9707 | 1.4136    | 10.4096  | 33.7913  | -1.4136   | -10.4098  |
| 66    | -25.4735 | 1.0737    | 13.0273  | 23.0568  | -1.0737   | -13.0273  |
| 67    | -13.3057 | 0.6396    | 16.1572  | 11.8659  | -0.6396   | -16.1569  |
| 68    | -0.9230  | 0.1078    | 19.8114  | 0.6805   | -0.1078   | -19.8109  |
| 69    | 11.1530  | -0.5285   | 23.9767  | -9.9655  | 0.5285    | -23.9765  |
| 70    | 22.3446  | -1.2677   | 28.6568  | -19.4922 | 1.2677    | -28.6572  |
| 71    | 32.1174  | -2.1165   | 33.8650  | -27.3549 | 2.1165    | -33.8645  |
| 72    | 39.8533  | -3.0705   | 39.5694  | -32.9451 | 3.0705    | -39.5696  |
| 73    | 45.0290  | -4.1386   | 45.7974  | -35.7146 | 4.1386    | -45.7973  |
| 74    | 47.0414  | -5.3253   | 52.5545  | -35.0565 | 5.3253    | -52.5541  |
| 75    | 45.1724  | -6.5932   | 59.7953  | -30.3442 | 6.5932    | -59.7953  |
| 76    | 39.2533  | -7.9590   | 67.5580  | -21.3378 | 7.9590    | -67.5577  |
| 77    | 29.0035  | -9.3961   | 75.8401  | -7.8671  | 9.3961    | -75.8402  |
| 78    | 12.8700  | -10.9522  | 84.6078  | 11.7747  | 10.9522   | -84.6076  |
| 79    | -8.1238  | -12.5460  | 93.8837  | 36.3526  | 12.5460   | -93.8838  |
| 80    | -35.1070 | -14.2335  | 103.6255 | 67.1307  | 14.2335   | -103.6255 |
| 81    | -70.7269 | 2.0085    | 4.9494   | 66.2080  | -2.0085   | -4.9492   |
| 82    | -65.1913 | 1.9767    | 5.5975   | 60.7421  | -1.9767   | -5.5980   |
| 83    | -57.7666 | 1.8796    | 6.7084   | 53.5382  | -1.8796   | -6.7084   |
| 84    | -48.6683 | 1.7097    | 8.2866   | 44.8220  | -1.7097   | -8.2865   |
| 85    | -38.1429 | 1.4581    | 10.4171  | 34.8612  | -1.4581   | -10.4170  |
| 86    | -26.5487 | 1.1184    | 13.0195  | 24.0327  | -1.1184   | -13.0192  |
| 87    | -14.2688 | 0.6845    | 16.1647  | 12.7282  | -0.6845   | -16.1649  |
| 88    | -1.7995  | 0.1522    | 19.8120  | 1.4565   | -0.1522   | -19.8119  |
| 89    | 10.7140  | -0.5034   | 23.9829  | -9.5823  | 0.5034    | -23.9828  |
| 90    | 21.9756  | -1.2434   | 28.6637  | -19.1770 | 1.2434    | -28.6637  |
| 91    | 31.7961  | -2.0908   | 33.8527  | -27.0907 | 2.0908    | -33.8526  |
| 92    | 40.0676  | -3.0933   | 39.5887  | -33.1063 | 3.0933    | -39.5889  |
| 93    | 44.8557  | -4.1171   | 45.7950  | -35.5922 | 4.1171    | -45.7947  |
| 94    | 47.0709  | -5.3301   | 52.5468  | -35.0797 | 5.3301    | -52.5470  |
| 95    | 45.2206  | -6.6111   | 59.8015  | -30.3435 | 6.6111    | -59.8013  |
| 96    | 39.0586  | -7.9926   | 67.5660  | -21.0787 | 7.9926    | -67.5656  |
| 97    | 28.1255  | -9.4361   | 75.8353  | -6.8924  | 9.4361    | -75.8351  |
| 98    | 12.1219  | -10.9705  | 84.6115  | 12.5703  | 10.9705   | -84.6117  |
| 99    | -9.4006  | -12.6144  | 93.8975  | 37.7761  | 12.6144   | -93.8973  |
| 100   | -36.2148 | -14.2525  | 103.6242 | 68.2820  | 14.2525   | -103.6242 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|----------|-----------|-----------|
| 101   | -70.7871 | 2.0103    | 4.9431   | 66.2636  | -2.0103   | -4.9431   |
| 102   | -65.2447 | 1.9789    | 5.6149   | 60.7924  | -1.9789   | -5.6148   |
| 103   | -57.8224 | 1.8815    | 6.7037   | 53.5885  | -1.8815   | -6.7037   |
| 104   | -48.7171 | 1.7120    | 8.2956   | 44.8641  | -1.7120   | -8.2959   |
| 105   | -38.1868 | 1.4601    | 10.4147  | 34.9008  | -1.4601   | -10.4147  |
| 106   | -26.5848 | 1.1199    | 13.0252  | 24.0649  | -1.1199   | -13.0251  |
| 107   | -14.3065 | 0.6855    | 16.1613  | 12.7626  | -0.6855   | -16.1616  |
| 108   | -1.8310  | 0.1541    | 19.8125  | 1.4834   | -0.1541   | -19.8127  |
| 109   | 10.3423  | -0.4808   | 23.9774  | -9.2607  | 0.4808    | -23.9775  |
| 110   | 22.2839  | -1.2651   | 28.6652  | -19.4387 | 1.2651    | -28.6653  |
| 111   | 32.0150  | -2.1090   | 33.8551  | -27.2703 | 2.1090    | -33.8556  |
| 112   | 39.8506  | -3.0746   | 39.5797  | -32.9332 | 3.0746    | -39.5798  |
| 113   | 44.9587  | -4.1357   | 45.7959  | -35.6543 | 4.1357    | -45.7957  |
| 114   | 46.9084  | -5.3122   | 52.5490  | -34.9569 | 5.3122    | -52.5490  |
| 115   | 45.1767  | -6.6190   | 59.8046  | -30.2814 | 6.6190    | -59.8043  |
| 116   | 38.9813  | -7.9990   | 67.5681  | -20.9872 | 7.9990    | -67.5689  |
| 117   | 28.0462  | -9.4456   | 75.8304  | -6.7979  | 9.4456    | -75.8304  |
| 118   | 12.0116  | -10.9823  | 84.6039  | 12.7006  | 10.9823   | -84.6036  |
| 119   | -9.3401  | -12.5754  | 93.8796  | 37.6344  | 12.5754   | -93.8796  |
| 120   | -36.4740 | -14.2791  | 103.6439 | 68.6038  | 14.2791   | -103.6440 |
| 121   | -71.3153 | 2.0387    | 4.9392   | 66.7279  | -2.0387   | -4.9392   |
| 122   | -65.7071 | 2.0080    | 5.6102   | 61.1900  | -2.0080   | -5.6103   |
| 123   | -57.9375 | 1.9009    | 6.6993   | 53.6616  | -1.9009   | -6.6994   |
| 124   | -48.7823 | 1.7290    | 8.3092   | 44.8926  | -1.7290   | -8.3092   |
| 125   | -38.2194 | 1.4746    | 10.4143  | 34.9004  | -1.4746   | -10.4141  |
| 126   | -26.5890 | 1.1317    | 13.0269  | 24.0433  | -1.1317   | -13.0264  |
| 127   | -14.2944 | 0.6933    | 16.1706  | 12.7343  | -0.6933   | -16.1708  |
| 128   | -1.8249  | 0.1564    | 19.8183  | 1.4736   | -0.1564   | -19.8185  |
| 129   | 10.3131  | -0.4828   | 23.9862  | -9.2268  | 0.4828    | -23.9861  |
| 130   | 22.0105  | -1.2595   | 28.6698  | -19.1783 | 1.2595    | -28.6694  |
| 131   | 31.8874  | -2.1275   | 33.8795  | -27.0990 | 2.1275    | -33.8794  |
| 132   | 39.5075  | -3.0879   | 39.5867  | -32.5616 | 3.0879    | -39.5870  |
| 133   | 44.4963  | -4.1592   | 45.8148  | -35.1375 | 4.1592    | -45.8144  |
| 134   | 46.2390  | -5.3344   | 52.5587  | -34.2321 | 5.3344    | -52.5590  |
| 135   | 44.2126  | -6.6183   | 59.8158  | -29.3230 | 6.6183    | -59.8157  |
| 136   | 37.8606  | -8.0051   | 67.5904  | -19.8492 | 8.0051    | -67.5908  |
| 137   | 26.7590  | -9.4720   | 75.8571  | -5.4488  | 9.4720    | -75.8570  |
| 138   | 10.5714  | -11.0016  | 84.6338  | 14.1883  | 11.0016   | -84.6337  |
| 139   | -11.0822 | -12.6316  | 93.9172  | 39.4979  | 12.6316   | -93.9171  |
| 140   | -38.4321 | -14.3353  | 103.6705 | 70.6911  | 14.3353   | -103.6703 |
| 141   | -73.4715 | 2.0414    | 5.9592   | 69.7964  | -2.0414   | -5.9592   |
| 142   | -68.8043 | 2.0128    | 6.5351   | 65.1821  | -2.0128   | -6.5352   |
| 143   | -63.4797 | 1.9600    | 7.5231   | 59.9521  | -1.9600   | -7.5234   |
| 144   | -56.3903 | 1.8441    | 8.8062   | 53.0695  | -1.8441   | -8.8061   |
| 145   | -48.5092 | 1.6859    | 10.5385  | 45.4751  | -1.6859   | -10.5388  |
| 146   | -39.7220 | 1.4733    | 12.6448  | 37.0701  | -1.4733   | -12.6449  |
| 147   | -30.1976 | 1.1998    | 15.1644  | 28.0377  | -1.1998   | -15.1641  |
| 148   | -20.1805 | 0.8642    | 18.0707  | 18.6253  | -0.8642   | -18.0704  |
| 149   | -9.9295  | 0.4623    | 21.3763  | 9.0979   | -0.4623   | -21.3767  |
| 150   | 0.2804   | -0.0116   | 25.0853  | -0.2603  | 0.0116    | -25.0861  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|---------|----------|-----------|----------|
| 151   | 10.8854  | -0.6012   | 29.1952 | -9.8024  | 0.6012    | -29.1949 |
| 152   | 19.9863  | -1.2288   | 33.7065 | -17.7735 | 1.2288    | -33.7065 |
| 153   | 27.8943  | -1.9297   | 38.6078 | -24.4207 | 1.9297    | -38.6081 |
| 154   | 34.3031  | -2.7149   | 43.9033 | -29.4172 | 2.7149    | -43.9036 |
| 155   | 38.7858  | -3.5860   | 49.6238 | -32.3325 | 3.5860    | -49.6234 |
| 156   | 41.1264  | -4.5640   | 55.7325 | -32.9099 | 4.5640    | -55.7329 |
| 157   | 40.2289  | -5.5762   | 62.2075 | -30.1927 | 5.5762    | -62.2079 |
| 158   | 36.2857  | -6.7089   | 69.1038 | -24.2087 | 6.7089    | -69.1038 |
| 159   | 28.7232  | -7.9686   | 76.3939 | -14.3839 | 7.9686    | -76.3938 |
| 160   | 16.7239  | -9.2861   | 84.0725 | -0.0064  | 9.2861    | -84.0725 |
| 161   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 162   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 163   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 164   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 165   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 166   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 167   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 168   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 169   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 170   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 171   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 172   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 173   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 174   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 175   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 176   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 177   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |
| 178   | 0.0000   | 0.0000    | 0.0000  | 0.0000   | 0.0000    | 0.0000   |

ENVOLVENTE DE MIN. TORSORES CON SOBRECARGA UNIFORME

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|----------|-----------|----------|
| 1     | 0.0058   | 9.2239    | -84.0825  | -16.6067 | -9.2239   | 84.0825  |
| 2     | 14.2575  | 7.9188    | -76.4098  | -28.5092 | -7.9188   | 76.4095  |
| 3     | 24.1627  | 6.7027    | -69.1163  | -36.2312 | -6.7027   | 69.1160  |
| 4     | 30.1663  | 5.5751    | -62.2228  | -40.2000 | -5.5751   | 62.2229  |
| 5     | 32.7170  | 4.5368    | -55.7343  | -40.8815 | -4.5368   | 55.7341  |
| 6     | 32.3047  | 3.5823    | -49.6249  | -38.7546 | -3.5823   | 49.6248  |
| 7     | 29.3822  | 2.7157    | -43.9278  | -34.2710 | -2.7157   | 43.9279  |
| 8     | 24.2598  | 1.9175    | -38.6071  | -27.7116 | -1.9175   | 38.6075  |
| 9     | 17.7177  | 1.2256    | -33.7167  | -19.9230 | -1.2256   | 33.7165  |
| 10    | 9.0890   | 0.5561    | -29.1978  | -10.0908 | -0.5561   | 29.1980  |
| 11    | 0.2402   | 0.0108    | -25.0941  | -0.2591  | -0.0108   | 25.0941  |
| 12    | -9.1080  | -0.4632   | -21.3876  | 9.9407   | 0.4632    | 21.3874  |
| 13    | -18.6491 | -0.8647   | -18.0759  | 20.2052  | 0.8647    | 18.0757  |
| 14    | -28.0651 | -1.2001   | -15.1688  | 30.2249  | 1.2001    | 15.1691  |
| 15    | -37.0902 | -1.4720   | -12.6625  | 39.7405  | 1.4720    | 12.6627  |
| 16    | -45.5070 | -1.6844   | -10.5225  | 48.5398  | 1.6844    | 10.5228  |
| 17    | -53.3439 | -1.8515   | -8.8526   | 56.6759  | 1.8515    | 8.8522   |
| 18    | -59.6887 | -1.9499   | -7.4989   | 63.2000  | 1.9499    | 7.4988   |
| 19    | -65.4863 | -2.0206   | -6.5623   | 69.1235  | 2.0206    | 6.5624   |
| 20    | -69.8901 | -2.0427   | -5.9859   | 73.5682  | 2.0427    | 5.9859   |
| 21    | -70.6389 | 14.3313   | -103.6683 | 38.3994  | -14.3313  | 103.6681 |
| 22    | -39.4857 | 12.6303   | -93.9130  | 11.0641  | -12.6303  | 93.9130  |
| 23    | -14.3267 | 11.0334   | -84.6356  | -10.4998 | -11.0334  | 84.6353  |
| 24    | 5.4215   | 9.4804    | -75.8596  | -26.7526 | -9.4804   | 75.8597  |
| 25    | 19.8398  | 8.0136    | -67.5923  | -37.8713 | -8.0136   | 67.5924  |
| 26    | 29.3222  | 6.6149    | -59.8153  | -44.2057 | -6.6149   | 59.8160  |
| 27    | 34.2368  | 5.3308    | -52.5508  | -46.2293 | -5.3308   | 52.5509  |
| 28    | 35.1322  | 4.1587    | -45.8218  | -44.4879 | -4.1587   | 45.8223  |
| 29    | 32.5699  | 3.0901    | -39.5889  | -39.5236 | -3.0901   | 39.5892  |
| 30    | 27.0432  | 2.1198    | -33.8638  | -31.8132 | -2.1198   | 33.8635  |
| 31    | 19.3617  | 1.2757    | -28.6806  | -22.2307 | -1.2757   | 28.6814  |
| 32    | 9.2347   | 0.4827    | -23.9849  | -10.3209 | -0.4827   | 23.9850  |
| 33    | -1.4616  | -0.1570   | -19.8204  | 1.8145   | 0.1570    | 19.8203  |
| 34    | -12.7266 | -0.6945   | -16.1651  | 14.2898  | 0.6945    | 16.1650  |
| 35    | -24.0234 | -1.1322   | -13.0338  | 26.5711  | 1.1322    | 13.0341  |
| 36    | -34.8796 | -1.4751   | -10.4244  | 38.1988  | 1.4751    | 10.4247  |
| 37    | -44.8829 | -1.7294   | -8.2931   | 48.7745  | 1.7294    | 8.2928   |
| 38    | -53.8432 | -1.9078   | -6.7306   | 58.1351  | 1.9078    | 6.7304   |
| 39    | -60.9062 | -1.9986   | -5.5864   | 65.4040  | 1.9986    | 5.5864   |
| 40    | -66.7775 | -2.0405   | -4.9560   | 71.3689  | 2.0405    | 4.9560   |
| 41    | -68.6284 | 14.2796   | -103.6372 | 36.5102  | -14.2796  | 103.6372 |
| 42    | -37.6623 | 12.5794   | -93.8862  | 9.3583   | -12.5794  | 93.8863  |
| 43    | -12.6699 | 10.9722   | -84.6061  | -12.0241 | -10.9722  | 84.6061  |
| 44    | 6.7743   | 9.4455    | -75.8317  | -28.0248 | -9.4455   | 75.8316  |
| 45    | 20.9758  | 7.9836    | -67.5684  | -38.9379 | -7.9836   | 67.5678  |
| 46    | 30.2398  | 6.5876    | -59.7945  | -45.0594 | -6.5876   | 59.7945  |
| 47    | 34.9256  | 5.3054    | -52.5403  | -46.8641 | -5.3054   | 52.5400  |
| 48    | 35.6392  | 4.1362    | -45.8028  | -44.9441 | -4.1362   | 45.8026  |
| 49    | 32.8987  | 3.0698    | -39.5739  | -39.8061 | -3.0698   | 39.5743  |
| 50    | 27.3121  | 2.1159    | -33.8689  | -32.0717 | -2.1159   | 33.8682  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|----------|-----------|----------|
| 51    | 19.3334  | 1.2566    | -28.6609  | -22.1601 | -1.2566   | 28.6612  |
| 52    | 9.7685   | 0.5168    | -23.9827  | -10.9293 | -0.5168   | 23.9821  |
| 53    | -1.4851  | -0.1538   | -19.8134  | 1.8318   | 0.1538    | 19.8130  |
| 54    | -12.7668 | -0.6867   | -16.1642  | 14.3132  | 0.6867    | 16.1642  |
| 55    | -24.0679 | -1.1205   | -13.0296  | 26.5893  | 1.1205    | 13.0295  |
| 56    | -34.9131 | -1.4600   | -10.4001  | 38.1978  | 1.4600    | 10.3997  |
| 57    | -44.8699 | -1.7120   | -8.3092   | 48.7248  | 1.7120    | 8.3088   |
| 58    | -53.5998 | -1.8823   | -6.6960   | 57.8352  | 1.8823    | 6.6961   |
| 59    | -60.8098 | -1.9791   | -5.5891   | 65.2632  | 1.9791    | 5.5891   |
| 60    | -66.4149 | -2.0140   | -4.9594   | 70.9472  | 2.0140    | 4.9596   |
| 61    | -68.2249 | 14.2514   | -103.6238 | 36.1590  | -14.2514  | 103.6238 |
| 62    | -37.3281 | 12.5570   | -93.8835  | 9.0768   | -12.5570  | 93.8832  |
| 63    | -12.3075 | 10.9324   | -84.6049  | -12.2962 | -10.9324  | 84.6044  |
| 64    | 7.1016   | 9.3832    | -75.8316  | -28.2099 | -9.3832   | 75.8319  |
| 65    | 21.1474  | 7.9215    | -67.5697  | -38.9691 | -7.9215   | 67.5694  |
| 66    | 30.2797  | 6.5539    | -59.8029  | -45.0276 | -6.5539   | 59.8029  |
| 67    | 34.9304  | 5.2794    | -52.5368  | -46.8110 | -5.2794   | 52.5370  |
| 68    | 35.5796  | 4.1144    | -45.8090  | -44.8384 | -4.1144   | 45.8086  |
| 69    | 32.7868  | 3.0503    | -39.5823  | -39.6497 | -3.0503   | 39.5822  |
| 70    | 27.0709  | 2.0882    | -33.8660  | -31.7699 | -2.0882   | 33.8658  |
| 71    | 18.9177  | 1.2219    | -28.6600  | -21.6668 | -1.2219   | 28.6599  |
| 72    | 9.2753   | 0.4820    | -23.9837  | -10.3598 | -0.4820   | 23.9838  |
| 73    | -1.4722  | -0.1533   | -19.8159  | 1.8167   | 0.1533    | 19.8158  |
| 74    | -12.7444 | -0.6859   | -16.1688  | 14.2872  | 0.6859    | 16.1687  |
| 75    | -24.0439 | -1.1195   | -13.0297  | 26.5610  | 1.1195    | 13.0298  |
| 76    | -34.8826 | -1.4589   | -10.4112  | 38.1664  | 1.4589    | 10.4111  |
| 77    | -44.8336 | -1.7104   | -8.3172   | 48.6816  | 1.7104    | 8.3167   |
| 78    | -53.5597 | -1.8813   | -6.6925   | 57.7930  | 1.8813    | 6.6924   |
| 79    | -60.7643 | -1.9782   | -5.6024   | 65.2141  | 1.9782    | 5.6023   |
| 80    | -66.2267 | -2.0092   | -4.9720   | 70.7468  | 2.0092    | 4.9722   |
| 81    | -67.0857 | 14.2327   | -103.6329 | 35.0632  | -14.2327  | 103.6327 |
| 82    | -36.3087 | 12.5364   | -93.8790  | 8.0964   | -12.5364  | 93.8792  |
| 83    | -11.4037 | 10.9200   | -84.6011  | -13.1633 | -10.9200  | 84.6007  |
| 84    | 7.0187   | 9.4119    | -75.8234  | -28.1929 | -9.4119   | 75.8232  |
| 85    | 21.7734  | 7.9262    | -67.5666  | -39.6096 | -7.9262   | 67.5668  |
| 86    | 30.3409  | 6.5772    | -59.7846  | -45.1363 | -6.5772   | 59.7847  |
| 87    | 35.0335  | 5.3168    | -52.5537  | -46.9977 | -5.3168   | 52.5532  |
| 88    | 35.6913  | 4.1339    | -45.7975  | -44.9917 | -4.1339   | 45.7973  |
| 89    | 32.9406  | 3.0677    | -39.5594  | -39.8419 | -3.0677   | 39.5593  |
| 90    | 27.3428  | 2.1134    | -33.8582  | -32.0970 | -2.1134   | 33.8582  |
| 91    | 19.4788  | 1.2661    | -28.6659  | -22.3271 | -1.2661   | 28.6662  |
| 92    | 9.9523   | 0.5266    | -23.9735  | -11.1374 | -0.5266   | 23.9734  |
| 93    | -0.6816  | -0.1077   | -19.8118  | 0.9233   | 0.1077    | 19.8117  |
| 94    | -11.8620 | -0.6405   | -16.1625  | 13.3018  | 0.6405    | 16.1627  |
| 95    | -23.0555 | -1.0741   | -13.0286  | 25.4741  | 1.0741    | 13.0283  |
| 96    | -33.7900 | -1.4150   | -10.4087  | 36.9725  | 1.4150    | 10.4084  |
| 97    | -43.6437 | -1.6665   | -8.3031   | 47.3932  | 1.6665    | 8.3028   |
| 98    | -52.2642 | -1.8371   | -6.7104   | 56.3995  | 1.8371    | 6.7104   |
| 99    | -59.3759 | -1.9333   | -5.5802   | 63.7246  | 1.9333    | 5.5801   |
| 100   | -64.7353 | -1.9641   | -4.9710   | 69.1532  | 1.9641    | 4.9710   |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|----------|-----------|----------|
| 101   | -66.3767 | 14.1978   | -103.5972 | 34.4343  | -14.1978  | 103.5972 |
| 102   | -35.6027 | 12.4949   | -93.8331  | 7.4899   | -12.4949  | 93.8331  |
| 103   | -10.7578 | 10.8689   | -84.5569  | -13.6947 | -10.8689  | 84.5571  |
| 104   | 8.3806   | 9.3243    | -75.7805  | -29.3632 | -9.3243   | 75.7803  |
| 105   | 22.2988  | 7.8639    | -67.5148  | -39.9954 | -7.8639   | 67.5150  |
| 106   | 30.2725  | 6.5420    | -59.7388  | -44.9933 | -6.5420   | 59.7386  |
| 107   | 34.8974  | 5.2745    | -52.4896  | -46.7613 | -5.2745   | 52.4896  |
| 108   | 35.5472  | 4.1082    | -45.7480  | -44.7903 | -4.1082   | 45.7483  |
| 109   | 32.7589  | 3.0479    | -39.5310  | -39.6165 | -3.0479   | 39.5308  |
| 110   | 27.1452  | 2.0953    | -33.8062  | -31.8589 | -2.0953   | 33.8060  |
| 111   | 19.2434  | 1.2487    | -28.6149  | -22.0523 | -1.2487   | 28.6148  |
| 112   | 9.6830   | 0.5087    | -23.9272  | -10.8278 | -0.5087   | 23.9275  |
| 113   | -0.9920  | -0.1251   | -19.7621  | 1.2739   | 0.1251    | 19.7619  |
| 114   | -12.1925 | -0.6560   | -16.1139  | 13.6688  | 0.6560    | 16.1138  |
| 115   | -23.4146 | -1.0893   | -12.9808  | 25.8668  | 1.0893    | 12.9810  |
| 116   | -34.1735 | -1.4283   | -10.3614  | 37.3870  | 1.4283    | 10.3610  |
| 117   | -44.0528 | -1.6802   | -8.2424   | 47.8330  | 1.6802    | 8.2424   |
| 118   | -52.6969 | -1.8501   | -6.6496   | 56.8615  | 1.8501    | 6.6499   |
| 119   | -59.8268 | -1.9470   | -5.5587   | 64.2080  | 1.9470    | 5.5587   |
| 120   | -65.2247 | -1.9780   | -4.8876   | 69.6753  | 1.9780    | 4.8877   |
| 121   | -66.8833 | 14.2505   | -102.5156 | 34.8199  | -14.2505  | 102.5156 |
| 122   | -35.9935 | 12.5480   | -92.7524  | 7.7601   | -12.5480  | 92.7521  |
| 123   | -11.1164 | 10.9263   | -83.4781  | -13.4660 | -10.9263  | 83.4777  |
| 124   | 8.2425   | 9.3798    | -74.7062  | -29.3461 | -9.3798   | 74.7061  |
| 125   | 22.1078  | 7.9299    | -66.4326  | -39.9540 | -7.9299   | 66.4328  |
| 126   | 30.3641  | 6.6076    | -58.6587  | -45.2321 | -6.6076   | 58.6591  |
| 127   | 35.1373  | 5.3459    | -51.4257  | -47.1586 | -5.3459   | 51.4255  |
| 128   | 35.9927  | 4.1849    | -44.6705  | -45.4096 | -4.1849   | 44.6705  |
| 129   | 33.4225  | 3.1295    | -38.4557  | -40.4649 | -3.1295   | 38.4557  |
| 130   | 28.0438  | 2.1820    | -32.7449  | -32.9524 | -2.1820   | 32.7451  |
| 131   | 20.4324  | 1.3411    | -27.5373  | -23.4512 | -1.3411   | 27.5377  |
| 132   | 11.1595  | 0.6084    | -22.8658  | -12.5275 | -0.6084   | 22.8659  |
| 133   | 0.8235   | -0.0193   | -18.7001  | -0.7802  | 0.0193    | 18.7002  |
| 134   | -10.0284 | -0.5458   | -15.0505  | 11.2564  | 0.5458    | 15.0504  |
| 135   | -20.8752 | -0.9724   | -11.9169  | 23.0632  | 0.9724    | 11.9169  |
| 136   | -31.2390 | -1.3065   | -9.3077   | 34.1785  | 1.3065    | 9.3076   |
| 137   | -40.7242 | -1.5525   | -7.1931   | 44.2170  | 1.5525    | 7.1931   |
| 138   | -48.9786 | -1.7195   | -5.6021   | 52.8485  | 1.7195    | 5.6020   |
| 139   | -55.7442 | -1.8142   | -4.4943   | 59.8256  | 1.8142    | 4.4941   |
| 140   | -60.8124 | -1.8440   | -3.8473   | 64.9617  | 1.8440    | 3.8472   |
| 141   | -62.5239 | 14.7344   | -80.0734  | 36.0082  | -14.7344  | 80.0734  |
| 142   | -36.8346 | 13.3571   | -72.3355  | 12.7883  | -13.3571  | 72.3356  |
| 143   | -14.9574 | 12.0235   | -64.9518  | -6.6797  | -12.0235  | 64.9520  |
| 144   | 2.8330   | 10.7524   | -57.9603  | -22.1963 | -10.7524  | 57.9602  |
| 145   | 17.4157  | 9.5226    | -51.3740  | -34.5504 | -9.5226   | 51.3740  |
| 146   | 27.3834  | 8.3969    | -45.1668  | -42.4989 | -8.3969   | 45.1667  |
| 147   | 35.3277  | 7.2948    | -39.3677  | -48.4590 | -7.2948   | 39.3675  |
| 148   | 40.3401  | 6.2573    | -33.9505  | -51.5991 | -6.2573   | 33.9510  |
| 149   | 42.6800  | 5.2898    | -28.9262  | -52.2016 | -5.2898   | 28.9259  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|----------|----------|-----------|---------|
| 150   | 42.6629  | 4.3968    | -24.3179 | -50.5777 | -4.3968   | 24.3179 |
| 151   | 40.6532  | 3.5779    | -20.0856 | -47.0961 | -3.5779   | 20.0856 |
| 152   | 37.0144  | 2.8391    | -16.2582 | -42.1245 | -2.8391   | 16.2582 |
| 153   | 32.1281  | 2.1832    | -12.8425 | -36.0581 | -2.1832   | 12.8423 |
| 154   | 26.4208  | 1.6083    | -9.8217  | -29.3154 | -1.6083   | 9.8218  |
| 155   | 20.3292  | 1.1202    | -7.1801  | -22.3453 | -1.1202   | 7.1800  |
| 156   | 14.2872  | 0.7189    | -4.9487  | -15.5813 | -0.7189   | 4.9488  |
| 157   | 8.7565   | 0.4051    | -3.1248  | -9.4857  | -0.4051   | 3.1248  |
| 158   | 4.2130   | 0.1805    | -1.6864  | -4.5379  | -0.1805   | 1.6864  |
| 159   | 1.1338   | 0.0453    | -0.6460  | -1.2153  | -0.0453   | 0.6460  |
| 160   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 161   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 162   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 163   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 164   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 165   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 166   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 167   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 168   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 169   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 170   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 171   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 172   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 173   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 174   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 175   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 176   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 177   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |
| 178   | 0.0000   | 0.0000    | 0.0000   | 0.0000   | 0.0000    | 0.0000  |

**ENVOLVENTES DE ESFUERZOS CON IMPACTO**



ENVOLVENTES DE ESFUERZOS CON IMPACTO

ENVOL. MAX. FLECTORES -IPF

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 1     | 0.0593    | 199.9323  | -780.3077 | -436.9985  | -228.4916 | 557.2332 |
| 2     | 836.9207  | 440.5975  | -50.4644  | -1576.9276 | -385.0980 | 45.2464  |
| 3     | 1576.9336 | 385.1021  | -44.7098  | -2220.3347 | -329.5830 | 39.3987  |
| 4     | 2220.3213 | 329.5261  | -38.8216  | -2767.1897 | -274.8322 | 33.7605  |
| 5     | 2767.2148 | 274.8364  | -33.7348  | -3217.8882 | -223.1060 | 28.7801  |
| 6     | 3217.8982 | 223.1407  | -27.6800  | -3570.4456 | -171.4060 | 22.7291  |
| 7     | 3570.4717 | 171.4266  | -22.7510  | -3826.6575 | -116.7310 | 17.4329  |
| 8     | 3826.6846 | 116.5754  | -15.1398  | -3986.5332 | -61.0468  | 9.8581   |
| 9     | 3986.5234 | 60.9829   | -11.2114  | -4049.2747 | -5.4631   | 5.8842   |
| 10    | 4049.2549 | 5.3498    | -3.1494   | -4015.6992 | 45.5381   | -1.8579  |
| 11    | 4015.7422 | -45.5023  | 1.5920    | -3884.7205 | 97.2365   | -6.5250  |
| 12    | 3884.7173 | -97.1736  | 7.8557    | -3656.8787 | 151.7412  | -13.0462 |
| 13    | 3656.8662 | -151.7685 | 13.0919   | -3333.7598 | 207.2699  | -18.3746 |
| 14    | 3333.7896 | -207.3604 | 19.5175   | -2913.4070 | 262.8809  | -24.9032 |
| 15    | 2913.3672 | -262.8330 | 25.7204   | -2397.8989 | 313.5940  | -30.3950 |
| 16    | 2397.8882 | -313.6075 | 29.7014   | -1783.9685 | 365.3710  | -34.5728 |
| 17    | 1784.3781 | -360.3073 | 35.4455   | -1108.8805 | 383.0778  | -37.6242 |
| 18    | 1237.9490 | -239.4055 | 23.4739   | -773.0004  | 204.5814  | -20.5255 |
| 19    | 878.2537  | -84.2950  | 10.0225   | -690.1354  | 124.7850  | -13.7680 |
| 20    | 776.2283  | -16.7431  | 4.5275    | -709.6366  | 57.2454   | -8.2575  |
| 21    | 772.8850  | -77.1615  | -0.6971   | -599.2999  | 77.1599   | 0.7141   |
| 22    | 657.7478  | -30.0431  | -4.5808   | -533.1794  | 80.6744   | -0.1031  |
| 23    | 674.1481  | 50.1775   | -11.5439  | -761.0104  | -61.4111  | 11.7234  |
| 24    | 881.8112  | 168.7766  | -22.2295  | -1257.4694 | -149.4249 | 21.2076  |
| 25    | 1421.1293 | 284.4453  | -36.0851  | -1987.9568 | -219.3488 | 30.1110  |
| 26    | 2172.4036 | 355.4991  | -34.9620  | -2902.6956 | -291.8561 | 28.8500  |
| 27    | 2902.7368 | 291.8716  | -27.4046  | -3488.4224 | -229.9562 | 21.6648  |
| 28    | 3488.3975 | 229.9555  | -21.6761  | -3928.0715 | -162.3269 | 15.3780  |
| 29    | 3928.0601 | 162.3304  | -14.3118  | -4218.9976 | -94.6169  | 7.7055   |
| 30    | 4218.9854 | 94.6219   | -5.6055   | -4362.5273 | -30.6186  | -0.3469  |
| 31    | 4362.5151 | 30.6460   | -0.8164   | -4358.5083 | 33.4039   | -5.3066  |
| 32    | 4358.5083 | -33.4821  | 8.6950    | -4206.4160 | 101.3204  | -15.3420 |
| 33    | 4206.4463 | -101.2235 | 15.3631   | -3904.7610 | 169.0462  | -21.5638 |
| 34    | 3904.8125 | -168.9284 | 21.6103   | -3455.3853 | 233.0320  | -27.7016 |
| 35    | 3455.3835 | -233.0010 | 29.4075   | -2858.0098 | 297.1223  | -35.6576 |
| 36    | 2858.0435 | -297.0853 | 37.1391   | -2112.9055 | 364.9665  | -43.4486 |
| 37    | 2165.3013 | -282.7285 | 18.3467   | -1468.3745 | 315.8609  | -20.8242 |
| 38    | 1594.6860 | -206.5520 | 29.3245   | -1114.8395 | 172.6964  | -26.6418 |
| 39    | 1280.0691 | -36.5978  | 12.6594   | -1140.7355 | 87.2301   | -17.3697 |
| 40    | 1279.1393 | 42.9901   | 5.9195    | -1318.9187 | 18.3631   | -10.4476 |
| 41    | 1419.7601 | -84.7692  | -1.4485   | -1204.9607 | 95.4940   | 1.6161   |
| 42    | 1266.2642 | -48.4654  | -5.3254   | -1100.2649 | 99.0911   | 0.5909   |
| 43    | 1252.6381 | 31.3886   | -12.3231  | -1266.2993 | 19.2506   | 7.5951   |
| 44    | 1403.7888 | 117.4880  | -20.8571  | -1716.6238 | -164.5176 | 24.5188  |
| 45    | 1833.8486 | 268.8755  | -36.3715  | -2366.1892 | -203.7672 | 30.3967  |
| 46    | 2577.5234 | 338.7376  | -35.0397  | -3270.2634 | -275.1114 | 29.0015  |
| 47    | 3270.2397 | 275.1446  | -28.1260  | -3818.5461 | -213.2127 | 22.3800  |
| 48    | 3818.5156 | 213.2672  | -21.5485  | -4220.5981 | -145.6384 | 15.1359  |
| 49    | 4220.6270 | 145.5665  | -13.9610  | -4473.7910 | -77.8500  | 7.6305   |
| 50    | 4473.7266 | 77.7646   | -7.6387   | -4579.2485 | -13.7399  | 1.5080   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| 51    | 4579.2725 | 13.6789   | 0.7405   | -4536.9775 | 50.3728   | -6.8736  |
| 52    | 4536.9829 | -50.4461  | 6.9039   | -4346.6328 | 118.2805  | -13.3881 |
| 53    | 4346.5757 | -118.3075 | 15.5251  | -4006.3196 | 186.1629  | -22.1484 |
| 54    | 4006.2537 | -186.1699 | 23.2504  | -3517.8369 | 250.2965  | -29.3384 |
| 55    | 3517.8472 | -250.3224 | 30.0998  | -2881.5955 | 314.4291  | -36.0559 |
| 56    | 2881.6108 | -314.4721 | 36.0781  | -2097.3647 | 382.3336  | -42.4219 |
| 57    | 2175.9324 | -260.7393 | 38.0724  | -1529.0894 | 293.6091  | -40.6586 |
| 58    | 1644.5029 | -189.3939 | 28.7682  | -1217.7610 | 152.7913  | -26.1026 |
| 59    | 1385.7129 | -16.1502  | 12.9412  | -1292.4106 | 66.7781   | -17.6867 |
| 60    | 1432.2925 | 63.6535   | 6.4169   | -1518.5610 | -0.5112   | -10.8693 |
| 61    | 1619.6844 | -88.3794  | -2.0814  | -1392.6660 | 100.8973  | 2.3031   |
| 62    | 1454.2600 | -53.8770  | -5.6122  | -1276.0994 | 104.4989  | 0.8454   |
| 63    | 1429.5618 | 25.9562   | -12.4566 | -1431.0032 | 24.6803   | 7.7204   |
| 64    | 1570.3944 | 112.0127  | -20.8878 | -1853.1321 | -159.7285 | 24.5186  |
| 65    | 1972.2100 | 263.9905  | -36.3555 | -2493.5557 | -198.8600 | 30.4332  |
| 66    | 2706.3867 | 332.7972  | -35.4225 | -3385.8560 | -269.1316 | 29.3602  |
| 67    | 3385.9338 | 269.1089  | -27.5500 | -3920.6841 | -207.1640 | 21.8031  |
| 68    | 3920.6807 | 207.1381  | -21.8046 | -4309.0366 | -139.5044 | 15.5460  |
| 69    | 4309.0410 | 139.5516  | -14.5996 | -4548.5942 | -71.8711  | 8.1584   |
| 70    | 4548.5640 | 71.8434   | -6.8974  | -4640.7881 | -7.8398   | 0.6200   |
| 71    | 4640.8350 | 7.8523    | 1.7584   | -4585.4521 | 56.1956   | -7.8935  |
| 72    | 4585.4707 | -56.2619  | 7.9049   | -4382.0879 | 124.0886  | -14.2566 |
| 73    | 4382.0840 | -124.1091 | 15.4405  | -4028.6846 | 191.9561  | -22.0306 |
| 74    | 4028.6179 | -191.8870 | 24.0110  | -3527.3271 | 256.0007  | -30.1030 |
| 75    | 3527.3540 | -255.9771 | 29.9495  | -2878.6274 | 320.0650  | -35.9039 |
| 76    | 2878.6257 | -320.0579 | 36.8769  | -2081.3560 | 387.9424  | -43.3044 |
| 77    | 2168.1184 | -256.6883 | 38.3300  | -1530.9357 | 289.5215  | -40.8365 |
| 78    | 1646.6411 | -185.2547 | 28.5300  | -1229.8580 | 148.5438  | -25.8062 |
| 79    | 1398.1029 | -11.8946  | 12.9558  | -1314.3838 | 62.5216   | -17.7184 |
| 80    | 1454.4000 | 67.9234   | 6.4309   | -1550.2698 | -4.7436   | -10.9016 |
| 81    | 1651.4098 | -88.1930  | -1.9194  | -1424.7361 | 100.7484  | 2.1469   |
| 82    | 1486.3406 | -53.7179  | -5.7949  | -1308.4680 | 104.3545  | 1.0549   |
| 83    | 1461.9934 | 26.0794   | -12.7962 | -1463.7290 | 24.5400   | 8.0417   |
| 84    | 1603.0520 | 112.1202  | -20.6884 | -1885.1145 | -159.8626 | 24.3041  |
| 85    | 2004.0839 | 264.1446  | -36.5800 | -2525.9250 | -199.0024 | 30.5697  |
| 86    | 2734.7314 | 330.2111  | -34.2334 | -3408.2202 | -266.5744 | 28.3252  |
| 87    | 3408.2529 | 266.6201  | -29.1241 | -3937.4329 | -204.6984 | 23.4087  |
| 88    | 3937.5342 | 204.7014  | -21.3635 | -4320.4209 | -137.0493 | 14.7143  |
| 89    | 4320.4341 | 136.9670  | -12.4962 | -4554.2451 | -69.2490  | 6.0494   |
| 90    | 4554.2686 | 69.1839   | -6.0331  | -4640.4629 | -5.1544   | 0.1950   |
| 91    | 4640.4053 | 5.0182    | -0.1785  | -4578.5752 | 59.0216   | -6.1151  |
| 92    | 4578.6079 | -58.8976  | 9.6445   | -4369.2637 | 126.6970  | -16.1292 |
| 93    | 4369.2539 | -126.5921 | 14.9347  | -4010.4072 | 194.4295  | -21.2201 |
| 94    | 4010.3789 | -194.4351 | 23.2071  | -3503.5527 | 258.5229  | -29.4397 |
| 95    | 3503.5674 | -258.4506 | 30.4156  | -2848.8105 | 322.5660  | -36.4789 |
| 96    | 2848.8203 | -322.5598 | 37.1390  | -2046.4749 | 390.4018  | -43.4743 |
| 97    | 2135.5845 | -256.4362 | 37.8226  | -1498.7405 | 289.3008  | -40.3540 |
| 98    | 1614.5404 | -185.0414 | 28.9286  | -1198.2119 | 148.3562  | -26.1773 |
| 99    | 1366.5791 | -11.7221  | 12.4288  | -1283.2899 | 62.3327   | -17.1781 |
| 100   | 1423.2727 | 68.1039   | 6.2704   | -1519.5537 | -4.9123   | -10.7796 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| 101   | 1620.6696 | -83.9995  | -1.6867  | -1403.3989 | 96.5676   | 1.9314   |
| 102   | 1465.0043 | -49.5529  | -6.0454  | -1296.5676 | 100.1748  | 1.3099   |
| 103   | 1450.0710 | 30.2725   | -12.6589 | -1461.2368 | 20.3474   | 7.8975   |
| 104   | 1600.5259 | 116.2941  | -20.9679 | -1892.0249 | -163.9952 | 24.5769  |
| 105   | 2011.0521 | 268.2261  | -36.4161 | -2542.1099 | -203.1062 | 30.4410  |
| 106   | 2736.9202 | 324.7205  | -34.7484 | -3398.2476 | -261.0595 | 28.7291  |
| 107   | 3398.2417 | 261.0305  | -27.9237 | -3914.6187 | -199.1086 | 22.1771  |
| 108   | 3914.6001 | 199.0356  | -21.1355 | -4284.6924 | -131.3708 | 14.8434  |
| 109   | 4284.6431 | 131.3493  | -14.8590 | -4505.7754 | -63.6512  | 8.4072   |
| 110   | 4505.7920 | 63.7114   | -6.1153  | -4579.7246 | 0.2907    | -0.0066  |
| 111   | 4579.7617 | -0.3375   | 0.0347   | -4505.9302 | 64.3976   | -6.1688  |
| 112   | 4505.9688 | -64.5601  | 8.4418   | -4283.8428 | 132.3927  | -14.9218 |
| 113   | 4283.8003 | -132.4125 | 14.9479  | -3911.7974 | 200.2793  | -21.4092 |
| 114   | 3911.8062 | -200.3514 | 23.3515  | -3391.6553 | 264.4576  | -29.5953 |
| 115   | 3391.6760 | -264.4315 | 30.5529  | -2723.4375 | 328.5553  | -36.6086 |
| 116   | 2723.3875 | -328.5556 | 37.1750  | -1907.5210 | 396.3867  | -43.4555 |
| 117   | 1999.4781 | -261.4115 | 37.3634  | -1352.1735 | 294.2208  | -39.8526 |
| 118   | 1469.5862 | -189.8700 | 28.4055  | -1043.8330 | 153.0975  | -25.7663 |
| 119   | 1213.8805 | -16.3559  | 12.8361  | -1120.1160 | 66.9845   | -17.5531 |
| 120   | 1261.1809 | 63.4756   | 5.4439   | -1347.0505 | -0.2449   | -9.9189  |
| 121   | 1448.4601 | -66.1182  | -1.7084  | -1271.3361 | 78.7218   | 1.9166   |
| 122   | 1333.2091 | -31.7397  | -6.0077  | -1204.8463 | 82.3649   | 1.2717   |
| 123   | 1359.3773 | 47.8769   | -12.6727 | -1410.1520 | 2.7446    | 7.9358   |
| 124   | 1550.9988 | 133.3725  | -21.5194 | -1881.0792 | -180.6818 | 25.0944  |
| 125   | 2000.6980 | 290.0507  | -17.0788 | -2580.8223 | -224.8684 | 11.0484  |
| 126   | 2713.7378 | 307.2565  | -33.8999 | -3335.7197 | -243.5915 | 27.9736  |
| 127   | 3335.6824 | 243.6484  | -28.1533 | -3812.6624 | -181.7033 | 22.3713  |
| 128   | 3812.7144 | 181.6986  | -20.2889 | -4143.7158 | -114.0365 | 13.8764  |
| 129   | 4143.6963 | 114.0426  | -13.8910 | -4325.7979 | -46.3195  | 7.5858   |
| 130   | 4325.8574 | 46.2615   | -6.5979  | -4360.3770 | 17.7584   | 0.3133   |
| 131   | 4360.3164 | -17.8283  | 2.0211   | -4246.9316 | 81.9051   | -8.1504  |
| 132   | 4246.9502 | -81.9331  | 7.9588   | -3985.7451 | 149.7478  | -14.2895 |
| 133   | 3985.6638 | -149.7616 | 15.3068  | -3574.5740 | 217.6100  | -21.7970 |
| 134   | 3574.5166 | -217.5742 | 22.7673  | -3015.3762 | 281.7063  | -28.8775 |
| 135   | 3015.3862 | -281.7659 | 29.5606  | -2308.3997 | 345.8721  | -35.6740 |
| 136   | 2308.3945 | -345.8652 | 36.7242  | -1453.7379 | 413.7144  | -43.0936 |
| 137   | 1575.6671 | -277.4845 | 37.1975  | -898.6633  | 310.0723  | -39.7041 |
| 138   | 1038.9308 | -174.9859 | 25.0993  | -662.9264  | 137.6885  | -22.4516 |
| 139   | 783.8994  | -30.2720  | 12.1244  | -658.8559  | 80.8887   | -16.8480 |
| 140   | 812.3461  | 49.9596   | 4.9555   | -867.8030  | 13.3632   | -9.4359  |
| 141   | 972.3214  | -14.3175  | -1.0282  | -923.7065  | 27.0098   | 1.2180   |
| 142   | 965.6792  | 11.2034   | -4.0739  | -949.3945  | 29.3024   | 0.3259   |
| 143   | 1057.7955 | 78.7298   | -10.2729 | -1163.0442 | -38.2399  | 6.4932   |
| 144   | 1274.3237 | 158.4730  | -16.3221 | -1523.2351 | -117.9527 | 12.5080  |
| 145   | 1652.7710 | 261.5378  | -26.3790 | -2219.5127 | -318.3561 | 29.6486  |
| 146   | 2228.2119 | 323.4626  | -29.6949 | -2754.5459 | -267.9786 | 24.5006  |
| 147   | 2754.5884 | 268.0757  | -24.4961 | -3186.2285 | -213.7891 | 19.4142  |
| 148   | 3186.2561 | 213.8044  | -18.4590 | -3521.5254 | -159.3522 | 13.2470  |
| 149   | 3521.5132 | 159.3053  | -12.0195 | -3761.2649 | -103.7970 | 6.7529   |
| 150   | 3761.2881 | 103.8802  | -6.7502  | -3904.3394 | -55.8679  | 2.1384   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|---------|------------|-----------|-----------|
| 151   | 3904.3315 | 55.7584   | -0.8237 | -3949.9880 | -1.0900   | -4.4744   |
| 152   | 3949.9680 | 1.0525    | 5.6371  | -3898.8928 | 54.4355   | -10.9204  |
| 153   | 3898.8889 | -54.3500  | 10.9418 | -3751.1169 | 109.8591  | -16.0696  |
| 154   | 3751.1406 | -110.0099 | 16.0153 | -3506.2573 | 164.8616  | -21.3052  |
| 155   | 3506.2302 | -164.9264 | 23.4320 | -3165.4263 | 212.9339  | -28.3159  |
| 156   | 3165.3879 | -212.9421 | 29.3423 | -2726.0559 | 268.4469  | -34.4946  |
| 157   | 2726.0339 | -268.4640 | 33.6055 | -2189.9343 | 323.9611  | -38.7149  |
| 158   | 2189.9324 | -323.9444 | 39.4336 | -1556.7566 | 379.4495  | -44.7344  |
| 159   | 1556.7361 | -379.4371 | 45.1870 | -826.9564  | 434.9271  | -50.4190  |
| 160   | 826.9354  | -434.9055 | 50.6885 | -0.0254    | 90.5854   | -268.4707 |

ENVOL. MAX CORTANTES -IPF

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2 |
|-------|------------|-----------|----------|------------|-----------|---------|
| 1     | 0.0054     | 488.6096  | -54.9000 | -833.3802  | -441.4174 | 50.6160 |
| 2     | 799.2164   | 442.6761  | -50.8582 | -1524.1555 | -388.8934 | 45.9219 |
| 3     | 1428.5117  | 392.6966  | -45.7584 | -2050.8843 | -339.0806 | 40.6950 |
| 4     | 1902.6959  | 345.3439  | -40.6771 | -2427.6951 | -292.0026 | 35.6963 |
| 5     | 2236.0559  | 300.8188  | -36.3164 | -2704.0920 | -250.2640 | 31.5195 |
| 6     | 2477.6487  | 261.5726  | -31.4644 | -2832.4048 | -212.4223 | 26.8210 |
| 7     | 2579.5959  | 226.1594  | -27.8453 | -2855.8984 | -173.5584 | 22.7801 |
| 8     | 2585.0317  | 189.5525  | -22.4094 | -2797.0610 | -137.9204 | 16.7644 |
| 9     | 2516.0498  | 156.3475  | -19.1025 | -2702.2068 | -107.4396 | 14.4906 |
| 10    | 2418.6829  | 128.1161  | -14.4224 | -2549.8752 | -80.4816  | 9.8274  |
| 11    | 2270.6572  | 103.4919  | -11.8903 | -1368.5178 | -69.0768  | 8.0072  |
| 12    | 2115.4893  | 82.7722   | -8.9103  | -1235.2849 | -57.1492  | 6.8391  |
| 13    | 1419.1852  | 65.6486   | -6.1921  | -1075.2208 | -45.9096  | 5.7015  |
| 14    | 1272.1742  | 54.2819   | -4.3379  | -893.4874  | -35.4174  | 4.4887  |
| 15    | 1131.7281  | 44.8654   | -2.8696  | -695.7443  | -25.7496  | 3.6872  |
| 16    | 1005.4740  | 37.1975   | -2.3481  | -611.8403  | -21.2250  | 3.0181  |
| 17    | 899.6512   | 31.2025   | -0.5255  | -393.4901  | -12.8457  | 2.1327  |
| 18    | 819.7382   | 26.7670   | -0.2759  | -229.6481  | -7.0814   | -0.2871 |
| 19    | 769.9150   | 23.7505   | 0.4450   | -242.3994  | -7.0840   | -0.3790 |
| 20    | 753.4537   | 22.0169   | 1.0996   | 257.4597   | -104.5864 | 10.4480 |
| 21    | -5525.3457 | 625.5759  | -52.4509 | 3966.8506  | -677.3242 | 55.3012 |
| 22    | -3994.6992 | 678.1833  | -56.7235 | 2573.4421  | -616.4241 | 51.3679 |
| 23    | -2654.9932 | 619.0717  | -53.1758 | 1370.9231  | -556.9929 | 47.6805 |
| 24    | -1504.9440 | 561.6776  | -48.2257 | 356.3428   | -495.5928 | 42.2445 |
| 25    | -540.4603  | 502.5388  | -42.9491 | -448.9361  | -437.7921 | 37.0092 |
| 26    | 218.7810   | 447.1957  | -37.8798 | -1100.8547 | -384.5734 | 31.9339 |
| 27    | 830.3262   | 396.6090  | -32.8254 | -1588.2009 | -334.0048 | 26.9821 |
| 28    | 1284.2812  | 348.7958  | -28.4590 | -1924.0994 | -282.5179 | 22.3036 |
| 29    | 1594.9414  | 300.1891  | -23.5985 | -2081.0146 | -235.7679 | 17.5095 |
| 30    | 1735.4536  | 256.3981  | -18.7216 | -2156.5637 | -194.3770 | 13.0585 |
| 31    | 1804.1536  | 218.0103  | -15.7840 | -2160.4785 | -158.2866 | 9.4629  |
| 32    | 1811.0645  | 184.9176  | -10.6257 | -1395.8990 | -131.0001 | 4.5031  |
| 33    | 1059.0405  | 160.6898  | -7.3892  | -1363.6277 | -110.0547 | 2.7061  |
| 34    | 1048.8516  | 142.7006  | -5.7474  | -1312.9685 | -92.0704  | 1.0908  |
| 35    | 1029.1611  | 127.5905  | -3.6296  | -1259.2737 | -76.9656  | -1.0236 |
| 36    | 1014.5453  | 115.2779  | -1.8770  | -1216.9465 | -64.6594  | -2.7961 |
| 37    | 1018.2916  | 105.6217  | -1.3511  | -1199.0175 | -54.9876  | -3.3540 |
| 38    | 1052.0488  | 98.4691   | 0.3085   | -1216.6306 | -47.8550  | -5.0000 |
| 39    | 1125.4310  | 93.6239   | 0.4889   | -1279.1438 | -42.9915  | -5.2006 |
| 40    | 1246.0033  | 90.8659   | 1.5901   | 249.8451   | -104.4938 | 10.3401 |
| 41    | -6075.1865 | 641.5030  | -50.7410 | 4480.9170  | -692.9562 | 54.3140 |
| 42    | -4509.5020 | 693.8252  | -55.9198 | 3052.8315  | -632.0686 | 50.5216 |
| 43    | -3136.3506 | 634.7949  | -51.8629 | 1816.5664  | -572.7004 | 46.3301 |
| 44    | -1953.4287 | 577.4897  | -47.3600 | 769.5996   | -511.4184 | 41.3818 |
| 45    | -957.0322  | 518.4794  | -42.0818 | -67.4530   | -453.7692 | 36.1432 |
| 46    | -166.2328  | 463.3281  | -37.2740 | -751.4981  | -400.7407 | 31.3858 |
| 47    | 477.4352   | 412.9316  | -32.5411 | -1271.5657 | -350.3471 | 26.6740 |
| 48    | 964.2230   | 365.3179  | -27.9747 | -1640.5084 | -299.0897 | 21.7463 |
| 49    | 1308.3055  | 316.8967  | -23.1586 | -1830.9714 | -252.5120 | 17.2675 |
| 50    | 1482.6825  | 273.2794  | -19.2183 | -1941.1853 | -211.2879 | 13.4041 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2 |
|-------|------------|-----------|----------|------------|-----------|---------|
| 51    | 1586.5078  | 235.0605  | -14.9091 | -1980.9613 | -175.3581 | 8.6044  |
| 52    | 1629.6360  | 202.1465  | -11.1172 | -1230.1099 | -150.9721 | 4.8825  |
| 53    | 891.8629   | 180.7754  | -6.9124  | -1241.6350 | -130.1534 | 2.2953  |
| 54    | 925.9248   | 162.9226  | -5.0120  | -1235.6082 | -112.2875 | 0.3580  |
| 55    | 951.1976   | 147.9340  | -3.4239  | -1227.0629 | -97.3180  | -1.2512 |
| 56    | 982.1333   | 135.7240  | -2.3280  | -1230.5410 | -85.1051  | -2.3605 |
| 57    | 1031.9321  | 126.1652  | -0.6683  | -1258.9185 | -75.5194  | -4.0201 |
| 58    | 1112.1190  | 119.0769  | -0.0733  | -1323.0621 | -68.4646  | -4.6265 |
| 59    | 1232.1022  | 114.2829  | 0.8635   | -1432.2975 | -63.6550  | -5.6101 |
| 60    | 1399.3597  | 111.5529  | 2.0839   | 249.2590   | -104.5201 | 10.3549 |
| 61    | -6223.6660 | 645.6693  | -49.3915 | 4619.9736  | -696.8851 | 52.9146 |
| 62    | -4648.6362 | 697.7628  | -55.6584 | 3183.1733  | -636.0116 | 50.3415 |
| 63    | -3266.8804 | 638.7346  | -51.7431 | 1938.3160  | -576.6349 | 46.2057 |
| 64    | -2075.4575 | 581.4271  | -47.2946 | 882.8903   | -515.3497 | 41.3288 |
| 65    | -1070.6443 | 522.3921  | -42.0572 | 37.5158    | -457.6758 | 36.1576 |
| 66    | -271.5367  | 467.2156  | -37.2052 | -655.0611  | -404.5951 | 31.2895 |
| 67    | 380.6128   | 416.8004  | -32.4186 | -1183.3534 | -354.2099 | 26.5743 |
| 68    | 875.7059   | 369.1826  | -28.0132 | -1560.8030 | -302.9430 | 21.8843 |
| 69    | 1228.2697  | 320.8130  | -23.3301 | -1759.5264 | -256.4791 | 17.3406 |
| 70    | 1411.2095  | 277.2824  | -18.9449 | -1878.6815 | -215.3135 | 13.0359 |
| 71    | 1523.9142  | 239.1261  | -14.6196 | -1927.4851 | -179.4301 | 8.3275  |
| 72    | 1576.1176  | 206.2318  | -10.9021 | -1184.8887 | -155.2040 | 4.8028  |
| 73    | 846.6514   | 185.0135  | -7.1926  | -1206.0496 | -134.3794 | 2.5750  |
| 74    | 890.2998   | 167.1661  | -4.9815  | -1209.5181 | -116.5309 | 0.3240  |
| 75    | 925.1911   | 152.1849  | -3.7834  | -1210.5449 | -101.5820 | -0.8929 |
| 76    | 965.7350   | 139.9936  | -2.2316  | -1223.8556 | -89.3488  | -2.4480 |
| 77    | 1025.1971  | 130.4311  | -0.7750  | -1261.6675 | -79.8204  | -3.9005 |
| 78    | 1114.9729  | 123.3503  | -0.4389  | -1335.5682 | -72.7207  | -4.2692 |
| 79    | 1244.6160  | 118.5518  | 0.8506   | -1454.4055 | -67.9247  | -5.6135 |
| 80    | 1421.4866  | 115.8200  | 2.0830   | 249.2091   | -104.5139 | 10.3750 |
| 81    | -6261.9473 | 645.7399  | -50.2304 | 4658.1094  | -696.9821 | 53.6856 |
| 82    | -4686.7832 | 697.8590  | -55.3320 | 3220.6687  | -636.0901 | 49.9170 |
| 83    | -3304.4023 | 638.8229  | -51.1166 | 1976.0504  | -576.7481 | 45.5807 |
| 84    | -2113.1248 | 581.5370  | -47.3646 | 920.3176   | -515.4746 | 41.4392 |
| 85    | -1108.0391 | 522.5590  | -41.8395 | 74.2083    | -457.8314 | 35.8618 |
| 86    | -308.2701  | 467.3691  | -37.2462 | -618.3517  | -404.7801 | 31.4760 |
| 87    | 343.9996   | 416.9948  | -32.6720 | -1147.2231 | -354.4128 | 26.8066 |
| 88    | 839.6335   | 369.3887  | -27.9049 | -1525.1953 | -303.1489 | 21.4861 |
| 89    | 1192.6692  | 320.9857  | -22.7773 | -1724.4255 | -256.6174 | 16.8349 |
| 90    | 1376.0288  | 277.4149  | -18.8832 | -1843.7417 | -215.4351 | 13.2916 |
| 91    | 1488.9885  | 239.2439  | -15.5062 | -1892.7803 | -179.5381 | 9.0786  |
| 92    | 1541.4731  | 206.3860  | -10.5471 | -1150.8707 | -155.3759 | 4.5051  |
| 93    | 812.6106   | 185.2109  | -7.7378  | -1172.3516 | -134.5887 | 3.0600  |
| 94    | 856.7307   | 167.3497  | -5.4076  | -1176.2709 | -116.7256 | 0.7768  |
| 95    | 892.0489   | 152.3786  | -3.7679  | -1177.9650 | -101.7408 | -0.9010 |
| 96    | 933.0643   | 140.1613  | -2.4063  | -1191.4357 | -89.5490  | -2.2761 |
| 97    | 992.9025   | 130.6006  | -1.1903  | -1229.8207 | -79.9731  | -3.5109 |
| 98    | 1083.1011  | 123.5146  | -0.1415  | -1304.1067 | -72.8721  | -4.5512 |
| 99    | 1213.1605  | 118.7155  | 0.2892   | -1423.2800 | -68.1049  | -5.0386 |
| 100   | 1390.3652  | 115.9872  | 1.9351   | 249.1774   | -104.5130 | 10.3961 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2 |
|-------|------------|-----------|----------|------------|-----------|---------|
| 101   | -6223.6973 | 640.9634  | -50.9465 | 4630.6367  | -692.1783 | 54.3490 |
| 102   | -4659.3286 | 693.0560  | -54.5689 | 3204.3909  | -631.2989 | 49.0945 |
| 103   | -3288.0881 | 634.0351  | -51.2862 | 1970.4700  | -571.9605 | 45.8040 |
| 104   | -2107.5527 | 576.7455  | -47.0330 | 925.1392   | -510.6560 | 41.0632 |
| 105   | -1112.9022 | 517.7336  | -41.7471 | 89.9017    | -453.0091 | 35.8094 |
| 106   | -323.9689  | 462.5869  | -37.0594 | -592.2491  | -399.9937 | 31.1964 |
| 107   | 317.7968   | 412.1891  | -32.3911 | -1109.8845 | -349.5969 | 26.5236 |
| 108   | 802.3675   | 364.5571  | -27.8526 | -1477.0745 | -298.3130 | 21.7158 |
| 109   | 1144.5691  | 316.1818  | -23.4026 | -1665.6204 | -251.8344 | 17.3939 |
| 110   | 1317.2723  | 272.6696  | -18.7822 | -1774.4326 | -210.7137 | 13.0014 |
| 111   | 1419.7655  | 234.5090  | -15.2394 | -1812.9111 | -174.7766 | 8.9245  |
| 112   | 1461.6768  | 201.5891  | -10.7869 | -1060.5402 | -150.6356 | 4.6149  |
| 113   | 722.4824   | 180.4713  | -7.4296  | -1071.5654 | -129.8534 | 2.7849  |
| 114   | 756.1004   | 162.6420  | -5.2198  | -1065.0551 | -112.0250 | 0.5906  |
| 115   | 781.0454   | 147.6908  | -3.6384  | -1056.4214 | -97.0544  | -1.0276 |
| 116   | 811.7978   | 135.5101  | -2.3409  | -1059.7068 | -84.8878  | -2.3373 |
| 117   | 861.4812   | 125.9615  | -1.4802  | -1087.9050 | -75.3431  | -3.2119 |
| 118   | 941.5103   | 118.8923  | -0.4461  | -1152.0792 | -68.2637  | -4.2812 |
| 119   | 1061.3917  | 114.1063  | 0.7214   | -1261.1818 | -63.4776  | -5.4390 |
| 120   | 1228.4474  | 111.3804  | 1.0996   | 248.3570   | -104.4845 | 10.3149 |
| 121   | -6067.5972 | 624.9637  | -50.5212 | 4510.7378  | -675.8361 | 54.1635 |
| 122   | -4539.4956 | 676.7170  | -54.4411 | 3121.0422  | -614.9165 | 48.9738 |
| 123   | -3204.8940 | 617.6760  | -51.1198 | 1923.9594  | -555.5615 | 45.6160 |
| 124   | -2061.1860 | 560.3947  | -46.1336 | 915.8032   | -494.2967 | 40.1135 |
| 125   | -1103.5596 | 501.4458  | -41.1998 | 117.2029   | -436.7081 | 35.2343 |
| 126   | -351.1224  | 446.3837  | -36.5335 | -528.6752  | -383.7961 | 30.7376 |
| 127   | 254.5806   | 396.0912  | -31.9250 | -1010.4386 | -333.5525 | 26.0160 |
| 128   | 703.7684   | 348.6405  | -27.2493 | -1343.0011 | -282.4366 | 21.0251 |
| 129   | 1011.6208  | 300.4383  | -22.7520 | -1498.2488 | -236.1711 | 16.8626 |
| 130   | 1151.4459  | 257.1325  | -18.5881 | -1574.6521 | -195.2505 | 12.6894 |
| 131   | 1222.0933  | 219.2014  | -14.4220 | -792.0879  | -159.6614 | 6.6842  |
| 132   | 443.2861   | 186.6746  | -9.3100  | -806.2856  | -136.0686 | 4.6485  |
| 133   | 471.3101   | 166.0849  | -7.1739  | -788.0511  | -115.4593 | 2.5395  |
| 134   | 475.9790   | 148.4147  | -5.3498  | -753.0146  | -97.7768  | 0.6964  |
| 135   | 472.6367   | 133.6204  | -3.8409  | -716.3307  | -82.9993  | -0.8243 |
| 136   | 475.6590   | 121.6001  | -2.4005  | -692.2891  | -70.9812  | -2.2774 |
| 137   | 497.9437   | 112.2116  | -1.5624  | -693.4577  | -61.5925  | -3.1296 |
| 138   | 550.7112   | 105.2650  | -0.6874  | -730.6300  | -54.6295  | -4.0259 |
| 139   | 643.0377   | 100.5734  | 0.0061   | -812.3447  | -49.9566  | -4.7297 |
| 140   | 781.7659   | 97.9196   | 0.6208   | 238.7220   | -104.6257 | 10.0921 |
| 141   | -5409.0908 | 575.4407  | -39.2187 | 4231.2163  | -636.7911 | 43.3874 |
| 142   | -4250.3926 | 637.3495  | -45.1954 | 3175.3193  | -584.0616 | 40.4191 |
| 143   | -3231.4475 | 585.7916  | -39.5166 | 2251.5479  | -531.8328 | 34.6082 |
| 144   | -2344.0596 | 534.8498  | -36.9101 | 1427.8401  | -479.3257 | 31.8259 |
| 145   | -1555.9963 | 483.7765  | -32.3428 | 729.3951   | -435.7867 | 27.8505 |
| 146   | -891.2706  | 441.7963  | -29.0665 | 151.9341   | -386.3068 | 23.8772 |
| 147   | -345.1466  | 393.9604  | -24.8128 | -311.0979  | -338.4746 | 19.5728 |
| 148   | 90.0151    | 347.9216  | -20.7907 | -437.6972  | -295.6984 | 15.9227 |
| 149   | 193.0086   | 307.0201  | -17.2855 | -658.4850  | -257.7187 | 12.7399 |
| 150   | 394.8868   | 271.0223  | -14.2621 | -816.1501  | -225.9579 | 10.0373 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| 151   | 539.2660  | 241.3310  | -11.6781 | -865.9838 | -191.3073 | 6.9785  |
| 152   | 581.8720  | 208.8416  | -8.8729  | -68.0386  | -157.2535 | 3.3711  |
| 153   | -216.4170 | 176.9884  | -5.5464  | -65.7681  | -136.4961 | 1.4051  |
| 154   | -211.9643 | 158.5636  | -3.7171  | -36.9137  | -118.0810 | 0.4400  |
| 155   | -226.4621 | 142.4713  | -2.8937  | 6.4787    | -101.9820 | -0.7350 |
| 156   | -247.4814 | 128.7551  | -2.0869  | 52.1445   | -88.2441  | -1.6516 |
| 157   | -262.5417 | 117.4808  | -1.3294  | 87.5567   | -76.9865  | -2.4229 |
| 158   | -258.6540 | 108.6571  | -0.6979  | 99.5021   | -68.1469  | -3.0092 |
| 159   | -222.5821 | 102.3350  | -0.3041  | 74.8594   | -61.8390  | -3.4225 |
| 160   | -140.9108 | 98.5240   | -0.0275  | -0.0004   | -58.0155  | -3.7131 |

ENVOL. MAX. TORSORES -IPF

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 1     | -0.0546    | 204.8576  | 728.1305 | -345.6412  | -181.2610 | -666.9254 |
| 2     | 328.5661   | 181.8945  | 670.9159 | -620.0222  | -155.0054 | -601.7740 |
| 3     | 572.0014   | 156.9076  | 608.4134 | -812.1300  | -130.1011 | -539.0696 |
| 4     | 737.9560   | 133.2529  | 548.1440 | -929.5019  | -106.5805 | -478.7635 |
| 5     | 833.7140   | 110.9850  | 490.1006 | -996.7700  | -85.7015  | -424.0244 |
| 6     | 883.4308   | 91.3443   | 438.0489 | -989.8044  | -66.7722  | -374.5833 |
| 7     | 863.4338   | 73.6460   | 390.7519 | -930.5823  | -47.3515  | -323.0194 |
| 8     | 795.0912   | 55.3844   | 342.0123 | -826.4004  | -29.3065  | -274.8139 |
| 9     | 685.9705   | 38.5384   | 295.5985 | -684.9272  | -12.6737  | -229.0609 |
| 10    | 557.4665   | 23.9298   | 252.7463 | -529.2465  | 1.0829    | -188.4677 |
| 11    | 382.2792   | 9.9972    | 214.2376 | -353.2594  | 13.4651   | -153.1394 |
| 12    | 228.7505   | -0.4280   | 181.3584 | -152.8661  | 25.6761   | -116.3149 |
| 13    | 27.3359    | -12.0751  | 146.9159 | -537.5474  | -22.9609  | -90.9033  |
| 14    | -141.2247  | -20.7422  | 115.4034 | -446.7255  | -17.7184  | -75.9918  |
| 15    | -342.9532  | -13.5771  | 92.0785  | -347.8850  | -12.8848  | -60.8792  |
| 16    | -496.1930  | -18.3479  | 76.6489  | -305.9893  | -10.6234  | -53.4557  |
| 17    | -579.8505  | -20.1034  | 62.8665  | -196.7925  | -6.4300   | -38.8374  |
| 18    | -688.0009  | -22.4580  | 52.3491  | -86.6159   | -2.6750   | -24.8682  |
| 19    | -773.2804  | -23.8477  | 43.8160  | 22.5939    | 0.6580    | -16.6309  |
| 20    | -845.7989  | -24.7085  | 37.4985  | 128.5839   | -52.2952  | -142.3025 |
| 21    | -1455.1857 | 247.5528  | 766.5376 | 822.7775   | -273.4190 | -805.7793 |
| 22    | -836.8795  | 273.8425  | 809.7230 | 273.1551   | -242.9621 | -729.7300 |
| 23    | -314.3065  | 244.2833  | 736.6195 | -180.8647  | -213.2456 | -656.3855 |
| 24    | 113.8621   | 215.5884  | 666.3524 | -541.3524  | -182.5466 | -580.9545 |
| 25    | 449.3037   | 186.0182  | 594.0887 | -797.1505  | -153.6455 | -511.3485 |
| 26    | 681.8173   | 158.3549  | 527.9905 | -975.9978  | -127.0434 | -447.0831 |
| 27    | 840.5136   | 133.0566  | 466.8760 | -1072.6399 | -101.7529 | -385.7238 |
| 28    | 920.7178   | 109.1516  | 408.2022 | -1093.8226 | -76.0184  | -322.4306 |
| 29    | 929.2428   | 84.8586   | 348.2773 | -1025.4655 | -52.6442  | -266.4314 |
| 30    | 852.6629   | 62.9695   | 295.5261 | -916.4324  | -31.9630  | -215.9570 |
| 31    | 740.2783   | 43.7711   | 247.6022 | -757.0098  | -12.9150  | -168.6326 |
| 32    | 595.2327   | 27.1211   | 203.9370 | -546.9760  | 5.5261    | -121.4382 |
| 33    | 378.0045   | 9.2765    | 159.4312 | -614.2363  | -30.4676  | -93.0146  |
| 34    | -10.6475   | -1.4065   | 121.7975 | -555.2726  | -25.0660  | -80.7410  |
| 35    | -151.0011  | -7.4173   | 99.1774  | -481.4394  | -19.9225  | -68.5686  |
| 36    | -292.9899  | -12.4971  | 79.5508  | -333.7385  | -12.7641  | -49.8481  |
| 37    | -453.6896  | -17.5040  | 63.3325  | -238.5741  | -8.4434   | -37.7370  |
| 38    | -586.1255  | -20.7581  | 49.6593  | -136.8756  | -4.5055   | -26.2051  |
| 39    | -706.9376  | -23.1830  | 39.8195  | -31.1384   | -0.9683   | -16.7180  |
| 40    | -801.3718  | -24.4739  | 32.3206  | 124.7799   | -52.2480  | -141.0486 |
| 41    | -1423.5684 | 246.8678  | 756.5408 | 792.6721   | -272.5887 | -804.5416 |
| 42    | -807.1517  | 273.0170  | 808.5195 | 245.1351   | -242.1393 | -728.5587 |
| 43    | -287.1116  | 243.5019  | 735.5132 | -206.4324  | -212.4535 | -655.2864 |
| 44    | 137.8488   | 214.8503  | 665.3417 | -563.5005  | -181.8166 | -579.9511 |
| 45    | 469.7819   | 185.3465  | 593.1031 | -815.7495  | -152.9955 | -510.3731 |
| 46    | 698.6349   | 157.7865  | 527.0356 | -991.2371  | -126.4919 | -446.1087 |
| 47    | 854.0821   | 132.5810  | 465.7290 | -1084.8657 | -101.2809 | -384.5729 |
| 48    | 931.1223   | 108.7700  | 407.2838 | -1103.0543 | -75.6582  | -321.5641 |
| 49    | 936.9425   | 84.5646   | 347.4224 | -1032.0444 | -52.3777  | -265.4804 |
| 50    | 857.9267   | 62.7704   | 294.2242 | -920.9516  | -31.7750  | -214.7410 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 51    | 743.7562   | 43.6766   | 246.9236 | -760.0302  | -12.8404  | -167.9349 |
| 52    | 584.3950   | 26.2381   | 202.8842 | -533.8435  | 6.3866    | -120.3656 |
| 53    | 379.3158   | 9.3666    | 158.5656 | -615.9417  | -30.2080  | -93.1485  |
| 54    | -9.6500    | -1.3139   | 121.7559 | -556.1915  | -24.8417  | -80.8419  |
| 55    | -146.7869  | -7.1229   | 99.1396  | -481.7741  | -19.7285  | -68.4101  |
| 56    | -313.7305  | -13.2245  | 79.7011  | -333.6389  | -12.6389  | -49.8056  |
| 57    | -449.9839  | -17.1973  | 63.1185  | -238.3216  | -8.3610   | -37.6940  |
| 58    | -590.5935  | -20.7366  | 49.9780  | -136.6630  | -4.4629   | -26.1554  |
| 59    | -707.3250  | -23.0096  | 39.7460  | -31.0489   | -0.9576   | -16.7078  |
| 60    | -801.3851  | -24.2891  | 32.2463  | 124.4652   | -52.2609  | -141.0379 |
| 61    | -1488.8654 | 248.9935  | 756.4251 | 853.2185   | -274.5961 | -804.8010 |
| 62    | -865.3323  | 274.9569  | 808.6080 | 298.9977   | -244.0829 | -728.6119 |
| 63    | -337.5524  | 245.3328  | 735.5469 | -160.0754  | -214.2834 | -655.3284 |
| 64    | 94.8721    | 216.5421  | 665.3580 | -524.2721  | -183.5044 | -579.9647 |
| 65    | 430.4085   | 187.0189  | 593.1055 | -780.0768  | -154.6577 | -510.3577 |
| 66    | 677.8116   | 158.8105  | 526.8565 | -972.7501  | -127.5033 | -445.9203 |
| 67    | 856.8915   | 132.5989  | 465.7735 | -1087.6770 | -101.3059 | -384.6107 |
| 68    | 933.8840   | 108.8039  | 407.1206 | -1105.8865 | -75.6849  | -321.3367 |
| 69    | 939.5643   | 84.6178   | 347.1799 | -1034.7072 | -52.4498  | -265.3110 |
| 70    | 860.4896   | 62.8504   | 294.2777 | -923.6786  | -31.8675  | -214.8379 |
| 71    | 746.3834   | 43.7857   | 246.9989 | -762.8869  | -12.9548  | -168.0028 |
| 72    | 587.2357   | 26.3641   | 202.9159 | -536.9778  | 6.2549    | -120.3571 |
| 73    | 376.3271   | 9.1329    | 158.4874 | -615.8744  | -30.1871  | -93.1685  |
| 74    | 14.1435    | -0.0966   | 121.7151 | -556.1013  | -24.8281  | -80.8358  |
| 75    | -183.9153  | -8.8385   | 99.1348  | -481.7124  | -19.7295  | -68.4313  |
| 76    | -302.9049  | -12.7726  | 79.5976  | -333.5989  | -12.6334  | -49.8694  |
| 77    | -451.7607  | -17.2616  | 63.0351  | -238.2955  | -8.3604   | -37.6915  |
| 78    | -595.9596  | -20.9296  | 50.0236  | -136.6738  | -4.4620   | -26.1611  |
| 79    | -713.1796  | -23.2015  | 39.5885  | -31.0838   | -0.9590   | -16.7141  |
| 80    | -807.6727  | -24.4869  | 32.0762  | 124.4640   | -52.2582  | -141.0276 |
| 81    | -1518.4856 | 250.2254  | 756.2014 | 880.0883   | -275.8404 | -804.6295 |
| 82    | -894.6603  | 276.2848  | 808.5804 | 325.1397   | -245.4004 | -728.6124 |
| 83    | -366.8880  | 246.7634  | 735.5600 | -133.7830  | -215.7256 | -655.3611 |
| 84    | 79.1900    | 217.6100  | 665.4320 | -510.9995  | -184.5830 | -580.0260 |
| 85    | 407.4385   | 188.5030  | 593.0546 | -760.5511  | -156.1378 | -510.3295 |
| 86    | 702.0745   | 158.4466  | 527.1334 | -996.1026  | -127.1514 | -446.1505 |
| 87    | 859.0598   | 133.2575  | 465.3454 | -1091.3702 | -101.9713 | -384.1877 |
| 88    | 937.3956   | 109.4608  | 407.2012 | -1110.8564 | -76.3408  | -321.5576 |
| 89    | 953.6523   | 84.7224   | 347.6094 | -1049.0498 | -52.5365  | -265.7076 |
| 90    | 874.8872   | 62.9379   | 294.4001 | -938.2733  | -31.9501  | -214.8120 |
| 91    | 760.9316   | 43.8460   | 246.6647 | -777.5525  | -13.0095  | -167.7410 |
| 92    | 601.9122   | 26.4219   | 203.0580 | -551.8021  | 6.1923    | -120.5031 |
| 93    | 382.7531   | 8.7185    | 158.4509 | -615.7988  | -30.2003  | -93.0081  |
| 94    | -7.0735    | -2.1364   | 121.7139 | -556.0155  | -24.8419  | -80.8154  |
| 95    | -153.5777  | -8.2933   | 99.1040  | -481.6373  | -19.7274  | -68.4798  |
| 96    | -316.3878  | -14.1143  | 79.5727  | -333.5744  | -12.6458  | -49.8344  |
| 97    | -469.6689  | -18.6608  | 63.1160  | -238.2375  | -8.3625   | -37.7201  |
| 98    | -613.5192  | -22.2075  | 49.7426  | -136.6208  | -4.4630   | -26.1660  |
| 99    | -737.4791  | -24.6024  | 39.7699  | -31.0840   | -0.9593   | -16.7078  |
| 100   | -833.4283  | -25.8299  | 31.9724  | 124.4785   | -52.2569  | -141.0172 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 101   | -1521.8430 | 250.1167  | 755.7545 | 883.6738   | -275.7184 | -804.2108 |
| 102   | -898.0281  | 276.1629  | 808.3674 | 328.9076   | -245.2852 | -728.4461 |
| 103   | -370.8021  | 246.6492  | 735.3309 | -129.6239  | -215.6115 | -655.1046 |
| 104   | 69.1434    | 217.7088  | 665.1379 | -501.3040  | -184.6635 | -579.7290 |
| 105   | 407.4369   | 188.2040  | 592.8876 | -759.8892  | -155.8414 | -510.1441 |
| 106   | 698.6727   | 158.2904  | 526.7800 | -992.4650  | -126.9991 | -445.8235 |
| 107   | 858.0023   | 132.9690  | 465.4123 | -1089.5242 | -101.6764 | -384.2812 |
| 108   | 935.6760   | 109.1520  | 407.0198 | -1108.4563 | -76.0291  | -321.2326 |
| 109   | 942.2371   | 84.9569   | 346.8705 | -1038.1788 | -52.7800  | -264.9917 |
| 110   | 874.6538   | 62.4734   | 294.1548 | -937.0414  | -31.4941  | -214.6581 |
| 111   | 760.0330   | 43.3808   | 246.4952 | -775.6869  | -12.5491  | -167.5249 |
| 112   | 599.9890   | 25.9503   | 202.7258 | -548.8896  | 6.6689    | -120.2050 |
| 113   | 379.8876   | 8.2494    | 158.2459 | -615.4362  | -30.1445  | -93.0661  |
| 114   | -10.8063   | -2.6010   | 121.5015 | -555.5482  | -24.7794  | -80.8702  |
| 115   | -187.1299  | -10.0879  | 98.8731  | -481.0724  | -19.6786  | -68.5210  |
| 116   | -360.6389  | -16.1789  | 79.3239  | -333.0406  | -12.6085  | -49.8036  |
| 117   | -524.6003  | -20.9570  | 63.0090  | -237.8667  | -8.3426   | -37.6660  |
| 118   | -673.4140  | -24.4886  | 49.6405  | -136.3610  | -4.4510   | -26.1905  |
| 119   | -802.3853  | -26.8899  | 39.1426  | -30.9664   | -0.9551   | -16.7164  |
| 120   | -907.7622  | -28.2529  | 32.1231  | 124.0643   | -52.2429  | -141.0522 |
| 121   | -1529.5336 | 250.8841  | 749.1405 | 889.7110   | -276.3148 | -797.4506 |
| 122   | -904.1068  | 276.7536  | 801.6009 | 333.5289   | -245.8550 | -721.6694 |
| 123   | -371.5964  | 247.1001  | 728.5499 | -129.9205  | -216.0435 | -648.3292 |
| 124   | 61.3111    | 218.4547  | 658.3328 | -495.0742  | -185.4077 | -572.9571 |
| 125   | 405.3219   | 188.8220  | 586.2430 | -759.1400  | -156.4555 | -503.5016 |
| 126   | 698.1036   | 158.9269  | 520.1399 | -993.3402  | -127.6319 | -439.1319 |
| 127   | 856.1874   | 133.7980  | 458.4976 | -1089.6110 | -102.5269 | -377.3939 |
| 128   | 949.2584   | 109.4010  | 400.4056 | -1122.7565 | -76.3067  | -314.6456 |
| 129   | 957.0784   | 85.3033   | 340.2699 | -1054.3047 | -53.1672  | -258.3015 |
| 130   | 884.2601   | 63.4085   | 287.2639 | -949.2632  | -32.4631  | -207.8146 |
| 131   | 773.2626   | 44.4002   | 240.0230 | -792.0867  | -13.6249  | -160.9615 |
| 132   | 617.7315   | 27.1297   | 195.8804 | -571.2785  | 5.3653    | -113.2660 |
| 133   | 403.7730   | 9.6399    | 151.4093 | -608.0924  | -29.7921  | -92.9645  |
| 134   | 18.2588    | -1.1455   | 114.9438 | -547.9239  | -24.4500  | -80.6744  |
| 135   | -152.9929  | -8.5505   | 92.3686  | -473.4837  | -19.3735  | -68.4112  |
| 136   | -321.0685  | -14.5655  | 72.7785  | -326.5885  | -12.3659  | -49.7501  |
| 137   | -479.4789  | -19.2575  | 56.4671  | -232.6073  | -8.1566   | -37.5954  |
| 138   | -622.6624  | -22.7339  | 43.1300  | -133.0206  | -4.3431   | -26.0781  |
| 139   | -746.0350  | -25.0664  | 32.9329  | -30.3228   | -0.9356   | -16.5931  |
| 140   | -846.1573  | -26.3864  | 25.6614  | 119.2303   | -52.3133  | -138.1574 |
| 141   | -1414.7632 | 251.8956  | 586.2318 | 890.3865   | -282.5643 | -641.7019 |
| 142   | -895.5007  | 282.7097  | 645.1794 | 422.7054   | -256.0641 | -576.0489 |
| 143   | -455.0209  | 257.0661  | 582.1152 | 29.5746    | -230.0875 | -512.6852 |
| 144   | -61.0589   | 231.1026  | 520.9669 | -331.5863  | -203.3400 | -447.6530 |
| 145   | 262.0744   | 205.7484  | 458.3485 | -610.3181  | -181.7536 | -395.0312 |
| 146   | 570.5910   | 183.2379  | 408.3440 | -872.4423  | -155.4922 | -335.1112 |
| 147   | 784.0100   | 159.0274  | 350.6835 | -1043.7960 | -131.2830 | -277.4723 |
| 148   | 945.5093   | 135.4857  | 295.7414 | -1050.1344 | -109.3780 | -231.7476 |
| 149   | 931.4959   | 114.8535  | 252.4706 | -1094.6534 | -90.1989  | -188.7097 |
| 150   | 962.8895   | 96.8716   | 211.5271 | -1103.9786 | -74.3445  | -152.8244 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| 151   | 978.5846 | 81.2817   | 178.3893 | -743.3725 | -54.8107  | -123.9841 |
| 152   | 929.9834 | 64.9651   | 142.0737 | -719.8608 | -47.6753  | -109.0508 |
| 153   | 719.8608 | 47.6753   | 109.0508 | -673.1003 | -40.3354  | -93.9990  |
| 154   | 673.1003 | 40.3354   | 93.9990  | -601.4557 | -32.8366  | -79.2128  |
| 155   | 601.4557 | 32.8366   | 79.2128  | -582.1130 | -29.0434  | -72.0179  |
| 156   | 582.1130 | 29.0434   | 72.0179  | -464.4593 | -21.3859  | -56.8700  |
| 157   | 464.4593 | 21.3859   | 56.8700  | -319.8320 | -13.6567  | -41.7513  |
| 158   | 319.8320 | 13.6567   | 41.7513  | -0.9764   | 0.2712    | -0.0069   |
| 159   | 67.4081  | 1.5172    | 10.4695  | -0.4927   | 0.2738    | -0.0072   |
| 160   | 18.9201  | -0.3850   | 4.0244   | 0.0000    | 0.2738    | -0.0074   |



ENVOLVENTES DE ESFUERZOS CON IMPACTO

ENVOL. MIN. FLECTORES -IPF

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====    |
| 1     | -0.0543    | 210.4306  | 720.6477 | 45.9261   | 25.5191   | -0.0047  |
| 2     | -139.2719  | -77.3830  | -0.3976  | 278.5381  | 77.3830   | 0.4000   |
| 3     | -278.5342  | -77.3833  | -0.5256  | 417.8672  | 77.3833   | 0.5270   |
| 4     | -417.8580  | -77.3601  | -0.6706  | 557.0692  | 77.3601   | 0.6689   |
| 5     | -557.0818  | -77.3596  | -0.6790  | 696.3097  | 77.3596   | 0.6784   |
| 6     | -696.3097  | -77.3864  | -0.9914  | 835.6271  | 77.3864   | 0.9904   |
| 7     | -835.6379  | -77.3815  | -0.9839  | 974.9529  | 77.3815   | 0.9829   |
| 8     | -974.9586  | -77.3148  | -1.7364  | 1114.1285 | 77.3148   | 1.7358   |
| 9     | -1114.1200 | -77.2768  | -1.2460  | 1287.5641 | 100.3777  | 2.0686   |
| 10    | -1287.5535 | -100.3176 | -3.1626  | 1470.6882 | 104.0674  | 2.8304   |
| 11    | -1470.7123 | -104.0945 | -2.7148  | 1662.2498 | 107.8466  | 2.3897   |
| 12    | -1662.2480 | -107.8791 | -3.0606  | 1861.9082 | 112.8765  | 2.6325   |
| 13    | -1861.8984 | -112.8666 | -2.6540  | 2069.5554 | 117.8656  | 2.2489   |
| 14    | -2069.5684 | -117.8040 | -3.0365  | 2285.1631 | 122.8050  | 2.6884   |
| 15    | -2285.1438 | -122.8255 | -3.3671  | 2508.7046 | 126.5751  | 3.0079   |
| 16    | -2508.6997 | -126.5728 | -2.2751  | 2740.8352 | 130.3213  | 2.1426   |
| 17    | -2741.2720 | -135.3946 | -3.8349  | 2990.4268 | 140.3954  | 3.5583   |
| 18    | -3119.4897 | -284.0609 | 11.0703  | 3635.3906 | 289.0646  | -11.5148 |
| 19    | -3740.6653 | -409.3437 | 21.2843  | 4480.8076 | 414.3446  | -21.4410 |
| 20    | -4566.9160 | -522.3916 | 29.3901  | 5509.8120 | 418.6576  | -21.7017 |
| 21    | -5573.0298 | 617.3978  | -51.9418 | 4018.1528 | -658.0439 | 53.9007  |
| 22    | -4076.5857 | 610.9307  | -50.9975 | 2839.5381 | -500.8341 | 37.9896  |
| 23    | -2980.4880 | 369.9808  | -27.4623 | 2147.9751 | -369.9845 | 27.6218  |
| 24    | -2268.7800 | 262.6110  | -17.1098 | 1677.8782 | -262.6094 | 17.1066  |
| 25    | -1841.5380 | 127.5859  | -2.2321  | 1554.4570 | -127.5840 | 2.3591   |
| 26    | -1738.8804 | -8.5631   | 2.7546   | 1758.1350 | 8.5630    | -2.5144  |
| 27    | -1758.1533 | -8.5695   | 1.6476   | 1777.4268 | 8.5672    | -1.5321  |
| 28    | -1777.4111 | -8.5774   | 1.5459   | 1796.6907 | 8.5765    | -1.4952  |
| 29    | -1796.6779 | -8.5776   | 0.9843   | 1815.9790 | 8.5776    | -0.8560  |
| 30    | -1815.9570 | -8.5790   | -0.1279  | 1835.2566 | 8.5786    | 0.1695   |
| 31    | -1835.2357 | -8.5860   | 0.3759   | 1854.5642 | 8.5843    | -0.3217  |
| 32    | -1854.5615 | -8.5476   | -1.3266  | 1873.7897 | 8.5505    | 1.4173   |
| 33    | -1873.8059 | -8.6106   | -1.4316  | 1937.0961 | 58.1121   | 0.1030   |
| 34    | -1937.1173 | -58.1906  | -0.1302  | 2073.0615 | 63.1954   | -0.2592  |
| 35    | -2073.0552 | -63.2104  | -0.8879  | 2221.5254 | 68.2121   | 0.6006   |
| 36    | -2221.5513 | -68.2400  | -1.8204  | 2382.5679 | 74.4890   | 1.2777   |
| 37    | -2434.9573 | -156.7374 | 23.8958  | 2794.2590 | 162.9851  | -24.2931 |
| 38    | -2920.6018 | -272.2995 | 14.9024  | 3538.1523 | 277.2981  | -15.2140 |
| 39    | -3703.3721 | -413.3895 | 29.7094  | 4639.8965 | 418.3871  | -30.0134 |
| 40    | -4778.3345 | -548.6195 | 39.7038  | 6020.3560 | 447.6802  | -31.4630 |
| 41    | -6121.5181 | 633.3060  | -50.2360 | 4532.0176 | -673.6703 | 52.9122  |
| 42    | -4593.3037 | 626.6361  | -50.1931 | 3412.9028 | -519.5021 | 36.9405  |
| 43    | -3565.2642 | 389.0250  | -25.8559 | 2689.7146 | -389.0250 | 26.0384  |
| 44    | -2827.1919 | 252.2895  | -13.0496 | 2259.5791 | -252.2899 | 13.1241  |
| 45    | -2376.8135 | 147.9239  | -1.2726  | 2044.0087 | -147.9189 | 1.4195   |
| 46    | -2255.3318 | 12.9555   | 3.4531   | 2226.1943 | -12.9484  | -3.2426  |
| 47    | -2226.1624 | 12.9315   | 2.6500   | 2197.0454 | -12.9268  | -2.5290  |
| 48    | -2197.0129 | 12.8891   | 2.0454   | 2168.0200 | -12.8919  | -1.9361  |
| 49    | -2168.0374 | 12.9480   | 1.3030   | 2138.8826 | -12.9531  | -1.2406  |
| 50    | -2138.8418 | 13.0049   | 1.2511   | 2109.5625 | -13.0113  | -1.1741  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====    |
| 51    | -2109.5723 | 13.0520   | 0.0381   | 2080.1851 | -13.0631  | 0.0479   |
| 52    | -2080.1855 | 13.1174   | -0.0755  | 2050.6504 | -13.1222  | 0.1243   |
| 53    | -2050.6270 | 13.1430   | -1.2841  | 2050.4438 | 38.7890   | 0.0733   |
| 54    | -2050.4016 | -38.7911  | -0.7350  | 2142.7017 | 43.7905   | 0.3231   |
| 55    | -2142.7056 | -43.7726  | -0.8468  | 2247.4270 | 48.7698   | 0.4140   |
| 56    | -2247.4297 | -48.7378  | -0.4330  | 2364.5627 | 54.9887   | -0.0030  |
| 57    | -2443.1423 | -176.5649 | 4.1795   | 2847.1504 | 182.8165  | -4.6300  |
| 58    | -2962.5615 | -287.0371 | 16.5875  | 3613.2490 | 292.0341  | -16.9515 |
| 59    | -3781.2170 | -428.6807 | 29.4829  | 4752.0615 | 433.6786  | -29.5797 |
| 60    | -4891.9722 | -564.1118 | 39.0946  | 6168.7202 | 463.4021  | -30.9788 |
| 61    | -6269.8525 | 637.4773  | -48.8798 | 4671.0542 | -677.6014 | 51.5147  |
| 62    | -4732.6226 | 630.5828  | -49.9448 | 3548.7017 | -523.5790 | 36.8606  |
| 63    | -3702.1533 | 393.1219  | -25.8935 | 2817.4414 | -393.1265 | 26.0739  |
| 64    | -2956.8323 | 256.4335  | -13.1785 | 2379.9341 | -256.4440 | 13.2546  |
| 65    | -2499.0232 | 152.1500  | -1.4235  | 2156.7183 | -152.1594 | 1.5035   |
| 66    | -2369.5381 | 18.2100   | 3.6275   | 2328.5479 | -18.2131  | -3.4096  |
| 67    | -2328.6008 | 18.2276   | 2.1795   | 2287.5796 | -18.2282  | -2.0391  |
| 68    | -2287.5842 | 18.2560   | 2.0506   | 2246.5107 | -18.2564  | -2.0122  |
| 69    | -2246.5176 | 18.2187   | 1.5004   | 2205.5454 | -18.2189  | -1.4077  |
| 70    | -2205.5288 | 18.2379   | 0.7518   | 2164.4846 | -18.2371  | -0.6149  |
| 71    | -2164.5327 | 18.2318   | -0.6118  | 2123.5227 | -18.2315  | 0.6819   |
| 72    | -2123.5376 | 18.2630   | -0.6937  | 2082.4419 | -18.2645  | 0.7186   |
| 73    | -2082.4343 | 18.2786   | -1.3595  | 2069.9976 | 33.7635   | 0.1539   |
| 74    | -2069.9478 | -33.8060  | -1.3431  | 2151.0049 | 38.8076   | 0.9149   |
| 75    | -2151.0195 | -38.8384  | -0.8075  | 2244.6177 | 43.8383   | 0.4044   |
| 76    | -2244.6147 | -43.8265  | -1.2164  | 2350.7688 | 50.0776   | 0.8178   |
| 77    | -2437.5552 | -181.3362 | 4.0154   | 2852.0146 | 187.5850  | -4.5518  |
| 78    | -2967.7197 | -291.8526 | 17.1379  | 3629.4504 | 296.8497  | -17.4655 |
| 79    | -3797.7178 | -433.5051 | 29.1644  | 4779.3779 | 438.5064  | -29.1648 |
| 80    | -4919.4229 | -568.9479 | 38.6946  | 6207.0029 | 468.2176  | -30.5670 |
| 81    | -6308.1133 | 637.5458  | -49.7311 | 4709.1748 | -677.6954 | 52.2823  |
| 82    | -4770.7656 | 630.6646  | -49.6031 | 3586.4907 | -523.7136 | 36.3719  |
| 83    | -3739.9966 | 393.2810  | -25.1509 | 2855.2178 | -393.2822 | 25.4079  |
| 84    | -2994.5154 | 256.6179  | -13.3792 | 2417.2156 | -256.6204 | 13.4854  |
| 85    | -2536.1902 | 152.3415  | -1.1414  | 2193.3713 | -152.3424 | 1.2799   |
| 86    | -2402.1528 | 21.1056   | 2.7337   | 2354.6646 | -21.1073  | -2.5766  |
| 87    | -2354.6736 | 21.0851   | 3.1146   | 2307.2490 | -21.0821  | -3.0530  |
| 88    | -2307.3027 | 21.0691   | 1.8323   | 2259.8977 | -21.0744  | -1.6074  |
| 89    | -2259.9031 | 21.1336   | 0.3798   | 2212.3384 | -21.1444  | -0.2696  |
| 90    | -2212.3550 | 21.1964   | 0.2585   | 2164.6606 | -21.2029  | -0.2600  |
| 91    | -2164.6221 | 21.3072   | 0.2519   | 2116.6741 | -21.3036  | -0.1578  |
| 92    | -2116.7119 | 21.2127   | -1.6873  | 2068.9866 | -21.2057  | 1.7652   |
| 93    | -2068.9968 | 21.1391   | -1.1025  | 2050.0012 | 30.9041   | -0.2054  |
| 94    | -2049.9988 | -30.9149  | -0.9759  | 2124.5444 | 35.9165   | 0.5941   |
| 95    | -2124.5505 | -35.9601  | -1.2606  | 2211.7402 | 40.9630   | 0.8829   |
| 96    | -2211.7480 | -40.9754  | -1.4320  | 2311.4253 | 47.2255   | 0.9672   |
| 97    | -2400.5393 | -181.1835 | 4.5950   | 2814.7961 | 187.4341  | -5.0155  |
| 98    | -2930.6138 | -291.6837 | 16.0897  | 3592.1514 | 296.6811  | -16.4809 |
| 99    | -3760.5269 | -433.3310 | 30.3456  | 4741.5132 | 438.3290  | -30.4388 |
| 100   | -4881.5430 | -568.7681 | 38.6405  | 6168.7119 | 468.0649  | -30.3326 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 101   | -6269.8071 | 632.7659  | -50.4515 | 4681.6631 | -672.8862 | 52.9339  |
| 102   | -4743.2705 | 625.8698  | -48.8062 | 3570.2209 | -518.9484 | 35.4573  |
| 103   | -3723.6951 | 388.5083  | -25.2586 | 2849.6375 | -388.5094 | 25.5476  |
| 104   | -2988.9185 | 251.8570  | -12.8212 | 2422.1270 | -251.8604 | 12.9177  |
| 105   | -2541.1440 | 147.6246  | -1.0599  | 2208.9414 | -147.6246 | 1.2144   |
| 106   | -2403.7266 | 26.0174   | 3.3319   | 2345.1785 | -26.0179  | -3.1221  |
| 107   | -2345.1550 | 26.0343   | 2.5796   | 2286.5896 | -26.0401  | -2.4574  |
| 108   | -2286.5640 | 26.0979   | 1.8365   | 2227.8298 | -26.1070  | -1.7758  |
| 109   | -2227.7998 | 26.1390   | 1.7767   | 2168.9961 | -26.1364  | -1.6869  |
| 110   | -2169.0217 | 26.0892   | 0.5014   | 2110.3372 | -26.0860  | -0.4079  |
| 111   | -2110.3650 | 26.1024   | 0.3925   | 2051.6306 | -26.1129  | -0.3285  |
| 112   | -2051.6470 | 26.2340   | -0.8450  | 1992.6162 | -26.2426  | 0.9124   |
| 113   | -1992.6003 | 26.2571   | -0.9315  | 1959.2742 | 25.6458   | -0.3511  |
| 114   | -1959.2852 | -25.6075  | -0.7836  | 2021.8948 | 30.6075   | 0.4089   |
| 115   | -2021.9037 | -30.6174  | -1.0544  | 2097.0537 | 35.6177   | 0.6719   |
| 116   | -2097.0229 | -35.6196  | -1.1433  | 2184.6392 | 41.8721   | 0.6155   |
| 117   | -2276.6038 | -176.8204 | 5.4771   | 2680.9546 | 183.0711  | -5.9635  |
| 118   | -2798.3850 | -287.4370 | 17.0660  | 3450.1777 | 292.4368  | -17.2314 |
| 119   | -3620.2490 | -429.1779 | 29.0008  | 4592.2070 | 434.1788  | -29.2585 |
| 120   | -4733.2710 | -564.6340 | 41.3511  | 6011.2500 | 464.2890  | -33.1765 |
| 121   | -6112.6147 | 616.7275  | -50.0127 | 4561.6655 | -550.3280 | 39.2759  |
| 122   | -4623.5391 | 503.3395  | -35.2114 | 3491.0234 | -503.3400 | 35.4045  |
| 123   | -3645.5366 | 373.1011  | -25.1611 | 2806.1084 | -373.1010 | 25.3519  |
| 124   | -2946.9519 | 236.9779  | -11.7611 | 2413.7852 | -236.9785 | 11.8489  |
| 125   | -2533.3889 | 127.6089  | -19.9471 | 2246.2065 | -127.6057 | 20.1826  |
| 126   | -2379.0842 | 45.2490   | 2.9002   | 2277.2605 | -45.2379  | -2.7651  |
| 127   | -2277.2483 | 45.1759   | 2.8889   | 2175.6509 | -45.1695  | -2.7785  |
| 128   | -2175.6553 | 45.1754   | 1.5642   | 2073.9805 | -45.1754  | -1.4414  |
| 129   | -2073.9565 | 45.1791   | 1.4475   | 1972.2972 | -45.1849  | -1.4083  |
| 130   | -1972.3267 | 45.2301   | 0.9266   | 1870.5737 | -45.2362  | -0.8010  |
| 131   | -1870.5488 | 45.2752   | -0.3013  | 1768.6207 | -45.2789  | 0.3785   |
| 132   | -1768.6322 | 45.2930   | -0.2866  | 1666.7341 | -45.2975  | 0.3119   |
| 133   | -1666.6855 | 45.3104   | -0.8072  | 1564.7338 | -45.3100  | 0.8551   |
| 134   | -1564.7058 | 45.2935   | -1.3654  | 1529.0643 | 7.8595    | -0.4138  |
| 135   | -1529.0818 | -7.8264   | 0.0003   | 1552.9368 | 12.8246   | -0.3766  |
| 136   | -1552.9396 | -12.8380  | -0.4156  | 1589.3239 | 19.0872   | -0.0965  |
| 137   | -1711.2280 | -155.3185 | 5.9864   | 2067.2195 | 161.5695  | -6.4984  |
| 138   | -2207.5005 | -296.6505 | 20.7858  | 2880.0903 | 301.6524  | -21.1019 |
| 139   | -3001.0706 | -409.0662 | 30.9086  | 3927.5586 | 414.0657  | -31.1825 |
| 140   | -4081.0610 | -544.9127 | 42.1288  | 5314.7627 | 445.5169  | -34.4513 |
| 141   | -5419.2017 | 571.5830  | -38.9165 | 4363.8115 | -512.3726 | 29.8794  |
| 142   | -4405.7671 | 474.1580  | -28.2825 | 3552.1748 | -474.1602 | 28.2915  |
| 143   | -3660.5847 | 366.1258  | -17.4293 | 3001.7029 | -366.1285 | 17.5530  |
| 144   | -3112.9609 | 245.8849  | -8.9152  | 2670.1501 | -245.8834 | 9.1548   |
| 145   | -2799.6831 | 102.2948  | 4.7636   | 2615.5962 | -102.2891 | -4.6740  |
| 146   | -2624.2744 | 97.2019   | 4.6420   | 2449.2891 | -97.1880  | -4.5309  |
| 147   | -2449.3125 | 97.1139   | 4.5236   | 2274.5054 | -97.1125  | -4.4331  |
| 148   | -2274.5139 | 97.1059   | 3.7786   | 2099.7869 | -97.1188  | -3.5984  |
| 149   | -2099.7720 | 97.1445   | 2.8859   | 1924.9116 | -97.1345  | -2.8038  |
| 150   | -1924.9216 | 97.0981   | 2.7980   | 1750.1691 | -97.0884  | -2.7202  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|-----------|-----------|----------|
| 151   | -1750.1731 | 97.1425   | 2.1390  | 1575.2402 | -97.1571  | -1.9996  |
| 152   | -1575.2283 | 97.1795   | 1.5338  | 1400.2888 | -97.1793  | -1.4754  |
| 153   | -1400.2904 | 97.1281   | 1.4715  | 1225.4823 | -97.1299  | -1.4765  |
| 154   | -1225.4844 | 97.2114   | 1.4948  | 1050.4790 | -97.2298  | -1.4107  |
| 155   | -1050.4744 | 97.2627   | 0.7690  | 875.4216  | -97.2685  | -0.6526  |
| 156   | -875.4068  | 97.2649   | 0.3674  | 700.2965  | -97.2636  | -0.3574  |
| 157   | -700.2784  | 97.2747   | 0.5902  | 525.2211  | -97.2756  | -0.5965  |
| 158   | -525.2209  | 97.2646   | 0.4211  | 350.1165  | -97.2639  | -0.3810  |
| 159   | -350.1089  | 97.2595   | 0.2768  | 175.0845  | -97.2560  | -0.2579  |
| 160   | -175.0785  | 97.2491   | 0.2001  | 0.0230    | 98.4459   | 246.8560 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | -0.5966   | -0.0220   | 0.0009  | -155.6720 | 24.9760   | 62.4893 |
| 102   | -155.6720 | 24.9760   | 62.4893 | -101.9953 | 22.4762   | 56.2028 |
| 103   | -101.9953 | 22.4762   | 56.2028 | -54.5790  | 19.9760   | 49.9064 |
| 104   | -54.5790  | 19.9760   | 49.9064 | -13.3854  | 16.8507   | 42.0785 |
| 105   | -13.3854  | 16.8507   | 42.0785 | 21.2440   | 13.7262   | 34.2668 |
| 106   | 21.2440   | 13.7262   | 34.2668 | 49.6160   | 11.2269   | 28.0252 |
| 107   | 49.6160   | 11.2269   | 28.0252 | 71.7372   | 8.7257    | 21.7889 |
| 108   | 71.7372   | 8.7257    | 21.7889 | 87.5930   | 5.5963    | 13.9820 |
| 109   | 87.5930   | 5.5963    | 13.9820 | 96.9282   | 2.4749    | 6.1933  |
| 110   | 96.9282   | 2.4749    | 6.1933  | 0.7317    | -0.0576   | 0.0005  |
| 111   | 0.7317    | -0.0576   | 0.0005  | 0.6830    | -0.0654   | 0.0008  |
| 112   | 0.6830    | -0.0654   | 0.0008  | 0.5358    | -0.0655   | 0.0010  |
| 113   | 0.5358    | -0.0655   | 0.0010  | 0.3748    | -0.0632   | 0.0011  |
| 114   | 0.3748    | -0.0632   | 0.0011  | 0.2327    | -0.0632   | 0.0012  |
| 115   | 0.2327    | -0.0632   | 0.0012  | 0.0906    | -0.0632   | 0.0013  |
| 116   | 0.0906    | -0.0632   | 0.0013  | -0.0502   | -0.0616   | 0.0013  |
| 117   | -0.0502   | -0.0616   | 0.0013  | -0.2007   | -0.0655   | 0.0013  |
| 118   | -0.2007   | -0.0655   | 0.0013  | -0.3480   | -0.0655   | 0.0012  |
| 119   | -0.3480   | -0.0655   | 0.0012  | -0.4520   | -0.0597   | 0.0010  |
| 120   | -0.4520   | -0.0597   | 0.0010  | -0.6043   | -0.0221   | 0.0010  |
| 121   | -0.6043   | -0.0221   | 0.0010  | -156.5914 | 25.0923   | 61.7674 |
| 122   | -156.5914 | 25.0923   | 61.7674 | -102.6515 | 22.5922   | 55.4796 |
| 123   | -102.6515 | 22.5922   | 55.4796 | -54.9640  | 20.0922   | 49.1929 |
| 124   | -54.9640  | 20.0922   | 49.1929 | -13.5156  | 16.9674   | 41.3721 |
| 125   | -13.5156  | 16.9674   | 41.3721 | 21.3705   | 13.8431   | 33.5574 |
| 126   | 21.3705   | 13.8431   | 33.5574 | 50.0118   | 11.3435   | 27.3078 |
| 127   | 50.0118   | 11.3435   | 27.3078 | 72.3941   | 8.8442    | 21.0753 |
| 128   | 72.3941   | 8.8442    | 21.0753 | 88.5391   | 5.7201    | 13.2806 |
| 129   | 88.5391   | 5.7201    | 13.2806 | 98.1270   | 2.5937    | 5.4763  |
| 130   | 98.1270   | 2.5937    | 5.4763  | 0.8166    | -0.0655   | 0.0006  |
| 131   | 0.8166    | -0.0655   | 0.0006  | 0.6692    | -0.0655   | 0.0008  |
| 132   | 0.6692    | -0.0655   | 0.0008  | 0.5033    | -0.0632   | 0.0009  |
| 133   | 0.5033    | -0.0632   | 0.0009  | 0.3611    | -0.0632   | 0.0011  |
| 134   | 0.3611    | -0.0632   | 0.0011  | 0.2190    | -0.0631   | 0.0012  |
| 135   | 0.2190    | -0.0631   | 0.0012  | 0.0786    | -0.0645   | 0.0012  |
| 136   | 0.0786    | -0.0645   | 0.0012  | -0.0634   | -0.0616   | 0.0012  |
| 137   | -0.0634   | -0.0616   | 0.0012  | -0.2149   | -0.0655   | 0.0012  |
| 138   | -0.2149   | -0.0655   | 0.0012  | -0.3622   | -0.0655   | 0.0012  |
| 139   | -0.3622   | -0.0655   | 0.0012  | -0.5096   | -0.0655   | 0.0010  |
| 140   | -0.5096   | -0.0655   | 0.0010  | -0.6334   | -0.0228   | 0.0009  |
| 141   | -0.6334   | -0.0228   | 0.0009  | -163.6837 | 26.5329   | 48.2565 |
| 142   | -163.6837 | 26.5329   | 48.2565 | -118.6696 | 24.0331   | 41.9919 |
| 143   | -118.6696 | 24.0331   | 41.9919 | -77.6763  | 21.5329   | 35.7290 |
| 144   | -77.6763  | 21.5329   | 35.7290 | -40.6636  | 19.0336   | 29.4418 |
| 145   | -40.6636  | 19.0336   | 29.4418 | -7.6687   | 17.7836   | 26.3140 |
| 146   | -7.6687   | 17.7836   | 26.3140 | 21.0864   | 15.2840   | 20.0571 |
| 147   | 21.0864   | 15.2840   | 20.0571 | 45.8489   | 12.7849   | 13.8106 |
| 148   | 45.8489   | 12.7849   | 13.8106 | 66.5993   | 10.2844   | 7.5778  |
| 149   | 66.5993   | 10.2844   | 7.5778  | 83.3606   | 7.7844    | 1.3379  |
| 150   | 83.3606   | 7.7844    | 1.3379  | 0.7578    | -0.0421   | 0.0002  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 0.7578   | -0.0421   | 0.0002  | 0.9714   | -0.0600   | 0.0006  |
| 152   | 0.9714   | -0.0600   | 0.0006  | 0.8634   | -0.0600   | 0.0008  |
| 153   | 0.8634   | -0.0600   | 0.0008  | 0.7990   | -0.0634   | 0.0008  |
| 154   | 0.7990   | -0.0634   | 0.0008  | 0.6677   | -0.0618   | 0.0010  |
| 155   | 0.6677   | -0.0618   | 0.0010  | 0.5919   | -0.0658   | 0.0014  |
| 156   | 0.5919   | -0.0658   | 0.0014  | 0.4736   | -0.0658   | 0.0015  |
| 157   | 0.4736   | -0.0658   | 0.0015  | 0.3496   | -0.0648   | 0.0014  |
| 158   | 0.3496   | -0.0648   | 0.0014  | 0.2283   | -0.0634   | 0.0015  |
| 159   | 0.2283   | -0.0634   | 0.0015  | 0.1184   | -0.0658   | 0.0016  |
| 160   | 0.1184   | -0.0658   | 0.0016  | 0.0000   | -0.0658   | 0.0017  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0002   | -0.0003   | -0.1613  | 1.1704    | -0.0439   | -0.4029  |
| 2     | 1.1704    | -0.0439   | -0.4029  | 6.5582    | -0.2613   | -1.1260  |
| 3     | 6.5582    | -0.2613   | -1.1260  | 15.2302   | -0.6511   | -2.1641  |
| 4     | 15.2302   | -0.6511   | -2.1641  | 26.2653   | -1.2124   | -3.5191  |
| 5     | 26.2653   | -1.2124   | -3.5191  | 30.9861   | -1.5565   | -4.3103  |
| 6     | 30.9861   | -1.5565   | -4.3103  | 43.1445   | -2.3692   | -6.1328  |
| 7     | 43.1445   | -2.3692   | -6.1328  | 55.3022   | -3.3479   | -8.2587  |
| 8     | 55.3022   | -3.3479   | -8.2587  | 66.6133   | -4.4897   | -10.7024 |
| 9     | 66.6133   | -4.4897   | -10.7024 | 76.2883   | -5.7890   | -13.4611 |
| 10    | 76.2883   | -5.7890   | -13.4611 | 83.5562   | -6.6118   | -14.9459 |
| 11    | 83.5562   | -6.6118   | -14.9459 | 78.8645   | -8.0161   | -18.1542 |
| 12    | 78.8645   | -8.0161   | -18.1542 | 79.7421   | -9.6784   | -21.6849 |
| 13    | 79.7421   | -9.6784   | -21.6849 | 76.4436   | -11.4810  | -25.5354 |
| 14    | 76.4436   | -11.4810  | -25.5354 | 68.4069   | -13.4114  | -29.6840 |
| 15    | 68.4069   | -13.4114  | -29.6840 | 55.1635   | -14.8370  | -32.6106 |
| 16    | 55.1635   | -14.8370  | -32.6106 | 31.5828   | -16.5305  | -36.5344 |
| 17    | 31.5828   | -16.5305  | -36.5344 | 7.8145    | -18.7464  | -41.4819 |
| 18    | 7.8145    | -18.7464  | -41.4819 | -22.1339  | -21.0578  | -46.7747 |
| 19    | -22.1339  | -21.0578  | -46.7747 | -58.3876  | -23.4597  | -52.3785 |
| 20    | -58.3876  | -23.4597  | -52.3785 | -101.1766 | -10.9087  | -28.7423 |
| 21    | -101.1766 | -10.9087  | -28.7423 | -92.8705  | 2.8158    | -2.7662  |
| 22    | -92.8705  | 2.8158    | -2.7662  | -82.3477  | 2.6797    | -3.4770  |
| 23    | -82.3477  | 2.6797    | -3.4770  | -69.8760  | 2.4542    | -4.4190  |
| 24    | -69.8760  | 2.4542    | -4.4190  | -55.7910  | 2.1308    | -5.5995  |
| 25    | -55.7910  | 2.1308    | -5.5995  | -34.2005  | 1.4442    | -7.8769  |
| 26    | -34.2005  | 1.4442    | -7.8769  | -17.4155  | 0.8426    | -9.7264  |
| 27    | -17.4155  | 0.8426    | -9.7264  | -0.6857   | 0.1197    | -11.8196 |
| 28    | -0.6857   | 0.1197    | -11.8196 | 15.3400   | -0.7287   | -14.1681 |
| 29    | 15.3400   | -0.7287   | -14.1681 | 39.0653   | -2.2441   | -18.1649 |
| 30    | 39.0653   | -2.2441   | -18.1649 | 51.5628   | -3.4192   | -21.1529 |
| 31    | 51.5628   | -3.4192   | -21.1529 | 60.9890   | -4.7281   | -24.3930 |
| 32    | 60.9890   | -4.7281   | -24.3930 | 75.5220   | -6.3116   | -28.1574 |
| 33    | 75.5220   | -6.3116   | -28.1574 | 75.8443   | -8.5698   | -33.6221 |
| 34    | 75.8443   | -8.5698   | -33.6221 | 70.7076   | -10.3299  | -37.7634 |
| 35    | 70.7076   | -10.3299  | -37.7634 | 59.4552   | -12.2130  | -42.1413 |
| 36    | 59.4552   | -12.2130  | -42.1413 | 46.8911   | -14.6334  | -47.6759 |
| 37    | 46.8911   | -14.6334  | -47.6759 | 20.1824   | -17.4262  | -54.3111 |
| 38    | 20.1824   | -17.4262  | -54.3111 | -14.3785  | -19.6931  | -59.6319 |
| 39    | -14.3785  | -19.6931  | -59.6319 | -57.1861  | -22.0518  | -65.2327 |
| 40    | -57.1861  | -22.0518  | -65.2327 | -108.5129 | -10.7073  | -36.9631 |
| 41    | -108.5129 | -10.7073  | -36.9631 | -99.6815  | 3.0216    | -3.4338  |
| 42    | -99.6815  | 3.0216    | -3.4338  | -88.5950  | 2.8819    | -4.1374  |
| 43    | -88.5950  | 2.8819    | -4.1374  | -75.5291  | 2.6517    | -5.0831  |
| 44    | -75.5291  | 2.6517    | -5.0831  | -60.8396  | 2.3217    | -6.2759  |
| 45    | -60.8396  | 2.3217    | -6.2759  | -38.5574  | 1.6249    | -8.5567  |
| 46    | -38.5574  | 1.6249    | -8.5567  | -21.1911  | 1.0155    | -10.4065 |
| 47    | -21.1911  | 1.0155    | -10.4065 | -3.9049   | 0.2849    | -12.5037 |
| 48    | -3.9049   | 0.2849    | -12.5037 | 12.6462   | -0.5716   | -14.8537 |
| 49    | 12.6462   | -0.5716   | -14.8537 | 36.9222   | -2.0992   | -18.8631 |
| 50    | 36.9222   | -2.0992   | -18.8631 | 49.8638   | -3.2825   | -21.8507 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | 49.8638   | -3.2825   | -21.8507 | 59.6855   | -4.5985   | -25.0902 |
| 52    | 59.6855   | -4.5985   | -25.0902 | 74.6059   | -6.1954   | -28.8773 |
| 53    | 74.6059   | -6.1954   | -28.8773 | 75.2488   | -8.4626   | -34.3068 |
| 54    | 75.2488   | -8.4626   | -34.3068 | 70.3756   | -10.2302  | -38.4419 |
| 55    | 70.3756   | -10.2302  | -38.4419 | 59.3391   | -12.1204  | -42.8508 |
| 56    | 59.3391   | -12.1204  | -42.8508 | 46.9887   | -14.5480  | -48.3929 |
| 57    | 46.9887   | -14.5480  | -48.3929 | 20.4611   | -17.3401  | -55.0119 |
| 58    | 20.4611   | -17.3401  | -55.0119 | -13.9304  | -19.6108  | -60.3510 |
| 59    | -13.9304  | -19.6108  | -60.3510 | -56.5426  | -21.9724  | -65.9558 |
| 60    | -56.5426  | -21.9724  | -65.9558 | -107.6685 | -10.6799  | -37.3315 |
| 61    | -107.6685 | -10.6799  | -37.3315 | -98.9084  | 2.9955    | -3.4603  |
| 62    | -98.9084  | 2.9955    | -3.4603  | -87.8726  | 2.8558    | -4.1767  |
| 63    | -87.8726  | 2.8558    | -4.1767  | -74.8530  | 2.6256    | -5.1220  |
| 64    | -74.8530  | 2.6256    | -5.1220  | -60.2062  | 2.2966    | -6.3134  |
| 65    | -60.2062  | 2.2966    | -6.3134  | -37.9552  | 1.5993    | -8.5868  |
| 66    | -37.9552  | 1.5993    | -8.5868  | -20.6259  | 0.9902    | -10.4370 |
| 67    | -20.6259  | 0.9902    | -10.4370 | -3.3814   | 0.2589    | -12.5340 |
| 68    | -3.3814   | 0.2589    | -12.5340 | 13.1199   | -0.5994   | -14.8861 |
| 69    | 13.1199   | -0.5994   | -14.8861 | 37.3492   | -2.1289   | -18.8946 |
| 70    | 37.3492   | -2.1289   | -18.8946 | 50.2337   | -3.3128   | -21.8729 |
| 71    | 50.2337   | -3.3128   | -21.8729 | 59.9911   | -4.6298   | -25.1083 |
| 72    | 59.9911   | -4.6298   | -25.1083 | 74.8425   | -6.2257   | -28.9025 |
| 73    | 74.8425   | -6.2257   | -28.9025 | 75.4096   | -8.4921   | -34.3334 |
| 74    | 75.4096   | -8.4921   | -34.3334 | 70.4629   | -10.2606  | -38.4678 |
| 75    | 70.4629   | -10.2606  | -38.4678 | 59.3690   | -12.1503  | -42.8781 |
| 76    | 59.3690   | -12.1503  | -42.8781 | 46.9408   | -14.5765  | -48.4071 |
| 77    | 46.9408   | -14.5765  | -48.4071 | 20.3557   | -17.3717  | -55.0308 |
| 78    | 20.3557   | -17.3717  | -55.0308 | -14.1118  | -19.6411  | -60.3746 |
| 79    | -14.1118  | -19.6411  | -60.3746 | -56.7794  | -22.0011  | -65.9805 |
| 80    | -56.7794  | -22.0011  | -65.9805 | -107.9799 | -10.6883  | -37.3525 |
| 81    | -107.9799 | -10.6883  | -37.3525 | -99.2052  | 3.0074    | -3.4642  |
| 82    | -99.2052  | 3.0074    | -3.4642  | -88.1393  | 2.8668    | -4.1644  |
| 83    | -88.1393  | 2.8668    | -4.1644  | -75.0958  | 2.6363    | -5.1214  |
| 84    | -75.0958  | 2.6363    | -5.1214  | -60.4284  | 2.3064    | -6.3161  |
| 85    | -60.4284  | 2.3064    | -6.3161  | -38.1566  | 1.6082    | -8.5944  |
| 86    | -38.1566  | 1.6082    | -8.5944  | -20.8128  | 0.9989    | -10.4398 |
| 87    | -20.8128  | 0.9989    | -10.4398 | -3.5521   | 0.2667    | -12.5364 |
| 88    | -3.5521   | 0.2667    | -12.5364 | 12.9744   | -0.5908   | -14.8853 |
| 89    | 12.9744   | -0.5908   | -14.8853 | 37.2211   | -2.1200   | -18.8853 |
| 90    | 37.2211   | -2.1200   | -18.8853 | 50.1140   | -3.3052   | -21.8836 |
| 91    | 50.1140   | -3.3052   | -21.8836 | 59.8870   | -4.6230   | -25.1155 |
| 92    | 59.8870   | -4.6230   | -25.1155 | 74.7491   | -6.2169   | -28.8939 |
| 93    | 74.7491   | -6.2169   | -28.8939 | 75.3318   | -8.4837   | -34.3540 |
| 94    | 75.3318   | -8.4837   | -34.3540 | 70.4189   | -10.2507  | -38.4783 |
| 95    | 70.4189   | -10.2507  | -38.4783 | 59.3340   | -12.1399  | -42.8758 |
| 96    | 59.3340   | -12.1399  | -42.8758 | 46.9372   | -14.5653  | -48.4135 |
| 97    | 46.9372   | -14.5653  | -48.4135 | 20.3776   | -17.3605  | -55.0379 |
| 98    | 20.3776   | -17.3605  | -55.0379 | -14.0786  | -19.6299  | -60.3689 |
| 99    | -14.0786  | -19.6299  | -60.3689 | -56.7201  | -21.9904  | -65.9808 |
| 100   | -56.7201  | -21.9904  | -65.9808 | -107.8880 | -10.6844  | -37.3613 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -107.8880 | -10.6844  | -37.3613 | -99.1173  | 3.0052    | -3.4540  |
| 102   | -99.1173  | 3.0052    | -3.4540  | -88.0591  | 2.8647    | -4.1535  |
| 103   | -88.0591  | 2.8647    | -4.1535  | -75.0205  | 2.6342    | -5.1141  |
| 104   | -75.0205  | 2.6342    | -5.1141  | -60.3546  | 2.3040    | -6.3086  |
| 105   | -60.3546  | 2.3040    | -6.3086  | -38.0882  | 1.6061    | -8.5883  |
| 106   | -38.0882  | 1.6061    | -8.5883  | -20.7473  | 0.9961    | -10.4370 |
| 107   | -20.7473  | 0.9961    | -10.4370 | -3.4924   | 0.2642    | -12.5335 |
| 108   | -3.4924   | 0.2642    | -12.5335 | 13.0196   | -0.5939   | -14.8846 |
| 109   | 13.0196   | -0.5939   | -14.8846 | 37.2552   | -2.1234   | -18.8924 |
| 110   | 37.2552   | -2.1234   | -18.8924 | 50.1423   | -3.3079   | -21.8774 |
| 111   | 50.1423   | -3.3079   | -21.8774 | 59.9032   | -4.6259   | -25.1189 |
| 112   | 59.9032   | -4.6259   | -25.1189 | 74.7514   | -6.2236   | -28.9012 |
| 113   | 74.7514   | -6.2236   | -28.9012 | 75.3114   | -8.4932   | -34.3457 |
| 114   | 75.3114   | -8.4932   | -34.3457 | 70.3631   | -10.2627  | -38.4690 |
| 115   | 70.3631   | -10.2627  | -38.4690 | 59.2338   | -12.1556  | -42.8654 |
| 116   | 59.2338   | -12.1556  | -42.8654 | 46.7688   | -14.5835  | -48.4092 |
| 117   | 46.7688   | -14.5835  | -48.4092 | 20.1624   | -17.3755  | -55.0444 |
| 118   | 20.1624   | -17.3755  | -55.0444 | -14.3115  | -19.6457  | -60.3807 |
| 119   | -14.3115  | -19.6457  | -60.3807 | -57.0208  | -22.0058  | -65.9686 |
| 120   | -57.0208  | -22.0058  | -65.9686 | -108.2598 | -10.6772  | -37.3478 |
| 121   | -108.2598 | -10.6772  | -37.3478 | -99.3731  | 3.0349    | -3.4672  |
| 122   | -99.3731  | 3.0349    | -3.4672  | -88.2395  | 2.8939    | -4.1674  |
| 123   | -88.2395  | 2.8939    | -4.1674  | -75.1290  | 2.6607    | -5.1153  |
| 124   | -75.1290  | 2.6607    | -5.1153  | -60.4015  | 2.3280    | -6.3096  |
| 125   | -60.4015  | 2.3280    | -6.3096  | -38.0919  | 1.6228    | -8.5984  |
| 126   | -38.0919  | 1.6228    | -8.5984  | -20.7360  | 1.0067    | -10.4424 |
| 127   | -20.7360  | 1.0067    | -10.4424 | -3.4922   | 0.2693    | -12.5401 |
| 128   | -3.4922   | 0.2693    | -12.5401 | 12.9786   | -0.5951   | -14.8908 |
| 129   | 12.9786   | -0.5951   | -14.8908 | 37.0946   | -2.1357   | -18.9030 |
| 130   | 37.0946   | -2.1357   | -18.9030 | 49.8588   | -3.3286   | -21.8830 |
| 131   | 49.8588   | -3.3286   | -21.8830 | 59.4443   | -4.6534   | -25.1199 |
| 132   | 59.4443   | -4.6534   | -25.1199 | 74.0061   | -6.2628   | -28.9195 |
| 133   | 74.0061   | -6.2628   | -28.9195 | 74.3056   | -8.5408   | -34.3627 |
| 134   | 74.3056   | -8.5408   | -34.3627 | 69.0543   | -10.3170  | -38.5021 |
| 135   | 69.0543   | -10.3170  | -38.5021 | 57.6178   | -12.2178  | -42.8974 |
| 136   | 57.6178   | -12.2178  | -42.8974 | 44.7330   | -14.6574  | -48.4328 |
| 137   | 44.7330   | -14.6574  | -48.4328 | 17.7743   | -17.4601  | -55.0683 |
| 138   | 17.7743   | -17.4601  | -55.0683 | -17.0493  | -19.7335  | -60.4041 |
| 139   | -17.0493  | -19.7335  | -60.4041 | -60.0507  | -22.0965  | -66.0036 |
| 140   | -60.0507  | -22.0965  | -66.0036 | -111.5284 | -10.7212  | -37.7069 |
| 141   | -111.5284 | -10.7212  | -37.7069 | -105.2971 | 3.0778    | -3.9517  |
| 142   | -105.2971 | 3.0778    | -3.9517  | -96.5657  | 2.9793    | -4.6201  |
| 143   | -96.5657  | 2.9793    | -4.6201  | -85.4874  | 2.7945    | -5.6072  |
| 144   | -85.4874  | 2.7945    | -5.6072  | -72.2547  | 2.5087    | -6.9256  |
| 145   | -72.2547  | 2.5087    | -6.9256  | -62.8190  | 2.3260    | -7.6988  |
| 146   | -62.8190  | 2.3260    | -7.6988  | -47.2996  | 1.8751    | -9.4701  |
| 147   | -47.2996  | 1.8751    | -9.4701  | -30.5739  | 1.3031    | -11.5537 |
| 148   | -30.5739  | 1.3031    | -11.5537 | -13.1178  | 0.6046    | -13.9524 |
| 149   | -13.1178  | 0.6046    | -13.9524 | 4.5162    | -0.2307   | -16.6570 |
| 150   | 4.5162    | -0.2307   | -16.6570 | 12.5807   | -0.7014   | -18.1244 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 12.5807  | -0.7014   | -18.1244 | 28.3676  | -1.7534   | -21.2874 |
| 152   | 28.3676  | -1.7534   | -21.2874 | 42.5466  | -2.9564   | -24.7641 |
| 153   | 42.5466  | -2.9564   | -24.7641 | 54.3637  | -4.3178   | -28.5635 |
| 154   | 54.3637  | -4.3178   | -28.5635 | 63.0322  | -5.8406   | -32.6568 |
| 155   | 63.0322  | -5.8406   | -32.6568 | 59.9385  | -6.6635   | -34.7910 |
| 156   | 59.9385  | -6.6635   | -34.7910 | 60.6789  | -8.4339   | -39.3662 |
| 157   | 60.6789  | -8.4339   | -39.3662 | 55.9661  | -10.3715  | -44.2677 |
| 158   | 55.9661  | -10.3715  | -44.2677 | 44.9021  | -12.4827  | -49.4615 |
| 159   | 44.9021  | -12.4827  | -49.4615 | 26.5651  | -14.7649  | -54.9795 |
| 160   | 26.5651  | -14.7649  | -54.9795 | -0.0048  | -15.9708  | -57.8594 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 1     | 0.0174   | 55.3018   | -146.9316 | 142.3363 | 79.0750   | -219.0485 |
| 2     | 142.3363 | 79.0750   | -219.0485 | 262.4202 | 72.8864   | -206.3117 |
| 3     | 262.4202 | 72.8864   | -206.3117 | 365.1281 | 39.8130   | -115.0883 |
| 4     | 365.1281 | 39.8130   | -115.0883 | 453.0133 | 33.7247   | -102.3031 |
| 5     | 453.0133 | 33.7247   | -102.3031 | 519.8824 | 42.7443   | -131.8167 |
| 6     | 519.8824 | 42.7443   | -131.8167 | 568.0328 | 24.8078   | -82.9508  |
| 7     | 568.0328 | 24.8078   | -82.9508  | 602.9717 | -8.1167   | 8.4172    |
| 8     | 602.9717 | -8.1167   | 8.4172    | 623.1288 | 16.1376   | -63.4634  |
| 9     | 623.1288 | 16.1376   | -63.4634  | 622.2368 | 10.5821   | -50.5454  |
| 10    | 622.2368 | 10.5821   | -50.5454  | 607.6447 | -22.1190  | 40.8374   |
| 11    | 607.6447 | -22.1190  | 40.8374   | 583.9357 | -27.3606  | 53.6996   |
| 12    | 583.9357 | -27.3606  | 53.6996   | 546.2535 | -32.3777  | 66.5935   |
| 13    | 546.2535 | -32.3777  | 66.5935   | 493.3290 | -7.1543   | -5.2880   |
| 14    | 493.3290 | -7.1543   | -5.2880   | 431.8658 | -39.4383  | 86.0164   |
| 15    | 431.8658 | -39.4383  | 86.0164   | 363.5523 | -43.7840  | 98.7574   |
| 16    | 363.5523 | -43.7840  | 98.7574   | 288.3375 | -47.8155  | 111.5798  |
| 17    | 288.3375 | -47.8155  | 111.5798  | 209.0020 | -51.5172  | 124.4234  |
| 18    | 209.0020 | -51.5172  | 124.4234  | 124.5772 | -24.8665  | 51.9689   |
| 19    | 124.5772 | -24.8665  | 51.9689   | 97.0244  | 2.8354    | -0.1734   |
| 20    | 97.0244  | 2.8354    | -0.1734   | 102.1304 | -3.6780   | -3.2587   |
| 21    | 102.1304 | -3.6780   | -3.2587   | 79.2051  | -10.1916  | -6.3507   |
| 22    | 79.2051  | -10.1916  | -6.3507   | 155.7209 | 38.4767   | -95.4236  |
| 23    | 155.7209 | 38.4767   | -95.4236  | 246.0827 | 48.3100   | -122.2959 |
| 24    | 246.0827 | 48.3100   | -122.2959 | 338.6736 | 44.4999   | -111.8298 |
| 25    | 338.6736 | 44.4999   | -111.8298 | 422.3617 | 40.4408   | -101.2151 |
| 26    | 422.3617 | 40.4408   | -101.2151 | 495.1497 | 21.1596   | -48.0420  |
| 27    | 495.1497 | 21.1596   | -48.0420  | 547.7891 | 1.7093    | 5.0059    |
| 28    | 547.7891 | 1.7093    | 5.0059    | 590.8999 | 24.7953   | -63.8714  |
| 29    | 590.8999 | 24.7953   | -63.8714  | 619.4617 | 20.0716   | -53.0344  |
| 30    | 619.4617 | 20.0716   | -53.0344  | 632.2125 | 0.3123    | -0.0503   |
| 31    | 632.2125 | 0.3123    | -0.0503   | 621.2155 | -19.4580  | 53.0406   |
| 32    | 621.2155 | -19.4580  | 53.0406   | 594.3672 | -24.1963  | 63.8865   |
| 33    | 594.3672 | -24.1963  | 63.8865   | 552.7941 | -1.1496   | -5.0936   |
| 34    | 552.7941 | -1.1496   | -5.0936   | 501.3347 | -20.6295  | 47.9603   |
| 35    | 501.3347 | -20.6295  | 47.9603   | 429.3626 | -39.9528  | 101.1367  |
| 36    | 429.3626 | -39.9528  | 101.1367  | 346.0597 | -44.0746  | 111.7041  |
| 37    | 346.0597 | -44.0746  | 111.7041  | 253.1125 | -47.9592  | 122.2412  |
| 38    | 253.1125 | -47.9592  | 122.2412  | 161.0323 | -38.2533  | 95.3929   |
| 39    | 161.0323 | -38.2533  | 95.3929   | 92.8051  | 2.8372    | -0.1403   |
| 40    | 92.8051  | 2.8372    | -0.1403   | 99.1906  | -3.6388   | -3.2313   |
| 41    | 99.1906  | -3.6388   | -3.2313   | 80.8907  | -2.4539   | 0.1345    |
| 42    | 80.8907  | -2.4539   | 0.1345    | 160.1548 | 38.3362   | -95.3736  |
| 43    | 160.1548 | 38.3362   | -95.3736  | 252.2162 | 48.0999   | -122.2458 |
| 44    | 252.2162 | 48.0999   | -122.2458 | 345.2755 | 44.2574   | -111.7426 |
| 45    | 345.2755 | 44.2574   | -111.7426 | 429.0244 | 40.1765   | -101.1236 |
| 46    | 429.0244 | 40.1765   | -101.1236 | 501.5979 | 20.8862   | -48.0243  |
| 47    | 501.5979 | 20.8862   | -48.0243  | 553.7943 | 1.4379    | 5.0217    |
| 48    | 553.7943 | 1.4379    | 5.0217    | 596.3690 | 24.5190   | -63.7752  |
| 49    | 596.3690 | 24.5190   | -63.7752  | 624.2352 | 19.7899   | -53.1512  |
| 50    | 624.2352 | 19.7899   | -53.1512  | 636.1105 | 0.0275    | -0.0525   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 51    | 636.1105 | 0.0275    | -0.0525   | 624.4247 | -19.7274  | 53.0481   |
| 52    | 624.4247 | -19.7274  | 53.0481   | 596.7153 | -24.4515  | 63.7617   |
| 53    | 596.7153 | -24.4515  | 63.7617   | 554.3000 | -1.3801   | -4.9231   |
| 54    | 554.3000 | -1.3801   | -4.9231   | 502.2050 | -20.8442  | 48.1213   |
| 55    | 502.2050 | -20.8442  | 48.1213   | 429.7617 | -40.1344  | 101.0570  |
| 56    | 429.7617 | -40.1344  | 101.0570  | 345.9353 | -44.2243  | 111.6698  |
| 57    | 345.9353 | -44.2243  | 111.6698  | 252.8386 | -48.0724  | 122.2703  |
| 58    | 252.8386 | -48.0724  | 122.2703  | 160.6725 | -38.3182  | 95.3454   |
| 59    | 160.6725 | -38.3182  | 95.3454   | 92.5826  | 2.8088    | -0.1332   |
| 60    | 92.5826  | 2.8088    | -0.1332   | 98.9026  | -3.6493   | -3.2457   |
| 61    | 98.9026  | -3.6493   | -3.2457   | 91.8920  | -2.7851   | 0.1317    |
| 62    | 91.8920  | -2.7851   | 0.1317    | 160.6068 | 38.3275   | -95.3480  |
| 63    | 160.6068 | 38.3275   | -95.3480  | 252.8359 | 48.0878   | -122.2072 |
| 64    | 252.8359 | 48.0878   | -122.2072 | 345.9534 | 44.2376   | -111.6956 |
| 65    | 345.9534 | 44.2376   | -111.6956 | 429.7017 | 40.1424   | -101.1374 |
| 66    | 429.7017 | 40.1424   | -101.1374 | 502.2134 | 20.8463   | -48.0223  |
| 67    | 502.2134 | 20.8463   | -48.0223  | 554.3625 | 1.3748    | 5.0317    |
| 68    | 554.3625 | 1.3748    | 5.0317    | 596.7781 | 24.4619   | -63.8691  |
| 69    | 596.7781 | 24.4619   | -63.8691  | 624.4944 | 19.7571   | -53.1651  |
| 70    | 624.4944 | 19.7571   | -53.1651  | 636.2642 | -0.0010   | 0.0539    |
| 71    | 636.2642 | -0.0010   | 0.0539    | 624.5060 | -19.7624  | 53.1600   |
| 72    | 624.5060 | -19.7624  | 53.1600   | 596.7399 | -24.4678  | 63.7712   |
| 73    | 596.7399 | -24.4678  | 63.7712   | 554.2203 | -1.3963   | -4.9119   |
| 74    | 554.2203 | -1.3963   | -4.9119   | 502.1470 | -20.8542  | 48.1216   |
| 75    | 502.1470 | -20.8542  | 48.1216   | 429.6602 | -40.1395  | 101.0649  |
| 76    | 429.6602 | -40.1395  | 101.0649  | 345.8155 | -44.2285  | 111.7430  |
| 77    | 345.8155 | -44.2285  | 111.7430  | 252.8192 | -48.0764  | 122.2783  |
| 78    | 252.8192 | -48.0764  | 122.2783  | 160.5886 | -38.3191  | 95.3447   |
| 79    | 160.5886 | -38.3191  | 95.3447   | 92.5215  | 2.8075    | -0.1143   |
| 80    | 92.5215  | 2.8075    | -0.1143   | 98.8542  | 3.6454    | 3.2433    |
| 81    | 98.8542  | 3.6454    | 3.2433    | 92.5374  | -2.8076   | 0.1336    |
| 82    | 92.5374  | -2.8076   | 0.1336    | 160.6407 | 38.3218   | -95.3792  |
| 83    | 160.6407 | 38.3218   | -95.3792  | 252.8288 | 48.0792   | -122.2023 |
| 84    | 252.8288 | 48.0792   | -122.2023 | 345.9343 | 44.2309   | -111.6996 |
| 85    | 345.9343 | 44.2309   | -111.6996 | 429.6816 | 40.1433   | -101.0634 |
| 86    | 429.6816 | 40.1433   | -101.0634 | 502.2385 | 20.8493   | -48.0585  |
| 87    | 502.2385 | 20.8493   | -48.0585  | 554.3044 | 1.3904    | 4.9184    |
| 88    | 554.3044 | 1.3904    | 4.9184    | 596.7889 | 24.4718   | -63.6761  |
| 89    | 596.7889 | 24.4718   | -63.6761  | 624.5382 | 19.7427   | -52.9643  |
| 90    | 624.5382 | 19.7427   | -52.9643  | 636.2758 | -0.0234   | -0.0695   |
| 91    | 636.2758 | -0.0234   | -0.0695   | 624.3475 | -19.7710  | 53.1359   |
| 92    | 624.3475 | -19.7710  | 53.1359   | 596.6500 | -24.4814  | 63.8682   |
| 93    | 596.6500 | -24.4814  | 63.8682   | 554.1625 | -1.3923   | -5.0445   |
| 94    | 554.1625 | -1.3923   | -5.0445   | 502.0656 | -20.8484  | 48.1034   |
| 95    | 502.0656 | -20.8484  | 48.1034   | 429.5773 | -40.1334  | 101.1213  |
| 96    | 429.5773 | -40.1334  | 101.1213  | 345.8362 | -44.2252  | 111.7234  |
| 97    | 345.8362 | -44.2252  | 111.7234  | 252.7383 | -48.0736  | 122.2957  |
| 98    | 252.7383 | -48.0736  | 122.2957  | 160.5959 | -38.3170  | 95.3781   |
| 99    | 160.5959 | -38.3170  | 95.3781   | 91.9288  | 2.7901    | -0.1232   |
| 100   | 91.9288  | 2.7901    | -0.1232   | 98.8689  | 3.6453    | 3.2429    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 101   | 98.8689  | 3.6453    | 3.2429    | 92.5497  | -2.8088   | 0.1238    |
| 102   | 92.5497  | -2.8088   | 0.1238    | 160.5872 | 38.3200   | -95.3953  |
| 103   | 160.5872 | 38.3200   | -95.3953  | 252.7906 | 48.0756   | -122.2351 |
| 104   | 252.7906 | 48.0756   | -122.2351 | 345.9045 | 44.2253   | -111.7172 |
| 105   | 345.9045 | 44.2253   | -111.7172 | 429.6695 | 40.1321   | -101.0934 |
| 106   | 429.6695 | 40.1321   | -101.0934 | 502.2281 | 20.8416   | -48.0056  |
| 107   | 502.2281 | 20.8416   | -48.0056  | 554.2989 | 1.3851    | 5.0421    |
| 108   | 554.2989 | 1.3851    | 5.0421    | 596.7044 | 24.4479   | -63.8452  |
| 109   | 596.7044 | 24.4479   | -63.8452  | 624.3429 | 19.7421   | -53.1242  |
| 110   | 624.3429 | 19.7421   | -53.1242  | 636.1438 | -0.0230   | -0.0266   |
| 111   | 636.1438 | -0.0230   | -0.0266   | 624.2627 | -19.7815  | 53.0784   |
| 112   | 624.2627 | -19.7815  | 53.0784   | 596.4642 | -24.5104  | 63.8028   |
| 113   | 596.4642 | -24.5104  | 63.8028   | 553.8765 | -1.4273   | -5.0022   |
| 114   | 553.8765 | -1.4273   | -5.0022   | 501.6846 | -20.8913  | 48.1429   |
| 115   | 501.6846 | -20.8913  | 48.1429   | 429.1004 | -40.1772  | 101.1563  |
| 116   | 429.1004 | -40.1772  | 101.1563  | 345.3433 | -44.2571  | 111.6934  |
| 117   | 345.3433 | -44.2571  | 111.6934  | 252.2856 | -48.0961  | 122.2125  |
| 118   | 252.2856 | -48.0961  | 122.2125  | 160.2046 | -38.3346  | 95.3826   |
| 119   | 160.2046 | -38.3346  | 95.3826   | 80.9195  | 2.4546    | -0.1350   |
| 120   | 80.9195  | 2.4546    | -0.1350   | 99.1550  | 3.6378    | 3.2329    |
| 121   | 99.1550  | 3.6378    | 3.2329    | 92.7731  | -2.8355   | 0.1338    |
| 122   | 92.7731  | -2.8355   | 0.1338    | 160.9225 | 38.2557   | -95.3663  |
| 123   | 160.9225 | 38.2557   | -95.3663  | 253.1193 | 47.9657   | -122.2538 |
| 124   | 253.1193 | 47.9657   | -122.2538 | 345.9501 | 44.0840   | -111.7144 |
| 125   | 345.9501 | 44.0840   | -111.7144 | 429.3809 | 39.9646   | -101.0169 |
| 126   | 429.3809 | 39.9646   | -101.0169 | 501.4467 | 20.6595   | -48.0140  |
| 127   | 501.4467 | 20.6595   | -48.0140  | 552.8932 | 1.1730    | 5.0416    |
| 128   | 552.8932 | 1.1730    | 5.0416    | 594.5590 | 24.2076   | -63.7313  |
| 129   | 594.5590 | 24.2076   | -63.7313  | 621.4572 | 19.4676   | -53.1178  |
| 130   | 621.4572 | 19.4676   | -53.1178  | 632.3413 | -0.3054   | 0.0989    |
| 131   | 632.3413 | -0.3054   | 0.0989    | 619.6774 | -20.0826  | 53.2004   |
| 132   | 619.6774 | -20.0826  | 53.2004   | 591.0592 | -24.8101  | 63.8092   |
| 133   | 591.0592 | -24.8101  | 63.8092   | 547.8230 | -1.7297   | -4.9570   |
| 134   | 547.8230 | -1.7297   | -4.9570   | 495.1740 | -21.1769  | 48.0993   |
| 135   | 495.1740 | -21.1769  | 48.0993   | 422.3445 | -40.4506  | 101.1857  |
| 136   | 422.3445 | -40.4506  | 101.1857  | 338.6492 | -44.5098  | 111.8075  |
| 137   | 338.6492 | -44.5098  | 111.8075  | 246.0033 | -48.3203  | 122.3259  |
| 138   | 246.0033 | -48.3203  | 122.3259  | 155.6631 | -38.4816  | 95.4583   |
| 139   | 155.6631 | -38.4816  | 95.4583   | 79.2494  | 10.1985   | 6.3467    |
| 140   | 79.2494  | 10.1985   | 6.3467    | 102.1982 | 3.6802    | 3.2753    |
| 141   | 102.1982 | 3.6802    | 3.2753    | 97.0879  | -2.8386   | 0.2112    |
| 142   | 97.0879  | -2.8386   | 0.2112    | 124.6796 | 24.8615   | -52.0017  |
| 143   | 124.6796 | 24.8615   | -52.0017  | 208.9707 | 51.5073   | -124.3693 |
| 144   | 208.9707 | 51.5073   | -124.3693 | 288.4653 | 47.7990   | -111.5711 |
| 145   | 288.4653 | 47.7990   | -111.5711 | 363.4944 | 43.7671   | -98.7833  |
| 146   | 363.4944 | 43.7671   | -98.7833  | 431.8591 | 39.4335   | -85.9812  |
| 147   | 431.8591 | 39.4335   | -85.9812  | 493.2648 | 7.1576    | 5.2294    |
| 148   | 493.2648 | 7.1576    | 5.2294    | 546.1592 | 32.3817   | -66.5654  |
| 149   | 546.1592 | 32.3817   | -66.5654  | 583.8652 | 27.3613   | -53.6911  |
| 150   | 583.8652 | 27.3613   | -53.6911  | 607.5955 | 22.1214   | -40.7924  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 607.5955 | 22.1214   | -40.7924 | 622.2064 | -10.6054  | 50.5957  |
| 152   | 622.2064 | -10.6054  | 50.5957  | 623.0249 | -16.1403  | 63.4818  |
| 153   | 623.0249 | -16.1403  | 63.4818  | 603.0068 | 8.1410    | -8.5140  |
| 154   | 603.0068 | 8.1410    | -8.5140  | 568.0454 | -24.7897  | 82.8353  |
| 155   | 568.0454 | -24.7897  | 82.8353  | 519.8896 | -27.7449  | 89.5542  |
| 156   | 519.8896 | -27.7449  | 89.5542  | 453.0573 | -33.7262  | 102.3119 |
| 157   | 453.0573 | -33.7262  | 102.3119 | 365.1821 | -39.8111  | 115.0061 |
| 158   | 365.1821 | -39.8111  | 115.0061 | 262.4966 | -72.8806  | 206.2386 |
| 159   | 262.4966 | -72.8806  | 206.2386 | 142.4085 | -79.0667  | 219.0180 |
| 160   | 142.4085 | -79.0667  | 219.0180 | 0.0197   | -79.0650  | 219.0474 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0001   | 2.8290    | -0.3963  | -18.3879  | -10.2176  | -7.6460  |
| 2     | -18.3879  | -10.2176  | -7.6460  | -36.7724  | -10.2181  | -7.6545  |
| 3     | -36.7724  | -10.2181  | -7.6545  | -55.1643  | -10.2157  | -7.6719  |
| 4     | -55.1643  | -10.2157  | -7.6719  | -73.5427  | -10.2139  | -7.6839  |
| 5     | -73.5427  | -10.2139  | -7.6839  | -91.9224  | -10.2171  | -7.7035  |
| 6     | -91.9224  | -10.2171  | -7.7035  | -110.3185 | -10.2161  | -7.7220  |
| 7     | -110.3185 | -10.2161  | -7.7220  | -128.7079 | -10.2122  | -7.7738  |
| 8     | -128.7079 | -10.2122  | -7.7738  | -147.0829 | -10.2080  | -7.7887  |
| 9     | -147.0829 | -10.2080  | -7.7887  | -165.4408 | -10.1994  | -7.8304  |
| 10    | -165.4408 | -10.1994  | -7.8304  | -183.7921 | -10.1975  | -7.8932  |
| 11    | -183.7921 | -10.1975  | -7.8932  | -202.1432 | -10.1980  | -7.9320  |
| 12    | -202.1432 | -10.1980  | -7.9320  | -220.5034 | -10.1966  | -7.9784  |
| 13    | -220.5034 | -10.1966  | -7.9784  | -238.8620 | -10.1967  | -8.0299  |
| 14    | -238.8620 | -10.1967  | -8.0299  | -257.2144 | -10.1943  | -8.1267  |
| 15    | -257.2144 | -10.1943  | -8.1267  | -275.5612 | -10.1953  | -8.1236  |
| 16    | -275.5612 | -10.1953  | -8.1236  | -293.9160 | -10.1954  | -8.2409  |
| 17    | -293.9160 | -10.1954  | -8.2409  | -312.2587 | -10.1938  | -8.3545  |
| 18    | -312.2587 | -10.1938  | -8.3545  | -330.6159 | -10.1965  | -8.3584  |
| 19    | -330.6159 | -10.1965  | -8.3584  | -348.9703 | -10.1980  | -8.4903  |
| 20    | -348.9703 | -10.1980  | -8.4903  | -367.3015 | 23.4663   | -81.4103 |
| 21    | -367.3015 | 23.4663   | -81.4103 | -291.2576 | 8.8358    | 6.6072   |
| 22    | -291.2576 | 8.8358    | 6.6072   | -271.3775 | 8.8366    | 6.4725   |
| 23    | -271.3775 | 8.8366    | 6.4725   | -251.4937 | 8.8370    | 6.3864   |
| 24    | -251.4937 | 8.8370    | 6.3864   | -231.6075 | 8.8372    | 6.3868   |
| 25    | -231.6075 | 8.8372    | 6.3868   | -211.7200 | 8.8382    | 6.3202   |
| 26    | -211.7200 | 8.8382    | 6.3202   | -191.8403 | 8.8374    | 6.1956   |
| 27    | -191.8403 | 8.8374    | 6.1956   | -171.9607 | 8.8372    | 6.1356   |
| 28    | -171.9607 | 8.8372    | 6.1356   | -152.0800 | 8.8387    | 6.1104   |
| 29    | -152.0800 | 8.8387    | 6.1104   | -132.1896 | 8.8387    | 6.0420   |
| 30    | -132.1896 | 8.8387    | 6.0420   | -127.1517 | -10.1913  | -6.4039  |
| 31    | -127.1517 | -10.1913  | -6.4039  | -150.0759 | -10.1918  | -6.4544  |
| 32    | -150.0759 | -10.1918  | -6.4544  | -173.0045 | -10.1933  | -6.5283  |
| 33    | -173.0045 | -10.1933  | -6.5283  | -195.9424 | -10.1966  | -6.5303  |
| 34    | -195.9424 | -10.1966  | -6.5303  | -218.8964 | -10.2004  | -6.6017  |
| 35    | -218.8964 | -10.2004  | -6.6017  | -241.8484 | -10.2031  | -6.7461  |
| 36    | -241.8484 | -10.2031  | -6.7461  | -264.8087 | -10.2041  | -6.7855  |
| 37    | -264.8087 | -10.2041  | -6.7855  | -287.7661 | -10.2007  | -6.8787  |
| 38    | -287.7661 | -10.2007  | -6.8787  | -310.7066 | -10.1990  | -6.9654  |
| 39    | -310.7066 | -10.1990  | -6.9654  | -333.6580 | -10.1985  | -7.0258  |
| 40    | -333.6580 | -10.1985  | -7.0258  | -356.6024 | 23.3198   | -80.6822 |
| 41    | -356.6024 | 23.3198   | -80.6822 | -330.3781 | 10.0205   | 7.0412   |
| 42    | -330.3781 | 10.0205   | 7.0412   | -307.8334 | 10.0196   | 6.9309   |
| 43    | -307.8334 | 10.0196   | 6.9309   | -285.2844 | 10.0194   | 6.8369   |
| 44    | -285.2844 | 10.0194   | 6.8369   | -262.7380 | 10.0217   | 6.7979   |
| 45    | -262.7380 | 10.0217   | 6.7979   | -240.1900 | 10.0236   | 6.7223   |
| 46    | -240.1900 | 10.0236   | 6.7223   | -217.6503 | 10.0184   | 6.6139   |
| 47    | -217.6503 | 10.0184   | 6.6139   | -195.1130 | 10.0148   | 6.5524   |
| 48    | -195.1130 | 10.0148   | 6.5524   | -172.5870 | 10.0173   | 6.4958   |
| 49    | -172.5870 | 10.0173   | 6.4958   | -150.0486 | 10.0205   | 6.4651   |
| 50    | -150.0486 | 10.0205   | 6.4651   | -128.3739 | -10.1142  | -6.3981  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | -128.3739 | -10.1142  | -6.3981  | -151.1201 | -10.1095  | -6.4402  |
| 52    | -151.1201 | -10.1095  | -6.4402  | -173.8517 | -10.1059  | -6.4945  |
| 53    | -173.8517 | -10.1059  | -6.4945  | -196.5791 | -10.1062  | -6.5805  |
| 54    | -196.5791 | -10.1062  | -6.5805  | -219.3204 | -10.1031  | -6.6462  |
| 55    | -219.3204 | -10.1031  | -6.6462  | -242.0450 | -10.1011  | -6.6770  |
| 56    | -242.0450 | -10.1011  | -6.6770  | -264.7684 | -10.1024  | -6.7683  |
| 57    | -264.7684 | -10.1024  | -6.7683  | -287.5072 | -10.1026  | -6.8495  |
| 58    | -287.5072 | -10.1026  | -6.8495  | -310.2291 | -10.1007  | -6.8934  |
| 59    | -310.2291 | -10.1007  | -6.8934  | -332.9504 | -10.0988  | -7.0510  |
| 60    | -332.9504 | -10.0988  | -7.0510  | -355.6735 | 23.3610   | -80.6559 |
| 61    | -355.6735 | 23.3610   | -80.6559 | -332.7352 | 10.0834   | 7.0578   |
| 62    | -332.7352 | 10.0834   | 7.0578   | -310.0541 | 10.0844   | 6.9011   |
| 63    | -310.0541 | 10.0844   | 6.9011   | -287.3636 | 10.0868   | 6.8061   |
| 64    | -287.3636 | 10.0868   | 6.8061   | -264.6700 | 10.0913   | 6.7661   |
| 65    | -264.6700 | 10.0913   | 6.7661   | -241.9623 | 10.0953   | 6.7241   |
| 66    | -241.9623 | 10.0953   | 6.7241   | -219.2466 | 10.0979   | 6.6111   |
| 67    | -219.2466 | 10.0979   | 6.6111   | -196.5264 | 10.1017   | 6.5405   |
| 68    | -196.5264 | 10.1017   | 6.5405   | -173.7993 | 10.1015   | 6.5167   |
| 69    | -173.7993 | 10.1015   | 6.5167   | -151.0828 | 10.0998   | 6.4662   |
| 70    | -151.0828 | 10.0998   | 6.4662   | -128.3899 | -10.1017  | -6.4430  |
| 71    | -128.3899 | -10.1017  | -6.4430  | -151.1145 | -10.0960  | -6.4834  |
| 72    | -151.1145 | -10.0960  | -6.4834  | -173.8255 | -10.0935  | -6.5146  |
| 73    | -173.8255 | -10.0935  | -6.5146  | -196.5417 | -10.0971  | -6.6045  |
| 74    | -196.5417 | -10.0971  | -6.6045  | -219.2665 | -10.1000  | -6.6597  |
| 75    | -219.2665 | -10.1000  | -6.6597  | -241.9844 | -10.1006  | -6.7039  |
| 76    | -241.9844 | -10.1006  | -6.7039  | -264.7184 | -10.0991  | -6.8271  |
| 77    | -264.7184 | -10.0991  | -6.8271  | -287.4313 | -10.0992  | -6.8596  |
| 78    | -287.4313 | -10.0992  | -6.8596  | -310.1602 | -10.0982  | -6.9181  |
| 79    | -310.1602 | -10.0982  | -6.9181  | -332.8740 | -10.0977  | -7.1196  |
| 80    | -332.8740 | -10.0977  | -7.1196  | -355.5854 | -23.3516  | 80.6484  |
| 81    | -355.5854 | -23.3516  | 80.6484  | -332.8432 | 10.0981   | 7.0482   |
| 82    | -332.8432 | 10.0981   | 7.0482   | -310.1205 | 10.0955   | 6.9467   |
| 83    | -310.1205 | 10.0955   | 6.9467   | -287.4193 | 10.0968   | 6.8139   |
| 84    | -287.4193 | 10.0968   | 6.8139   | -264.7031 | 10.0983   | 6.7611   |
| 85    | -264.7031 | 10.0983   | 6.7611   | -241.9892 | 10.0977   | 6.6883   |
| 86    | -241.9892 | 10.0977   | 6.6883   | -219.2740 | 10.0977   | 6.6082   |
| 87    | -219.2740 | 10.0977   | 6.6082   | -196.5547 | 10.0958   | 6.5775   |
| 88    | -196.5547 | 10.0958   | 6.5775   | -173.8445 | 10.0961   | 6.4612   |
| 89    | -173.8445 | 10.0961   | 6.4612   | -151.1266 | 10.1041   | 6.4037   |
| 90    | -151.1266 | 10.1041   | 6.4037   | -128.3809 | 10.1103   | 6.4029   |
| 91    | -128.3809 | 10.1103   | 6.4029   | -151.0260 | -10.0867  | -6.4781  |
| 92    | -151.0260 | -10.0867  | -6.4781  | -173.7299 | -10.0933  | -6.5197  |
| 93    | -173.7299 | -10.0933  | -6.5197  | -196.4476 | -10.0989  | -6.5484  |
| 94    | -196.4476 | -10.0989  | -6.5484  | -219.1594 | -10.1009  | -6.6493  |
| 95    | -219.1594 | -10.1009  | -6.6493  | -241.8888 | -10.1034  | -6.7219  |
| 96    | -241.8888 | -10.1034  | -6.7219  | -264.6102 | -10.1040  | -6.8018  |
| 97    | -264.6102 | -10.1040  | -6.8018  | -287.3381 | -10.1046  | -6.8932  |
| 98    | -287.3381 | -10.1046  | -6.8932  | -310.0776 | -10.1034  | -6.9318  |
| 99    | -310.0776 | -10.1034  | -6.9318  | -332.7928 | -10.0995  | -7.0846  |
| 100   | -332.7928 | -10.0995  | -7.0846  | -355.5867 | -23.3478  | 80.6211  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | -355.5867 | -23.3478  | 80.6211 | -332.8401 | 10.0996   | 7.0800  |
| 102   | -332.8401 | 10.0996   | 7.0800  | -310.1259 | 10.0984   | 6.9830  |
| 103   | -310.1259 | 10.0984   | 6.9830  | -287.4162 | 10.0991   | 6.8357  |
| 104   | -287.4162 | 10.0991   | 6.8357  | -264.6891 | 10.0999   | 6.7857  |
| 105   | -264.6891 | 10.0999   | 6.7857  | -241.9691 | 10.0992   | 6.7093  |
| 106   | -241.9691 | 10.0992   | 6.7093  | -219.2448 | 10.0980   | 6.6020  |
| 107   | -219.2448 | 10.0980   | 6.6020  | -196.5333 | 10.0985   | 6.5408  |
| 108   | -196.5333 | 10.0985   | 6.5408  | -173.8020 | 10.1058   | 6.5080  |
| 109   | -173.8020 | 10.1058   | 6.5080  | -151.0562 | 10.1088   | 6.4582  |
| 110   | -151.0562 | 10.1088   | 6.4582  | -128.3291 | 10.1049   | 6.4096  |
| 111   | -128.3291 | 10.1049   | 6.4096  | -150.0980 | -10.0258  | -6.4375 |
| 112   | -150.0980 | -10.0258  | -6.4375 | -172.6424 | -10.0174  | -6.4870 |
| 113   | -172.6424 | -10.0174  | -6.4870 | -195.1837 | -10.0161  | -6.5490 |
| 114   | -195.1837 | -10.0161  | -6.5490 | -217.7160 | -10.0182  | -6.6479 |
| 115   | -217.7160 | -10.0182  | -6.6479 | -240.2646 | -10.0201  | -6.7189 |
| 116   | -240.2646 | -10.0201  | -6.7189 | -262.7966 | -10.0204  | -6.7524 |
| 117   | -262.7966 | -10.0204  | -6.7524 | -285.3455 | -10.0215  | -6.8013 |
| 118   | -285.3455 | -10.0215  | -6.8013 | -307.8967 | -10.0214  | -6.9471 |
| 119   | -307.8967 | -10.0214  | -6.9471 | -330.4474 | -10.0233  | -7.0432 |
| 120   | -330.4474 | -10.0233  | -7.0432 | -356.5656 | -23.3195  | 80.6776 |
| 121   | -356.5656 | -23.3195  | 80.6776 | -333.6529 | 10.1969   | 7.0478  |
| 122   | -333.6529 | 10.1969   | 7.0478  | -310.7136 | 10.1969   | 6.9488  |
| 123   | -310.7136 | 10.1969   | 6.9488  | -287.7734 | 10.1971   | 6.8532  |
| 124   | -287.7734 | 10.1971   | 6.8532  | -264.8312 | 10.1993   | 6.8067  |
| 125   | -264.8312 | 10.1993   | 6.8067  | -241.8845 | 10.1968   | 6.6869  |
| 126   | -241.8845 | 10.1968   | 6.6869  | -218.9489 | 10.1910   | 6.6157  |
| 127   | -218.9489 | 10.1910   | 6.6157  | -196.0331 | 10.1871   | 6.5570  |
| 128   | -196.0331 | 10.1871   | 6.5570  | -173.1087 | 10.1854   | 6.4920  |
| 129   | -173.1087 | 10.1854   | 6.4920  | -150.1806 | 10.1892   | 6.4711  |
| 130   | -150.1806 | 10.1892   | 6.4711  | -127.2544 | 10.1959   | 6.4078  |
| 131   | -127.2544 | 10.1959   | 6.4078  | -132.2501 | -8.8317   | -6.0945 |
| 132   | -132.2501 | -8.8317   | -6.0945 | -152.1131 | -8.8329   | -6.1179 |
| 133   | -152.1131 | -8.8329   | -6.1179 | -171.9830 | -8.8351   | -6.1707 |
| 134   | -171.9830 | -8.8351   | -6.1707 | -191.8636 | -8.8340   | -6.2289 |
| 135   | -191.8636 | -8.8340   | -6.2289 | -211.7282 | -8.8312   | -6.3221 |
| 136   | -211.7282 | -8.8312   | -6.3221 | -231.5941 | -8.8300   | -6.3878 |
| 137   | -231.5941 | -8.8300   | -6.3878 | -251.4564 | -8.8298   | -6.4305 |
| 138   | -251.4564 | -8.8298   | -6.4305 | -271.3253 | -8.8306   | -6.5099 |
| 139   | -271.3253 | -8.8306   | -6.5099 | -291.1947 | -8.8318   | -6.5977 |
| 140   | -291.1947 | -8.8318   | -6.5977 | -367.4412 | -23.4668  | 81.3554 |
| 141   | -367.4412 | -23.4668  | 81.3554 | -349.0738 | 10.2064   | 8.3552  |
| 142   | -349.0738 | 10.2064   | 8.3552  | -330.7006 | 10.2071   | 8.3532  |
| 143   | -330.7006 | 10.2071   | 8.3532  | -312.3329 | 10.2120   | 8.2891  |
| 144   | -312.3329 | 10.2120   | 8.2891  | -293.9443 | 10.2103   | 8.1646  |
| 145   | -293.9443 | 10.2103   | 8.1646  | -275.5751 | 10.2076   | 8.1213  |
| 146   | -275.5751 | 10.2076   | 8.1213  | -257.2021 | 10.2052   | 8.0616  |
| 147   | -257.2021 | 10.2052   | 8.0616  | -238.8427 | 10.2003   | 8.0192  |
| 148   | -238.8427 | 10.2003   | 8.0192  | -220.4962 | 10.2017   | 7.9312  |
| 149   | -220.4962 | 10.2017   | 7.9312  | -202.1361 | 10.1989   | 7.8812  |
| 150   | -202.1361 | 10.1989   | 7.8812  | -183.7914 | 10.2003   | 7.8448  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 151   | -183.7914 | 10.2003   | 7.8448  | -165.4142 | 10.2069   | 7.7723  |
| 152   | -165.4142 | 10.2069   | 7.7723  | -147.0456 | 10.2043   | 7.7410  |
| 153   | -147.0456 | 10.2043   | 7.7410  | -128.6844 | 10.2045   | 7.7421  |
| 154   | -128.6844 | 10.2045   | 7.7421  | -110.3106 | 10.2115   | 7.7001  |
| 155   | -110.3106 | 10.2115   | 7.7001  | -91.9285  | 10.2169   | 7.6393  |
| 156   | -91.9285  | 10.2169   | 7.6393  | -73.5350  | 10.2169   | 7.6367  |
| 157   | -73.5350  | 10.2169   | 7.6367  | -55.1506  | 10.2155   | 7.6393  |
| 158   | -55.1506  | 10.2155   | 7.6393  | -36.7642  | 10.2146   | 7.6220  |
| 159   | -36.7642  | 10.2146   | 7.6220  | -18.3854  | 10.2133   | 7.6111  |
| 160   | -18.3854  | 10.2133   | 7.6111  | -0.0004   | -2.7835   | 0.4523  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0169    | 82.1848   | -225.3687 | 142.3363  | 79.0750   | -219.0485 |
| 2     | 142.3363  | 79.0750   | -219.0485 | 262.4202  | 72.8864   | -206.3117 |
| 3     | 262.4202  | 72.8864   | -206.3117 | 360.6570  | 66.7613   | -193.4787 |
| 4     | 360.6570  | 66.7613   | -193.4787 | 437.3721  | 60.7187   | -180.6828 |
| 5     | 437.3721  | 60.7187   | -180.6828 | 493.3368  | 54.8026   | -167.8105 |
| 6     | 493.3368  | 54.8026   | -167.8105 | 560.5660  | 51.8905   | -161.3148 |
| 7     | 560.5660  | 51.8905   | -161.3148 | 582.0099  | 46.1570   | -148.3066 |
| 8     | 582.0099  | 46.1570   | -148.3066 | 585.1959  | 40.5949   | -135.4399 |
| 9     | 585.1959  | 40.5949   | -135.4399 | 571.4973  | 35.2279   | -122.5085 |
| 10    | 571.4973  | 35.2279   | -122.5085 | 542.4712  | 30.0970   | -109.5155 |
| 11    | 542.4712  | 30.0970   | -109.5155 | 547.5224  | 27.6245   | -103.0287 |
| 12    | 547.5224  | 27.6245   | -103.0287 | 494.1926  | 22.8499   | -90.1523  |
| 13    | 494.1926  | 22.8499   | -90.1523  | 430.1387  | 18.3590   | -77.2838  |
| 14    | 430.1387  | 18.3590   | -77.2838  | 357.4095  | 14.1592   | -64.3844  |
| 15    | 357.4095  | 14.1592   | -64.3844  | 278.2874  | 10.2919   | -51.6532  |
| 16    | 278.2874  | 10.2919   | -51.6532  | 244.6808  | 8.4813    | -45.1791  |
| 17    | 244.6808  | 8.4813    | -45.1791  | 157.3581  | 5.1326    | -32.7761  |
| 18    | 157.3581  | 5.1326    | -32.7761  | 91.9202   | 2.8337    | -0.2102   |
| 19    | 91.9202   | 2.8337    | -0.2102   | 97.0244   | 2.8354    | -0.1734   |
| 20    | 97.0244   | 2.8354    | -0.1734   | -103.1006 | 41.8329   | -122.2004 |
| 21    | -103.1006 | 41.8329   | -122.2004 | 12.7985   | 83.4772   | -222.5994 |
| 22    | 12.7985   | 83.4772   | -222.5994 | 125.7393  | 80.1089   | -212.3242 |
| 23    | 125.7393  | 80.1089   | -212.3242 | 233.6035  | 76.4399   | -201.8108 |
| 24    | 233.6035  | 76.4399   | -201.8108 | 301.3359  | 70.4415   | -186.0955 |
| 25    | 301.3359  | 70.4415   | -186.0955 | 391.2061  | 66.1604   | -175.4402 |
| 26    | 391.2061  | 66.1604   | -175.4402 | 468.8908  | 61.7103   | -164.6393 |
| 27    | 468.8908  | 61.7103   | -164.6393 | 532.8168  | 57.1244   | -153.9833 |
| 28    | 532.8168  | 57.1244   | -153.9833 | 544.2517  | 50.0737   | -138.0742 |
| 29    | 544.2517  | 50.0737   | -138.0742 | 575.2245  | 45.3098   | -127.2528 |
| 30    | 575.2245  | 45.3098   | -127.2528 | 590.0605  | 40.5443   | -116.6618 |
| 31    | 590.0605  | 40.5443   | -116.6618 | 588.7717  | 35.7973   | -105.9044 |
| 32    | 588.7717  | 35.7973   | -105.9044 | 525.3903  | 28.8389   | -89.8450  |
| 33    | 525.3903  | 28.8389   | -89.8450  | 491.5052  | 24.3580   | -79.3278  |
| 34    | 491.5052  | 24.3580   | -79.3278  | 444.2693  | 20.0471   | -68.6377  |
| 35    | 444.2693  | 20.0471   | -68.6377  | 385.1819  | 15.9257   | -57.8701  |
| 36    | 385.1819  | 15.9257   | -57.8701  | 266.9553  | 10.2018   | -42.0867  |
| 37    | 266.9553  | 10.2018   | -42.0867  | 26.7994   | 8.8305    | 5.9261    |
| 38    | 26.7994   | 8.8305    | 5.9261    | 46.6647   | 8.8311    | 5.9319    |
| 39    | 46.6647   | 8.8311    | 5.9319    | 66.5366   | 8.8314    | 5.9463    |
| 40    | 66.5366   | 8.8314    | 5.9463    | -100.0522 | 41.7966   | -121.1110 |
| 41    | -100.0522 | 41.7966   | -121.1110 | 17.5873   | 83.3352   | -222.5291 |
| 42    | 17.5873   | 83.3352   | -222.5291 | 131.6833  | 79.9190   | -212.2922 |
| 43    | 131.6833  | 79.9190   | -212.2922 | 240.2737  | 76.2113   | -201.7577 |
| 44    | 240.2737  | 76.2113   | -201.7577 | 308.6125  | 70.1739   | -186.0092 |
| 45    | 308.6125  | 70.1739   | -186.0092 | 398.2980  | 65.8827   | -175.3611 |
| 46    | 398.2980  | 65.8827   | -175.3611 | 475.5385  | 61.4333   | -164.6348 |
| 47    | 475.5385  | 61.4333   | -164.6348 | 538.9041  | 56.8493   | -153.9604 |
| 48    | 538.9041  | 56.8493   | -153.9604 | 549.6620  | 49.8041   | -137.9922 |
| 49    | 549.6620  | 49.8041   | -137.9922 | 579.7553  | 45.0457   | -127.3798 |
| 50    | 579.7553  | 45.0457   | -127.3798 | 593.7719  | 40.2857   | -116.6385 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 51    | 593.7719 | 40.2857   | -116.6385 | 591.7480 | 35.5559   | -105.9287 |
| 52    | 591.7480 | 35.5559   | -105.9287 | 527.3790 | 28.6187   | -89.9299  |
| 53    | 527.3790 | 28.6187   | -89.9299  | 492.8408 | 24.1604   | -79.1562  |
| 54    | 492.8408 | 24.1604   | -79.1562  | 445.0523 | 19.8664   | -68.5050  |
| 55    | 445.0523 | 19.8664   | -68.5050  | 385.4829 | 15.7745   | -57.9497  |
| 56    | 385.4829 | 15.7745   | -57.9497  | 266.9131 | 10.1049   | -42.0824  |
| 57    | 266.9131 | 10.1049   | -42.0824  | 30.4547  | 10.0304   | 6.3082    |
| 58    | 30.4547  | 10.0304   | 6.3082    | 53.0212  | 10.0315   | 6.3167    |
| 59    | 53.0212  | 10.0315   | 6.3167    | 75.5903  | 10.0317   | 6.3498    |
| 60    | 75.5903  | 10.0317   | 6.3498    | -99.8350 | 41.8074   | -121.1142 |
| 61    | -99.8350 | 41.8074   | -121.1142 | 18.0380  | 83.3264   | -222.5061 |
| 62    | 18.0380  | 83.3264   | -222.5061 | 132.2785 | 79.9086   | -212.2589 |
| 63    | 132.2785 | 79.9086   | -212.2589 | 240.9480 | 76.1978   | -201.7157 |
| 64    | 240.9480 | 76.1978   | -201.7157 | 309.3741 | 70.1478   | -185.9649 |
| 65    | 309.3741 | 70.1478   | -185.9649 | 398.9920 | 65.8477   | -175.3773 |
| 66    | 398.9920 | 65.8477   | -175.3773 | 476.1936 | 61.3826   | -164.6201 |
| 67    | 476.1936 | 61.3826   | -164.6201 | 539.4594 | 56.7879   | -153.9613 |
| 68    | 539.4594 | 56.7879   | -153.9613 | 550.0436 | 49.7543   | -138.0950 |
| 69    | 550.0436 | 49.7543   | -138.0950 | 579.9844 | 45.0035   | -127.3728 |
| 70    | 579.9844 | 45.0035   | -127.3728 | 593.9114 | 40.2444   | -116.5309 |
| 71    | 593.9114 | 40.2444   | -116.5309 | 591.8125 | 35.5342   | -105.8271 |
| 72    | 591.8125 | 35.5342   | -105.8271 | 527.3549 | 28.6102   | -89.9277  |
| 73    | 527.3549 | 28.6102   | -89.9277  | 492.7992 | 24.1371   | -79.1422  |
| 74    | 492.7992 | 24.1371   | -79.1422  | 444.9848 | 19.8578   | -68.5129  |
| 75    | 444.9848 | 19.8578   | -68.5129  | 385.3678 | 15.7719   | -57.9328  |
| 76    | 385.3678 | 15.7719   | -57.9328  | 266.8804 | 10.1015   | -42.0360  |
| 77    | 266.8804 | 10.1015   | -42.0360  | 30.6877  | 10.0997   | 6.2923    |
| 78    | 30.6877  | 10.0997   | 6.2923    | 53.4132  | 10.0995   | 6.3045    |
| 79    | 53.4132  | 10.0995   | 6.3045    | 76.1331  | 10.0989   | 6.3454    |
| 80    | 76.1331  | 10.0989   | 6.3454    | -99.7961 | 41.8045   | -121.1221 |
| 81    | -99.7961 | 41.8045   | -121.1221 | 18.0778  | 83.3203   | -222.5297 |
| 82    | 18.0778  | 83.3203   | -222.5297 | 132.3191 | 79.9014   | -212.2972 |
| 83    | 132.3191 | 79.9014   | -212.2972 | 240.9329 | 76.1880   | -201.7088 |
| 84    | 240.9329 | 76.1880   | -201.7088 | 309.3167 | 70.1483   | -185.9640 |
| 85    | 309.3167 | 70.1483   | -185.9640 | 399.0408 | 65.8488   | -175.2952 |
| 86    | 399.0408 | 65.8488   | -175.2952 | 476.1772 | 61.3915   | -164.6920 |
| 87    | 476.1772 | 61.3915   | -164.6920 | 539.3918 | 56.8017   | -154.0479 |
| 88    | 539.3918 | 56.8017   | -154.0479 | 550.0604 | 49.7550   | -137.8866 |
| 89    | 550.0604 | 49.7550   | -137.8866 | 580.0615 | 44.9832   | -127.1935 |
| 90    | 580.0615 | 44.9832   | -127.1935 | 593.8827 | 40.2338   | -116.6642 |
| 91    | 593.8827 | 40.2338   | -116.6642 | 591.6785 | 35.5089   | -105.8165 |
| 92    | 591.6785 | 35.5089   | -105.8165 | 527.3014 | 28.6058   | -89.8780  |
| 93    | 527.3014 | 28.6058   | -89.8780  | 492.7116 | 24.1506   | -79.2630  |
| 94    | 492.7116 | 24.1506   | -79.2630  | 444.8825 | 19.8566   | -68.5204  |
| 95    | 444.8825 | 19.8566   | -68.5204  | 385.3428 | 15.7747   | -57.8891  |
| 96    | 385.3428 | 15.7747   | -57.8891  | 266.8162 | 10.1063   | -42.0556  |
| 97    | 266.8162 | 10.1063   | -42.0556  | 30.7055  | 10.0990   | 6.2856    |
| 98    | 30.7055  | 10.0990   | 6.2856    | 53.4337  | 10.0992   | 6.2897    |
| 99    | 53.4337  | 10.0992   | 6.2897    | 76.1469  | 10.0993   | 6.3251    |
| 100   | 76.1469  | 10.0993   | 6.3251    | -99.7591 | 41.8049   | -121.1307 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 101   | -99.7591 | 41.8049   | -121.1307 | 18.0789  | 83.3195   | -222.5710 |
| 102   | 18.0789  | 83.3195   | -222.5710 | 132.2703 | 79.8991   | -212.3105 |
| 103   | 132.2703 | 79.8991   | -212.3105 | 240.8931 | 76.1829   | -201.7440 |
| 104   | 240.8931 | 76.1829   | -201.7440 | 309.3096 | 70.1369   | -185.9799 |
| 105   | 309.3096 | 70.1369   | -185.9799 | 398.9934 | 65.8472   | -175.3285 |
| 106   | 398.9934 | 65.8472   | -175.3285 | 476.1868 | 61.3859   | -164.6154 |
| 107   | 476.1868 | 61.3859   | -164.6154 | 539.3888 | 56.7851   | -153.9393 |
| 108   | 539.3888 | 56.7851   | -153.9393 | 549.9218 | 49.7333   | -138.0695 |
| 109   | 549.9218 | 49.7333   | -138.0695 | 579.8831 | 44.9762   | -127.3339 |
| 110   | 579.8831 | 44.9762   | -127.3339 | 593.7483 | 40.2401   | -116.6262 |
| 111   | 593.7483 | 40.2401   | -116.6262 | 591.5712 | 35.5030   | -105.8893 |
| 112   | 591.5712 | 35.5030   | -105.8893 | 527.0819 | 28.5718   | -89.9249  |
| 113   | 527.0819 | 28.5718   | -89.9249  | 492.4169 | 24.1098   | -79.2242  |
| 114   | 492.4169 | 24.1098   | -79.2242  | 444.5112 | 19.8179   | -68.4778  |
| 115   | 444.5112 | 19.8179   | -68.4778  | 384.9198 | 15.7362   | -57.8590  |
| 116   | 384.9198 | 15.7362   | -57.8590  | 8.1575   | 10.1121   | 6.2874    |
| 117   | 8.1575   | 10.1121   | 6.2874    | 30.9015  | 10.1114   | 6.2920    |
| 118   | 30.9015  | 10.1114   | 6.2920    | 53.6537  | 10.1117   | 6.3147    |
| 119   | 53.6537  | 10.1117   | 6.3147    | 76.4032  | 10.1110   | 6.3321    |
| 120   | 76.4032  | 10.1110   | 6.3321    | -99.4342 | 41.7933   | -121.0937 |
| 121   | -99.4342 | 41.7933   | -121.0937 | 18.5532  | 83.2561   | -222.5421 |
| 122   | 18.5532  | 83.2561   | -222.5421 | 132.7775 | 79.8025   | -212.2772 |
| 123   | 132.7775 | 79.8025   | -212.2772 | 241.2629 | 76.0604   | -201.7641 |
| 124   | 241.2629 | 76.0604   | -201.7641 | 309.3742 | 69.9648   | -185.9577 |
| 125   | 309.3742 | 69.9648   | -185.9577 | 398.6743 | 65.6433   | -175.2513 |
| 126   | 398.6743 | 65.6433   | -175.2513 | 475.3027 | 61.1665   | -164.6295 |
| 127   | 475.3027 | 61.1665   | -164.6295 | 537.8147 | 56.5590   | -153.9218 |
| 128   | 537.8147 | 56.5590   | -153.9218 | 547.6265 | 49.4751   | -137.9556 |
| 129   | 547.6265 | 49.4751   | -137.9556 | 576.7632 | 44.6882   | -127.3235 |
| 130   | 576.7632 | 44.6882   | -127.3235 | 589.8092 | 39.9235   | -116.4767 |
| 131   | 589.8092 | 39.9235   | -116.4767 | 586.8926 | 35.1980   | -105.7771 |
| 132   | 586.8926 | 35.1980   | -105.7771 | 521.7134 | 28.2705   | -89.8878  |
| 133   | 521.7134 | 28.2705   | -89.8878  | 486.5544 | 23.8276   | -79.1795  |
| 134   | 486.5544 | 23.8276   | -79.1795  | 438.3885 | 19.5473   | -68.5025  |
| 135   | 438.3885 | 19.5473   | -68.5025  | 378.7767 | 15.4904   | -57.8096  |
| 136   | 378.7767 | 15.4904   | -57.8096  | 10.4134  | 10.1999   | 6.3050    |
| 137   | 10.4134  | 10.1999   | 6.3050    | 33.3594  | 10.1993   | 6.3107    |
| 138   | 33.3594  | 10.1993   | 6.3107    | 56.3096  | 10.1986   | 6.3251    |
| 139   | 56.3096  | 10.1986   | 6.3251    | 79.2494  | 10.1985   | 6.3467    |
| 140   | 79.2494  | 10.1985   | 6.3467    | -95.5934 | 41.8500   | -118.5996 |
| 141   | -95.5934 | 41.8500   | -118.5996 | 22.8787  | 84.8614   | -221.4792 |
| 142   | 22.8787  | 84.8614   | -221.4792 | 104.2719 | 81.5078   | -209.1863 |
| 143   | 104.2719 | 81.5078   | -209.1863 | 184.2883 | 77.8019   | -196.3914 |
| 144   | 184.2883 | 77.8019   | -196.3914 | 260.7302 | 73.7695   | -183.5981 |
| 145   | 260.7302 | 73.7695   | -183.5981 | 361.1652 | 71.6308   | -177.1690 |
| 146   | 361.1652 | 71.6308   | -177.1690 | 423.3827 | 67.1505   | -164.3626 |
| 147   | 423.3827 | 67.1505   | -164.3626 | 475.8414 | 62.3857   | -151.5133 |
| 148   | 475.8414 | 62.3857   | -151.5133 | 516.5886 | 57.3653   | -138.5502 |
| 149   | 516.5886 | 57.3653   | -138.5502 | 543.7416 | 52.1202   | -125.6642 |
| 150   | 543.7416 | 52.1202   | -125.6642 | 596.2330 | 49.4142   | -119.1443 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 596.2330 | 49.4142   | -119.1443 | 595.0613 | 43.8542   | -106.1299 |
| 152   | 595.0613 | 43.8542   | -106.1299 | 576.3196 | 38.1404   | -93.2645  |
| 153   | 576.3196 | 38.1404   | -93.2645  | 538.7662 | 32.2666   | -80.4873  |
| 154   | 538.7662 | 32.2666   | -80.4873  | 481.4435 | 26.2722   | -67.4917  |
| 155   | 481.4435 | 26.2722   | -67.4917  | 466.0185 | 23.2425   | -60.8371  |
| 156   | 466.0185 | 23.2425   | -60.8371  | 371.9628 | 17.1154   | -48.1308  |
| 157   | 371.9628 | 17.1154   | -48.1308  | 256.0786 | 10.9302   | -35.4019  |
| 158   | 256.0786 | 10.9302   | -35.4019  | -36.7642 | 10.2146   | 7.6220    |
| 159   | -36.7642 | 10.2146   | 7.6220    | -18.3854 | 10.2133   | 7.6111    |
| 160   | -18.3854 | 10.2133   | 7.6111    | 0.0004   | 10.2130   | 7.6072    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 1     | 0.0000   | -10.2176  | -7.6460  | -18.3879 | -10.2176  | -7.6460  |
| 2     | -18.3879 | -10.2176  | -7.6460  | -36.7724 | -10.2181  | -7.6545  |
| 3     | -36.7724 | -10.2181  | -7.6545  | 256.0173 | -10.9253  | 35.3471  |
| 4     | 256.0173 | -10.9253  | 35.3471  | 371.9041 | -17.1199  | 48.1190  |
| 5     | 371.9041 | -17.1199  | 48.1190  | 403.4533 | -20.1852  | 54.5658  |
| 6     | 403.4533 | -20.1852  | 54.5658  | 481.4544 | -26.2617  | 67.4181  |
| 7     | 481.4544 | -26.2617  | 67.4181  | 538.8058 | -32.2581  | 80.3790  |
| 8     | 538.8058 | -32.2581  | 80.3790  | 576.3595 | -38.1376  | 93.2771  |
| 9     | 576.3595 | -38.1376  | 93.2771  | 595.1329 | -43.8696  | 106.1572 |
| 10    | 595.1329 | -43.8696  | 106.1572 | 555.7906 | -46.6721  | 112.8011 |
| 11    | 555.7906 | -46.6721  | 112.8011 | 543.8467 | -52.1153  | 125.6703 |
| 12    | 543.8467 | -52.1153  | 125.6703 | 516.6823 | -57.3545  | 138.5804 |
| 13    | 516.6823 | -57.3545  | 138.5804 | 475.9462 | -62.3902  | 151.4498 |
| 14    | 475.9462 | -62.3902  | 151.4498 | 423.3920 | -67.1535  | 164.3896 |
| 15    | 423.3920 | -67.1535  | 164.3896 | 330.9077 | -69.4398  | 170.7824 |
| 16    | 330.9077 | -69.4398  | 170.7824 | 260.6226 | -73.7855  | 183.5873 |
| 17    | 260.6226 | -73.7855  | 183.5873 | 184.2634 | -77.8156  | 196.4622 |
| 18    | 184.2634 | -77.8156  | 196.4622 | 104.2355 | -81.5154  | 209.1553 |
| 19    | 104.2355 | -81.5154  | 209.1553 | 22.7893  | -84.8654  | 221.4942 |
| 20    | 22.7893  | -84.8654  | 221.4942 | -95.6524 | -41.8513  | 118.6142 |
| 21    | -95.6524 | -41.8513  | 118.6142 | 79.2051  | -10.1916  | -6.3507  |
| 22    | 79.2051  | -10.1916  | -6.3507  | 56.2735  | -10.1911  | -6.3195  |
| 23    | 56.2735  | -10.1911  | -6.3195  | 33.3434  | -10.1904  | -6.3024  |
| 24    | 33.3434  | -10.1904  | -6.3024  | 10.4138  | -10.1910  | -6.3023  |
| 25    | 10.4138  | -10.1910  | -6.3023  | 378.7822 | -15.5005  | 57.7881  |
| 26    | 378.7822 | -15.5005  | 57.7881  | 438.3581 | -19.5591  | 68.5536  |
| 27    | 438.3581 | -19.5591  | 68.5536  | 486.5429 | -23.8396  | 79.2359  |
| 28    | 486.5429 | -23.8396  | 79.2359  | 521.6304 | -28.2846  | 89.8441  |
| 29    | 521.6304 | -28.2846  | 89.8441  | 586.6674 | -35.2069  | 105.9164 |
| 30    | 586.6674 | -35.2069  | 105.9164 | 589.6440 | -39.9242  | 116.5531 |
| 31    | 589.6440 | -39.9242  | 116.5531 | 576.5854 | -44.6948  | 127.2431 |
| 32    | 576.5854 | -44.6948  | 127.2431 | 547.3926 | -49.4641  | 138.1007 |
| 33    | 547.3926 | -49.4641  | 138.1007 | 537.7252 | -56.5322  | 153.8961 |
| 34    | 537.7252 | -56.5322  | 153.8961 | 475.1756 | -61.1365  | 164.5547 |
| 35    | 475.1756 | -61.1365  | 164.5547 | 398.6171 | -65.6239  | 175.3701 |
| 36    | 398.6171 | -65.6239  | 175.3701 | 309.4849 | -69.9536  | 185.9800 |
| 37    | 309.4849 | -69.9536  | 185.9800 | 241.2750 | -76.0513  | 201.7469 |
| 38    | 241.2750 | -76.0513  | 201.7469 | 132.8629 | -79.8004  | 212.3371 |
| 39    | 132.8629 | -79.8004  | 212.3371 | 18.6278  | -83.2542  | 222.5016 |
| 40    | 18.6278  | -83.2542  | 222.5016 | -99.4720 | -41.7914  | 121.0965 |
| 41    | -99.4720 | -41.7914  | 121.0965 | 76.4431  | -10.1143  | -6.3375  |
| 42    | 76.4431  | -10.1143  | -6.3375  | 53.6882  | -10.1143  | -6.3146  |
| 43    | 53.6882  | -10.1143  | -6.3146  | 30.9259  | -10.1148  | -6.3012  |
| 44    | 30.9259  | -10.1148  | -6.3012  | 8.1714   | -10.1136  | -6.2964  |
| 45    | 8.1714   | -10.1136  | -6.2964  | 384.8287 | -15.7432  | 57.8763  |
| 46    | 384.8287 | -15.7432  | 57.8763  | 444.4390 | -19.8204  | 68.5840  |
| 47    | 444.4390 | -19.8204  | 68.5840  | 492.3471 | -24.1039  | 79.2517  |
| 48    | 492.3471 | -24.1039  | 79.2517  | 527.0367 | -28.5668  | 89.9385  |
| 49    | 527.0367 | -28.5668  | 89.9385  | 591.5397 | -35.4921  | 105.8365 |
| 50    | 591.5397 | -35.4921  | 105.8365 | 593.7202 | -40.2166  | 116.5310 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 593.7202 | -40.2166  | 116.5310 | 579.9224 | -44.9837  | 127.2748 |
| 52    | 579.9224 | -44.9837  | 127.2748 | 549.9758 | -49.7323  | 137.9707 |
| 53    | 549.9758 | -49.7323  | 137.9707 | 539.3795 | -56.7822  | 154.0525 |
| 54    | 539.3795 | -56.7822  | 154.0525 | 476.1617 | -61.3794  | 164.7354 |
| 55    | 476.1617 | -61.3794  | 164.7354 | 399.0831 | -65.8405  | 175.3127 |
| 56    | 399.0831 | -65.8405  | 175.3127 | 309.4019 | -70.1322  | 185.9139 |
| 57    | 309.4019 | -70.1322  | 185.9139 | 240.9207 | -76.1797  | 201.7805 |
| 58    | 240.9207 | -76.1797  | 201.7805 | 132.3835 | -79.8947  | 212.2657 |
| 59    | 132.3835 | -79.8947  | 212.2657 | 18.1157  | -83.3198  | 222.5029 |
| 60    | 18.1157  | -83.3198  | 222.5029 | -99.7907 | -41.8065  | 121.1135 |
| 61    | -99.7907 | -41.8065  | 121.1135 | 76.1631  | -10.1073  | -6.3637  |
| 62    | 76.1631  | -10.1073  | -6.3637  | 53.4260  | -10.1074  | -6.3305  |
| 63    | 53.4260  | -10.1074  | -6.3305  | 30.6807  | -10.1063  | -6.3173  |
| 64    | 30.6807  | -10.1063  | -6.3173  | 7.9485   | -10.1028  | -6.3128  |
| 65    | 7.9485   | -10.1028  | -6.3128  | 385.4589 | -15.7684  | 57.8708  |
| 66    | 385.4589 | -15.7684  | 57.8708  | 445.0185 | -19.8629  | 68.5766  |
| 67    | 445.0185 | -19.8629  | 68.5766  | 492.8937 | -24.1562  | 79.2598  |
| 68    | 492.8937 | -24.1562  | 79.2598  | 527.4447 | -28.6146  | 89.8526  |
| 69    | 527.4447 | -28.6146  | 89.8526  | 591.8221 | -35.5345  | 105.8119 |
| 70    | 591.8221 | -35.5345  | 105.8119 | 593.8936 | -40.2434  | 116.6322 |
| 71    | 593.8936 | -40.2434  | 116.6322 | 580.0338 | -45.0134  | 127.3843 |
| 72    | 580.0338 | -45.0134  | 127.3843 | 550.0181 | -49.7681  | 138.0027 |
| 73    | 550.0181 | -49.7681  | 138.0027 | 539.3204 | -56.8014  | 154.0582 |
| 74    | 539.3204 | -56.8014  | 154.0582 | 476.0791 | -61.3921  | 164.7454 |
| 75    | 476.0791 | -61.3921  | 164.7454 | 399.0121 | -65.8459  | 175.3115 |
| 76    | 399.0121 | -65.8459  | 175.3115 | 309.2278 | -70.1409  | 185.9874 |
| 77    | 309.2278 | -70.1409  | 185.9874 | 240.9012 | -76.1850  | 201.7944 |
| 78    | 240.9012 | -76.1850  | 201.7944 | 132.2892 | -79.8999  | 212.2600 |
| 79    | 132.2892 | -79.8999  | 212.2600 | 18.0289  | -83.3203  | 222.5261 |
| 80    | 18.0289  | -83.3203  | 222.5261 | -99.8106 | -41.8059  | 121.1160 |
| 81    | -99.8106 | -41.8059  | 121.1160 | 76.1221  | -10.0983  | -6.3542  |
| 82    | 76.1221  | -10.0983  | -6.3542  | 53.3967  | -10.0989  | -6.3331  |
| 83    | 53.3967  | -10.0989  | -6.3331  | 30.6772  | -10.0984  | -6.3155  |
| 84    | 30.6772  | -10.0984  | -6.3155  | 266.9170 | -10.1004  | 42.0916  |
| 85    | 266.9170 | -10.1004  | 42.0916  | 385.4202 | -15.7720  | 57.9264  |
| 86    | 385.4202 | -15.7720  | 57.9264  | 445.0378 | -19.8615  | 68.5723  |
| 87    | 445.0378 | -19.8615  | 68.5723  | 492.8751 | -24.1460  | 79.1483  |
| 88    | 492.8751 | -24.1460  | 79.1483  | 527.4061 | -28.6181  | 90.0088  |
| 89    | 527.4061 | -28.6181  | 90.0088  | 591.8390 | -35.5462  | 106.0161 |
| 90    | 591.8390 | -35.5462  | 106.0161 | 593.9343 | -40.2762  | 116.5434 |
| 91    | 593.9343 | -40.2762  | 116.5434 | 579.9026 | -45.0165  | 127.3358 |
| 92    | 579.9026 | -45.0165  | 127.3358 | 549.8552 | -49.7641  | 138.0970 |
| 93    | 549.8552 | -49.7641  | 138.0970 | 539.2658 | -56.8082  | 153.9311 |
| 94    | 539.2658 | -56.8082  | 153.9311 | 476.0145 | -61.3884  | 164.7118 |
| 95    | 476.0145 | -61.3884  | 164.7118 | 398.8788 | -65.8428  | 175.3738 |
| 96    | 398.8788 | -65.8428  | 175.3738 | 309.2574 | -70.1288  | 185.9811 |
| 97    | 309.2574 | -70.1288  | 185.9811 | 240.8360 | -76.1784  | 201.8051 |
| 98    | 240.8360 | -76.1784  | 201.8051 | 132.2447 | -79.8941  | 212.3182 |
| 99    | 132.2447 | -79.8941  | 212.3182 | 18.0614  | -83.3186  | 222.5077 |
| 100   | 18.0614  | -83.3186  | 222.5077 | -99.8318 | -41.8049  | 121.1079 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -99.8318  | -41.8049  | 121.1079 | 75.6322   | -10.0340  | -6.3290  |
| 102   | 75.6322   | -10.0340  | -6.3290  | 53.0562   | -10.0344  | -6.3125  |
| 103   | 53.0562   | -10.0344  | -6.3125  | 30.4823   | -10.0340  | -6.2909  |
| 104   | 30.4823   | -10.0340  | -6.2909  | 266.8849  | -10.1050  | 42.0702  |
| 105   | 266.8849  | -10.1050  | 42.0702  | 385.4051  | -15.7707  | 57.9044  |
| 106   | 385.4051  | -15.7707  | 57.9044  | 445.0008  | -19.8652  | 68.6055  |
| 107   | 445.0008  | -19.8652  | 68.6055  | 492.8666  | -24.1659  | 79.2738  |
| 108   | 492.8666  | -24.1659  | 79.2738  | 527.3865  | -28.6253  | 89.8839  |
| 109   | 527.3865  | -28.6253  | 89.8839  | 591.6877  | -35.5492  | 105.8403 |
| 110   | 591.6877  | -35.5492  | 105.8403 | 593.7748  | -40.2566  | 116.5686 |
| 111   | 593.7748  | -40.2566  | 116.5686 | 579.8177  | -45.0312  | 127.2864 |
| 112   | 579.8177  | -45.0312  | 127.2864 | 549.7114  | -49.7968  | 138.0249 |
| 113   | 549.7114  | -49.7968  | 138.0249 | 538.9853  | -56.8482  | 153.9740 |
| 114   | 538.9853  | -56.8482  | 153.9740 | 475.6310  | -61.4250  | 164.7512 |
| 115   | 475.6310  | -61.4250  | 164.7512 | 398.3853  | -65.8886  | 175.4118 |
| 116   | 398.3853  | -65.8886  | 175.4118 | 308.7014  | -70.1732  | 185.9644 |
| 117   | 308.7014  | -70.1732  | 185.9644 | 240.3482  | -76.2085  | 201.7209 |
| 118   | 240.3482  | -76.2085  | 201.7209 | 131.7485  | -79.9165  | 212.2901 |
| 119   | 131.7485  | -79.9165  | 212.2901 | 17.6777   | -83.3344  | 222.5571 |
| 120   | 17.6777   | -83.3344  | 222.5571 | -100.0423 | -41.7958  | 121.1005 |
| 121   | -100.0423 | -41.7958  | 121.1005 | 66.5626   | -8.8351   | -5.9875  |
| 122   | 66.5626   | -8.8351   | -5.9875  | 46.6849   | -8.8350   | -5.9724  |
| 123   | 46.6849   | -8.8350   | -5.9724  | 26.8074   | -8.8353   | -5.9584  |
| 124   | 26.8074   | -8.8353   | -5.9584  | 266.9464  | -10.1957  | 42.0588  |
| 125   | 266.9464  | -10.1957  | 42.0588  | 385.1557  | -15.9130  | 57.9642  |
| 126   | 385.1557  | -15.9130  | 57.9642  | 444.3483  | -20.0282  | 68.6052  |
| 127   | 444.3483  | -20.0282  | 68.6052  | 491.6635  | -24.3345  | 79.2601  |
| 128   | 491.6635  | -24.3345  | 79.2601  | 525.5177  | -28.8370  | 89.9750  |
| 129   | 525.5177  | -28.8370  | 89.9750  | 589.0052  | -35.8025  | 105.8510 |
| 130   | 589.0052  | -35.8025  | 105.8510 | 590.2275  | -40.5410  | 116.6729 |
| 131   | 590.2275  | -40.5410  | 116.6729 | 575.3851  | -45.3065  | 127.4191 |
| 132   | 575.3851  | -45.3065  | 127.4191 | 544.4792  | -50.0872  | 138.0275 |
| 133   | 544.4792  | -50.0872  | 138.0275 | 532.8917  | -57.1390  | 154.0091 |
| 134   | 532.8917  | -57.1390  | 154.0091 | 468.9066  | -61.7261  | 164.7087 |
| 135   | 468.9066  | -61.7261  | 164.7087 | 391.2250  | -66.1804  | 175.4176 |
| 136   | 391.2250  | -66.1804  | 175.4176 | 301.3186  | -70.4482  | 186.0664 |
| 137   | 301.3186  | -70.4482  | 186.0664 | 233.5314  | -76.4496  | 201.8336 |
| 138   | 233.5314  | -76.4496  | 201.8336 | 125.6472  | -80.1145  | 212.3736 |
| 139   | 125.6472  | -80.1145  | 212.3736 | 12.8067   | -83.4818  | 222.6069 |
| 140   | 12.8067   | -83.4818  | 222.6069 | -103.1380 | -41.8326  | 122.1785 |
| 141   | -103.1380 | -41.8326  | 122.1785 | 97.0879   | -2.8386   | 0.2112   |
| 142   | 97.0879   | -2.8386   | 0.2112   | 91.9778   | -2.8389   | 0.2123   |
| 143   | 91.9778   | -2.8389   | 0.2123   | 157.3982  | -5.1382   | 32.7888  |
| 144   | 157.3982  | -5.1382   | 32.7888  | 244.7566  | -8.4935   | 45.2125  |
| 145   | 244.7566  | -8.4935   | 45.2125  | 278.2900  | -10.3048  | 51.6191  |
| 146   | 278.2900  | -10.3048  | 51.6191  | 357.4041  | -14.1667  | 64.4236  |
| 147   | 357.4041  | -14.1667  | 64.4236  | 430.0925  | -18.3557  | 77.2380  |
| 148   | 430.0925  | -18.3557  | 77.2380  | 494.1327  | -22.8381  | 90.1754  |
| 149   | 494.1327  | -22.8381  | 90.1754  | 547.4678  | -27.6120  | 103.0554 |
| 150   | 547.4678  | -27.6120  | 103.0554 | 542.3947  | -30.0903  | 109.5426 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 542.3947 | -30.0903  | 109.5426 | 571.4251 | -35.2391  | 122.5611 |
| 152   | 571.4251 | -35.2391  | 122.5611 | 585.1149 | -40.6073  | 135.4603 |
| 153   | 585.1149 | -40.6073  | 135.4603 | 581.9984 | -46.1453  | 148.2249 |
| 154   | 581.9984 | -46.1453  | 148.2249 | 560.5908 | -51.8750  | 161.1924 |
| 155   | 560.5908 | -51.8750  | 161.1924 | 493.3636 | -54.7962  | 167.9118 |
| 156   | 493.3636 | -54.7962  | 167.9118 | 437.3843 | -60.7207  | 180.7009 |
| 157   | 437.3843 | -60.7207  | 180.7009 | 360.7197 | -66.7578  | 193.3962 |
| 158   | 360.7197 | -66.7578  | 193.3962 | 262.4966 | -72.8806  | 206.2386 |
| 159   | 262.4966 | -72.8806  | 206.2386 | 142.4085 | -79.0667  | 219.0180 |
| 160   | 142.4085 | -79.0667  | 219.0180 | 0.0181   | -82.1786  | 225.3739 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 1     | 0.0060   | -0.0060   | 4.3689   | 28.1181  | -1.0470   | 6.4714   |
| 2     | 28.1181  | -1.0470   | 6.4714   | 118.0827 | -4.6988   | 22.5943  |
| 3     | 118.0827 | -4.6988   | 22.5943  | 256.0173 | -10.9253  | 35.3471  |
| 4     | 256.0173 | -10.9253  | 35.3471  | 371.9041 | -17.1199  | 48.1190  |
| 5     | 371.9041 | -17.1199  | 48.1190  | 403.4533 | -20.1852  | 54.5658  |
| 6     | 403.4533 | -20.1852  | 54.5658  | 481.4544 | -26.2617  | 67.4181  |
| 7     | 481.4544 | -26.2617  | 67.4181  | 538.8058 | -32.2581  | 80.3790  |
| 8     | 538.8058 | -32.2581  | 80.3790  | 576.3595 | -38.1376  | 93.2771  |
| 9     | 576.3595 | -38.1376  | 93.2771  | 595.1329 | -43.8696  | 106.1572 |
| 10    | 595.1329 | -43.8696  | 106.1572 | 555.7906 | -46.6721  | 112.8011 |
| 11    | 555.7906 | -46.6721  | 112.8011 | 543.8467 | -52.1153  | 125.6703 |
| 12    | 543.8467 | -52.1153  | 125.6703 | 516.6823 | -57.3545  | 138.5804 |
| 13    | 516.6823 | -57.3545  | 138.5804 | 475.9462 | -62.3902  | 151.4498 |
| 14    | 475.9462 | -62.3902  | 151.4498 | 423.3920 | -67.1535  | 164.3896 |
| 15    | 423.3920 | -67.1535  | 164.3896 | 330.9077 | -69.4398  | 170.7824 |
| 16    | 330.9077 | -69.4398  | 170.7824 | 260.6226 | -73.7855  | 183.5873 |
| 17    | 260.6226 | -73.7855  | 183.5873 | 184.2634 | -77.8156  | 196.4622 |
| 18    | 184.2634 | -77.8156  | 196.4622 | 104.2355 | -81.5154  | 209.1553 |
| 19    | 104.2355 | -81.5154  | 209.1553 | 22.7893  | -84.8654  | 221.4942 |
| 20    | 22.7893  | -84.8654  | 221.4942 | -95.6524 | -41.8513  | 118.6142 |
| 21    | -95.6524 | -41.8513  | 118.6142 | 24.1394  | -0.7424   | 14.1140  |
| 22    | 24.1394  | -0.7424   | 14.1140  | 106.3559 | -3.4696   | 22.0271  |
| 23    | 106.3559 | -3.4696   | 22.0271  | 186.0876 | -6.5236   | 31.7510  |
| 24    | 186.0876 | -6.5236   | 31.7510  | 261.3002 | -9.8937   | 41.9669  |
| 25    | 261.3002 | -9.8937   | 41.9669  | 378.7822 | -15.5005  | 57.7881  |
| 26    | 378.7822 | -15.5005  | 57.7881  | 438.3581 | -19.5591  | 68.5536  |
| 27    | 438.3581 | -19.5591  | 68.5536  | 486.5429 | -23.8396  | 79.2359  |
| 28    | 486.5429 | -23.8396  | 79.2359  | 521.6304 | -28.2846  | 89.8441  |
| 29    | 521.6304 | -28.2846  | 89.8441  | 586.6674 | -35.2069  | 105.9164 |
| 30    | 586.6674 | -35.2069  | 105.9164 | 589.6440 | -39.9242  | 116.5531 |
| 31    | 589.6440 | -39.9242  | 116.5531 | 576.5854 | -44.6948  | 127.2431 |
| 32    | 576.5854 | -44.6948  | 127.2431 | 547.3926 | -49.4641  | 138.1007 |
| 33    | 547.3926 | -49.4641  | 138.1007 | 537.7252 | -56.5322  | 153.8961 |
| 34    | 537.7252 | -56.5322  | 153.8961 | 475.1756 | -61.1365  | 164.5547 |
| 35    | 475.1756 | -61.1365  | 164.5547 | 398.6171 | -65.6239  | 175.3701 |
| 36    | 398.6171 | -65.6239  | 175.3701 | 309.4849 | -69.9536  | 185.9800 |
| 37    | 309.4849 | -69.9536  | 185.9800 | 241.2750 | -76.0513  | 201.7469 |
| 38    | 241.2750 | -76.0513  | 201.7469 | 132.8629 | -79.8004  | 212.3371 |
| 39    | 132.8629 | -79.8004  | 212.3371 | 18.6278  | -83.2542  | 222.5016 |
| 40    | 18.6278  | -83.2542  | 222.5016 | -99.4720 | -41.7914  | 121.0965 |
| 41    | -99.4720 | -41.7914  | 121.0965 | 24.6301  | -0.7572   | 14.2175  |
| 42    | 24.6301  | -0.7572   | 14.2175  | 108.9632 | -3.5532   | 22.0979  |
| 43    | 108.9632 | -3.5532   | 22.0979  | 190.1917 | -6.6641   | 31.8055  |
| 44    | 190.1917 | -6.6641   | 31.8055  | 266.3983 | -10.0819  | 42.0500  |
| 45    | 266.3983 | -10.0819  | 42.0500  | 384.8287 | -15.7432  | 57.8763  |
| 46    | 384.8287 | -15.7432  | 57.8763  | 444.4390 | -19.8204  | 68.5840  |
| 47    | 444.4390 | -19.8204  | 68.5840  | 492.3471 | -24.1039  | 79.2517  |
| 48    | 492.3471 | -24.1039  | 79.2517  | 527.0367 | -28.5668  | 89.9385  |
| 49    | 527.0367 | -28.5668  | 89.9385  | 591.5397 | -35.4921  | 105.8365 |
| 50    | 591.5397 | -35.4921  | 105.8365 | 593.7202 | -40.2166  | 116.5310 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 593.7202 | -40.2166  | 116.5310 | 579.9224 | -44.9837  | 127.2748 |
| 52    | 579.9224 | -44.9837  | 127.2748 | 549.9758 | -49.7323  | 137.9707 |
| 53    | 549.9758 | -49.7323  | 137.9707 | 539.3795 | -56.7822  | 154.0525 |
| 54    | 539.3795 | -56.7822  | 154.0525 | 476.1617 | -61.3794  | 164.7354 |
| 55    | 476.1617 | -61.3794  | 164.7354 | 399.0831 | -65.8405  | 175.3127 |
| 56    | 399.0831 | -65.8405  | 175.3127 | 309.4019 | -70.1322  | 185.9139 |
| 57    | 309.4019 | -70.1322  | 185.9139 | 240.9207 | -76.1797  | 201.7805 |
| 58    | 240.9207 | -76.1797  | 201.7805 | 132.3835 | -79.8947  | 212.2657 |
| 59    | 132.3835 | -79.8947  | 212.2657 | 18.1157  | -83.3198  | 222.5029 |
| 60    | 18.1157  | -83.3198  | 222.5029 | -99.7907 | -41.8065  | 121.1135 |
| 61    | -99.7907 | -41.8065  | 121.1135 | 24.6914  | -0.7581   | 14.2201  |
| 62    | 24.6914  | -0.7581   | 14.2201  | 109.2352 | -3.5591   | 22.1144  |
| 63    | 109.2352 | -3.5591   | 22.1144  | 190.6210 | -6.6734   | 31.8319  |
| 64    | 190.6210 | -6.6734   | 31.8319  | 266.9360 | -10.0972  | 42.0835  |
| 65    | 266.9360 | -10.0972  | 42.0835  | 385.4589 | -15.7684  | 57.8708  |
| 66    | 385.4589 | -15.7684  | 57.8708  | 445.0185 | -19.8629  | 68.5766  |
| 67    | 445.0185 | -19.8629  | 68.5766  | 492.8937 | -24.1562  | 79.2598  |
| 68    | 492.8937 | -24.1562  | 79.2598  | 527.4447 | -28.6146  | 89.8526  |
| 69    | 527.4447 | -28.6146  | 89.8526  | 591.8221 | -35.5345  | 105.8119 |
| 70    | 591.8221 | -35.5345  | 105.8119 | 593.8936 | -40.2434  | 116.6322 |
| 71    | 593.8936 | -40.2434  | 116.6322 | 580.0338 | -45.0134  | 127.3843 |
| 72    | 580.0338 | -45.0134  | 127.3843 | 550.0181 | -49.7681  | 138.0027 |
| 73    | 550.0181 | -49.7681  | 138.0027 | 539.3204 | -56.8014  | 154.0582 |
| 74    | 539.3204 | -56.8014  | 154.0582 | 476.0791 | -61.3921  | 164.7454 |
| 75    | 476.0791 | -61.3921  | 164.7454 | 399.0121 | -65.8459  | 175.3115 |
| 76    | 399.0121 | -65.8459  | 175.3115 | 309.2278 | -70.1409  | 185.9874 |
| 77    | 309.2278 | -70.1409  | 185.9874 | 240.9012 | -76.1850  | 201.7944 |
| 78    | 240.9012 | -76.1850  | 201.7944 | 132.2892 | -79.8999  | 212.2600 |
| 79    | 132.2892 | -79.8999  | 212.2600 | 18.0289  | -83.3203  | 222.5261 |
| 80    | 18.0289  | -83.3203  | 222.5261 | -99.8106 | -41.8059  | 121.1160 |
| 81    | -99.8106 | -41.8059  | 121.1160 | 24.7294  | -0.7603   | 14.2207  |
| 82    | 24.7294  | -0.7603   | 14.2207  | 109.2562 | -3.5626   | 22.0975  |
| 83    | 109.2562 | -3.5626   | 22.0975  | 190.6212 | -6.6790   | 31.8283  |
| 84    | 190.6212 | -6.6790   | 31.8283  | 266.9170 | -10.1004  | 42.0916  |
| 85    | 266.9170 | -10.1004  | 42.0916  | 385.4202 | -15.7720  | 57.9264  |
| 86    | 385.4202 | -15.7720  | 57.9264  | 445.0378 | -19.8615  | 68.5723  |
| 87    | 445.0378 | -19.8615  | 68.5723  | 492.8751 | -24.1460  | 79.1483  |
| 88    | 492.8751 | -24.1460  | 79.1483  | 527.4061 | -28.6181  | 90.0088  |
| 89    | 527.4061 | -28.6181  | 90.0088  | 591.8390 | -35.5462  | 106.0161 |
| 90    | 591.8390 | -35.5462  | 106.0161 | 593.9343 | -40.2762  | 116.5434 |
| 91    | 593.9343 | -40.2762  | 116.5434 | 579.9026 | -45.0165  | 127.3358 |
| 92    | 579.9026 | -45.0165  | 127.3358 | 549.8552 | -49.7641  | 138.0970 |
| 93    | 549.8552 | -49.7641  | 138.0970 | 539.2658 | -56.8082  | 153.9311 |
| 94    | 539.2658 | -56.8082  | 153.9311 | 476.0145 | -61.3884  | 164.7118 |
| 95    | 476.0145 | -61.3884  | 164.7118 | 398.8788 | -65.8428  | 175.3738 |
| 96    | 398.8788 | -65.8428  | 175.3738 | 309.2574 | -70.1288  | 185.9811 |
| 97    | 309.2574 | -70.1288  | 185.9811 | 240.8360 | -76.1784  | 201.8051 |
| 98    | 240.8360 | -76.1784  | 201.8051 | 132.2447 | -79.8941  | 212.3182 |
| 99    | 132.2447 | -79.8941  | 212.3182 | 18.0614  | -83.3186  | 222.5077 |
| 100   | 18.0614  | -83.3186  | 222.5077 | -99.8318 | -41.8049  | 121.1079 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====    |
| 101   | -99.8318  | -41.8049  | 121.1079 | 24.7304   | -0.7604   | 14.2160  |
| 102   | 24.7304   | -0.7604   | 14.2160  | 109.2243  | -3.5624   | 22.0833  |
| 103   | 109.2243  | -3.5624   | 22.0833  | 190.5938  | -6.6804   | 31.8134  |
| 104   | 190.5938  | -6.6804   | 31.8134  | 266.8849  | -10.1050  | 42.0702  |
| 105   | 266.8849  | -10.1050  | 42.0702  | 385.4051  | -15.7707  | 57.9044  |
| 106   | 385.4051  | -15.7707  | 57.9044  | 445.0008  | -19.8652  | 68.6055  |
| 107   | 445.0008  | -19.8652  | 68.6055  | 492.8666  | -24.1659  | 79.2738  |
| 108   | 492.8666  | -24.1659  | 79.2738  | 527.3865  | -28.6253  | 89.8839  |
| 109   | 527.3865  | -28.6253  | 89.8839  | 591.6877  | -35.5492  | 105.8403 |
| 110   | 591.6877  | -35.5492  | 105.8403 | 593.7748  | -40.2566  | 116.5686 |
| 111   | 593.7748  | -40.2566  | 116.5686 | 579.8177  | -45.0312  | 127.2864 |
| 112   | 579.8177  | -45.0312  | 127.2864 | 549.7114  | -49.7968  | 138.0249 |
| 113   | 549.7114  | -49.7968  | 138.0249 | 538.9853  | -56.8482  | 153.9740 |
| 114   | 538.9853  | -56.8482  | 153.9740 | 475.6310  | -61.4250  | 164.7512 |
| 115   | 475.6310  | -61.4250  | 164.7512 | 398.3853  | -65.8886  | 175.4118 |
| 116   | 398.3853  | -65.8886  | 175.4118 | 308.7014  | -70.1732  | 185.9644 |
| 117   | 308.7014  | -70.1732  | 185.9644 | 240.3482  | -76.2085  | 201.7209 |
| 118   | 240.3482  | -76.2085  | 201.7209 | 131.7485  | -79.9165  | 212.2901 |
| 119   | 131.7485  | -79.9165  | 212.2901 | 17.6777   | -83.3344  | 222.5571 |
| 120   | 17.6777   | -83.3344  | 222.5571 | -100.0423 | -41.7958  | 121.1005 |
| 121   | -100.0423 | -41.7958  | 121.1005 | 24.7605   | -0.7672   | 14.2192  |
| 122   | 24.7605   | -0.7672   | 14.2192  | 109.4063  | -3.5968   | 22.0993  |
| 123   | 109.4063  | -3.5968   | 22.0993  | 190.7912  | -6.7444   | 31.8095  |
| 124   | 190.7912  | -6.7444   | 31.8095  | 266.9464  | -10.1957  | 42.0588  |
| 125   | 266.9464  | -10.1957  | 42.0588  | 385.1557  | -15.9130  | 57.9642  |
| 126   | 385.1557  | -15.9130  | 57.9642  | 444.3483  | -20.0282  | 68.6052  |
| 127   | 444.3483  | -20.0282  | 68.6052  | 491.6635  | -24.3345  | 79.2601  |
| 128   | 491.6635  | -24.3345  | 79.2601  | 525.5177  | -28.8370  | 89.9750  |
| 129   | 525.5177  | -28.8370  | 89.9750  | 589.0052  | -35.8025  | 105.8510 |
| 130   | 589.0052  | -35.8025  | 105.8510 | 590.2275  | -40.5410  | 116.6729 |
| 131   | 590.2275  | -40.5410  | 116.6729 | 575.3851  | -45.3065  | 127.4191 |
| 132   | 575.3851  | -45.3065  | 127.4191 | 544.4792  | -50.0872  | 138.0275 |
| 133   | 544.4792  | -50.0872  | 138.0275 | 532.8917  | -57.1390  | 154.0091 |
| 134   | 532.8917  | -57.1390  | 154.0091 | 468.9066  | -61.7261  | 164.7087 |
| 135   | 468.9066  | -61.7261  | 164.7087 | 391.2250  | -66.1804  | 175.4176 |
| 136   | 391.2250  | -66.1804  | 175.4176 | 301.3186  | -70.4482  | 186.0664 |
| 137   | 301.3186  | -70.4482  | 186.0664 | 233.5314  | -76.4496  | 201.8336 |
| 138   | 233.5314  | -76.4496  | 201.8336 | 125.6472  | -80.1145  | 212.3736 |
| 139   | 125.6472  | -80.1145  | 212.3736 | 12.8067   | -83.4818  | 222.6069 |
| 140   | 12.8067   | -83.4818  | 222.6069 | -103.1380 | -41.8326  | 122.1785 |
| 141   | -103.1380 | -41.8326  | 122.1785 | -18.2625  | 0.5358    | 14.2841  |
| 142   | -18.2625  | 0.5358    | 14.2841  | 69.2054   | -2.1328   | 21.0789  |
| 143   | 69.2054   | -2.1328   | 21.0789  | 157.3982  | -5.1382   | 32.7888  |
| 144   | 157.3982  | -5.1382   | 32.7888  | 244.7566  | -8.4935   | 45.2125  |
| 145   | 244.7566  | -8.4935   | 45.2125  | 278.2900  | -10.3048  | 51.6191  |
| 146   | 278.2900  | -10.3048  | 51.6191  | 357.4041  | -14.1667  | 64.4236  |
| 147   | 357.4041  | -14.1667  | 64.4236  | 430.0925  | -18.3557  | 77.2380  |
| 148   | 430.0925  | -18.3557  | 77.2380  | 494.1327  | -22.8381  | 90.1754  |
| 149   | 494.1327  | -22.8381  | 90.1754  | 547.4678  | -27.6120  | 103.0554 |
| 150   | 547.4678  | -27.6120  | 103.0554 | 542.3947  | -30.0903  | 109.5426 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| ===== | =====    | =====     | =====    | =====    | =====     | =====    |
| 151   | 542.3947 | -30.0903  | 109.5426 | 571.4251 | -35.2391  | 122.5611 |
| 152   | 571.4251 | -35.2391  | 122.5611 | 585.1149 | -40.6073  | 135.4603 |
| 153   | 585.1149 | -40.6073  | 135.4603 | 581.9984 | -46.1453  | 148.2249 |
| 154   | 581.9984 | -46.1453  | 148.2249 | 560.5908 | -51.8750  | 161.1924 |
| 155   | 560.5908 | -51.8750  | 161.1924 | 493.3636 | -54.7962  | 167.9118 |
| 156   | 493.3636 | -54.7962  | 167.9118 | 437.3843 | -60.7207  | 180.7009 |
| 157   | 437.3843 | -60.7207  | 180.7009 | 360.7197 | -66.7578  | 193.3962 |
| 158   | 360.7197 | -66.7578  | 193.3962 | 262.4966 | -72.8806  | 206.2386 |
| 159   | 262.4966 | -72.8806  | 206.2386 | 142.4085 | -79.0667  | 219.0180 |
| 160   | 142.4085 | -79.0667  | 219.0180 | 0.0181   | -82.1786  | 225.3739 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0169    | 82.1848   | -225.3687 | 142.3363  | 79.0750   | -219.0485 |
| 2     | 142.3363  | 79.0750   | -219.0485 | 262.4202  | 72.8864   | -206.3117 |
| 3     | 262.4202  | 72.8864   | -206.3117 | 360.6570  | 66.7613   | -193.4787 |
| 4     | 360.6570  | 66.7613   | -193.4787 | 437.3721  | 60.7187   | -180.6828 |
| 5     | 437.3721  | 60.7187   | -180.6828 | 493.3368  | 54.8026   | -167.8105 |
| 6     | 493.3368  | 54.8026   | -167.8105 | 560.5660  | 51.8905   | -161.3148 |
| 7     | 560.5660  | 51.8905   | -161.3148 | 582.0099  | 46.1570   | -148.3066 |
| 8     | 582.0099  | 46.1570   | -148.3066 | 585.1959  | 40.5949   | -135.4399 |
| 9     | 585.1959  | 40.5949   | -135.4399 | 571.4973  | 35.2279   | -122.5085 |
| 10    | 571.4973  | 35.2279   | -122.5085 | 542.4712  | 30.0970   | -109.5155 |
| 11    | 542.4712  | 30.0970   | -109.5155 | 547.5224  | 27.6245   | -103.0287 |
| 12    | 547.5224  | 27.6245   | -103.0287 | 494.1926  | 22.8499   | -90.1523  |
| 13    | 494.1926  | 22.8499   | -90.1523  | 430.1387  | 18.3590   | -77.2838  |
| 14    | 430.1387  | 18.3590   | -77.2838  | 357.4095  | 14.1592   | -64.3844  |
| 15    | 357.4095  | 14.1592   | -64.3844  | 278.2874  | 10.2919   | -51.6532  |
| 16    | 278.2874  | 10.2919   | -51.6532  | 244.6808  | 8.4813    | -45.1791  |
| 17    | 244.6808  | 8.4813    | -45.1791  | 157.3581  | 5.1326    | -32.7761  |
| 18    | 157.3581  | 5.1326    | -32.7761  | 69.1189   | 2.1284    | -21.0901  |
| 19    | 69.1189   | 2.1284    | -21.0901  | -18.2926  | -0.5365   | -14.2972  |
| 20    | -18.2926  | -0.5365   | -14.2972  | -103.1006 | 41.8329   | -122.2004 |
| 21    | -103.1006 | 41.8329   | -122.2004 | 12.7985   | 83.4772   | -222.5994 |
| 22    | 12.7985   | 83.4772   | -222.5994 | 125.7393  | 80.1089   | -212.3242 |
| 23    | 125.7393  | 80.1089   | -212.3242 | 233.6035  | 76.4399   | -201.8108 |
| 24    | 233.6035  | 76.4399   | -201.8108 | 301.3359  | 70.4415   | -186.0955 |
| 25    | 301.3359  | 70.4415   | -186.0955 | 391.2061  | 66.1604   | -175.4402 |
| 26    | 391.2061  | 66.1604   | -175.4402 | 468.8908  | 61.7103   | -164.6393 |
| 27    | 468.8908  | 61.7103   | -164.6393 | 532.8168  | 57.1244   | -153.9833 |
| 28    | 532.8168  | 57.1244   | -153.9833 | 544.2517  | 50.0737   | -138.0742 |
| 29    | 544.2517  | 50.0737   | -138.0742 | 575.2245  | 45.3098   | -127.2528 |
| 30    | 575.2245  | 45.3098   | -127.2528 | 590.0605  | 40.5443   | -116.6618 |
| 31    | 590.0605  | 40.5443   | -116.6618 | 588.7717  | 35.7973   | -105.9044 |
| 32    | 588.7717  | 35.7973   | -105.9044 | 525.3903  | 28.8389   | -89.8450  |
| 33    | 525.3903  | 28.8389   | -89.8450  | 491.5052  | 24.3580   | -79.3278  |
| 34    | 491.5052  | 24.3580   | -79.3278  | 444.2693  | 20.0471   | -68.6377  |
| 35    | 444.2693  | 20.0471   | -68.6377  | 385.1819  | 15.9257   | -57.8701  |
| 36    | 385.1819  | 15.9257   | -57.8701  | 266.9553  | 10.2018   | -42.0867  |
| 37    | 266.9553  | 10.2018   | -42.0867  | 190.8228  | 6.7465    | -31.7958  |
| 38    | 190.8228  | 6.7465    | -31.7958  | 109.4777  | 3.6002    | -22.0972  |
| 39    | 109.4777  | 3.6002    | -22.0972  | 24.7812   | 0.7678    | -14.2256  |
| 40    | 24.7812   | 0.7678    | -14.2256  | -100.0522 | 41.7966   | -121.1110 |
| 41    | -100.0522 | 41.7966   | -121.1110 | 17.5873   | 83.3352   | -222.5291 |
| 42    | 17.5873   | 83.3352   | -222.5291 | 131.6833  | 79.9190   | -212.2922 |
| 43    | 131.6833  | 79.9190   | -212.2922 | 240.2737  | 76.2113   | -201.7577 |
| 44    | 240.2737  | 76.2113   | -201.7577 | 308.6125  | 70.1739   | -186.0092 |
| 45    | 308.6125  | 70.1739   | -186.0092 | 398.2980  | 65.8827   | -175.3611 |
| 46    | 398.2980  | 65.8827   | -175.3611 | 475.5385  | 61.4333   | -164.6348 |
| 47    | 475.5385  | 61.4333   | -164.6348 | 538.9041  | 56.8493   | -153.9604 |
| 48    | 538.9041  | 56.8493   | -153.9604 | 549.6620  | 49.8041   | -137.9922 |
| 49    | 549.6620  | 49.8041   | -137.9922 | 579.7553  | 45.0457   | -127.3798 |
| 50    | 579.7553  | 45.0457   | -127.3798 | 593.7719  | 40.2857   | -116.6385 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 51    | 593.7719 | 40.2857   | -116.6385 | 591.7480 | 35.5559   | -105.9287 |
| 52    | 591.7480 | 35.5559   | -105.9287 | 527.3790 | 28.6187   | -89.9299  |
| 53    | 527.3790 | 28.6187   | -89.9299  | 492.8408 | 24.1604   | -79.1562  |
| 54    | 492.8408 | 24.1604   | -79.1562  | 445.0523 | 19.8664   | -68.5050  |
| 55    | 445.0523 | 19.8664   | -68.5050  | 385.4829 | 15.7745   | -57.9497  |
| 56    | 385.4829 | 15.7745   | -57.9497  | 266.9131 | 10.1049   | -42.0824  |
| 57    | 266.9131 | 10.1049   | -42.0824  | 190.6405 | 6.6826    | -31.8007  |
| 58    | 190.6405 | 6.6826    | -31.8007  | 109.2661 | 3.5643    | -22.1164  |
| 59    | 109.2661 | 3.5643    | -22.1164  | 24.6999  | 0.7592    | -14.2205  |
| 60    | 24.6999  | 0.7592    | -14.2205  | -99.8350 | 41.8074   | -121.1142 |
| 61    | -99.8350 | 41.8074   | -121.1142 | 18.0380  | 83.3264   | -222.5061 |
| 62    | 18.0380  | 83.3264   | -222.5061 | 132.2785 | 79.9086   | -212.2589 |
| 63    | 132.2785 | 79.9086   | -212.2589 | 240.9480 | 76.1978   | -201.7157 |
| 64    | 240.9480 | 76.1978   | -201.7157 | 309.3741 | 70.1478   | -185.9649 |
| 65    | 309.3741 | 70.1478   | -185.9649 | 398.9920 | 65.8477   | -175.3773 |
| 66    | 398.9920 | 65.8477   | -175.3773 | 476.1936 | 61.3826   | -164.6201 |
| 67    | 476.1936 | 61.3826   | -164.6201 | 539.4594 | 56.7879   | -153.9613 |
| 68    | 539.4594 | 56.7879   | -153.9613 | 550.0436 | 49.7543   | -138.0950 |
| 69    | 550.0436 | 49.7543   | -138.0950 | 579.9844 | 45.0035   | -127.3728 |
| 70    | 579.9844 | 45.0035   | -127.3728 | 593.9114 | 40.2444   | -116.5309 |
| 71    | 593.9114 | 40.2444   | -116.5309 | 591.8125 | 35.5342   | -105.8271 |
| 72    | 591.8125 | 35.5342   | -105.8271 | 527.3549 | 28.6102   | -89.9277  |
| 73    | 527.3549 | 28.6102   | -89.9277  | 492.7992 | 24.1371   | -79.1422  |
| 74    | 492.7992 | 24.1371   | -79.1422  | 444.9848 | 19.8578   | -68.5129  |
| 75    | 444.9848 | 19.8578   | -68.5129  | 385.3678 | 15.7719   | -57.9328  |
| 76    | 385.3678 | 15.7719   | -57.9328  | 266.8804 | 10.1015   | -42.0360  |
| 77    | 266.8804 | 10.1015   | -42.0360  | 190.5800 | 6.6812    | -31.8040  |
| 78    | 190.5800 | 6.6812    | -31.8040  | 109.2064 | 3.5627    | -22.1133  |
| 79    | 109.2064 | 3.5627    | -22.1133  | 24.6610  | 0.7584    | -14.2172  |
| 80    | 24.6610  | 0.7584    | -14.2172  | -99.7961 | 41.8045   | -121.1221 |
| 81    | -99.7961 | 41.8045   | -121.1221 | 18.0778  | 83.3203   | -222.5297 |
| 82    | 18.0778  | 83.3203   | -222.5297 | 132.3191 | 79.9014   | -212.2972 |
| 83    | 132.3191 | 79.9014   | -212.2972 | 240.9329 | 76.1880   | -201.7088 |
| 84    | 240.9329 | 76.1880   | -201.7088 | 309.3167 | 70.1483   | -185.9640 |
| 85    | 309.3167 | 70.1483   | -185.9640 | 399.0408 | 65.8488   | -175.2952 |
| 86    | 399.0408 | 65.8488   | -175.2952 | 476.1772 | 61.3915   | -164.6920 |
| 87    | 476.1772 | 61.3915   | -164.6920 | 539.3918 | 56.8017   | -154.0479 |
| 88    | 539.3918 | 56.8017   | -154.0479 | 550.0604 | 49.7550   | -137.8866 |
| 89    | 550.0604 | 49.7550   | -137.8866 | 580.0615 | 44.9832   | -127.1935 |
| 90    | 580.0615 | 44.9832   | -127.1935 | 593.8827 | 40.2338   | -116.6642 |
| 91    | 593.8827 | 40.2338   | -116.6642 | 591.6785 | 35.5089   | -105.8165 |
| 92    | 591.6785 | 35.5089   | -105.8165 | 527.3014 | 28.6058   | -89.8780  |
| 93    | 527.3014 | 28.6058   | -89.8780  | 492.7116 | 24.1506   | -79.2630  |
| 94    | 492.7116 | 24.1506   | -79.2630  | 444.8825 | 19.8566   | -68.5204  |
| 95    | 444.8825 | 19.8566   | -68.5204  | 385.3428 | 15.7747   | -57.8891  |
| 96    | 385.3428 | 15.7747   | -57.8891  | 266.8162 | 10.1063   | -42.0556  |
| 97    | 266.8162 | 10.1063   | -42.0556  | 190.5618 | 6.6836    | -31.7733  |
| 98    | 190.5618 | 6.6836    | -31.7733  | 109.2238 | 3.5639    | -22.1017  |
| 99    | 109.2238 | 3.5639    | -22.1017  | 24.6597  | 0.7584    | -14.2171  |
| 100   | 24.6597  | 0.7584    | -14.2171  | -99.7591 | 41.8049   | -121.1307 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 101   | -99.7591 | 41.8049   | -121.1307 | 18.0789  | 83.3195   | -222.5710 |
| 102   | 18.0789  | 83.3195   | -222.5710 | 132.2703 | 79.8991   | -212.3105 |
| 103   | 132.2703 | 79.8991   | -212.3105 | 240.8931 | 76.1829   | -201.7440 |
| 104   | 240.8931 | 76.1829   | -201.7440 | 309.3096 | 70.1369   | -185.9799 |
| 105   | 309.3096 | 70.1369   | -185.9799 | 398.9934 | 65.8472   | -175.3285 |
| 106   | 398.9934 | 65.8472   | -175.3285 | 476.1868 | 61.3859   | -164.6154 |
| 107   | 476.1868 | 61.3859   | -164.6154 | 539.3888 | 56.7851   | -153.9393 |
| 108   | 539.3888 | 56.7851   | -153.9393 | 549.9218 | 49.7333   | -138.0695 |
| 109   | 549.9218 | 49.7333   | -138.0695 | 579.8831 | 44.9762   | -127.3339 |
| 110   | 579.8831 | 44.9762   | -127.3339 | 593.7483 | 40.2401   | -116.6262 |
| 111   | 593.7483 | 40.2401   | -116.6262 | 591.5712 | 35.5030   | -105.8893 |
| 112   | 591.5712 | 35.5030   | -105.8893 | 527.0819 | 28.5718   | -89.9249  |
| 113   | 527.0819 | 28.5718   | -89.9249  | 492.4169 | 24.1098   | -79.2242  |
| 114   | 492.4169 | 24.1098   | -79.2242  | 444.5112 | 19.8179   | -68.4778  |
| 115   | 444.5112 | 19.8179   | -68.4778  | 384.9198 | 15.7362   | -57.8590  |
| 116   | 384.9198 | 15.7362   | -57.8590  | 266.4641 | 10.0823   | -42.0886  |
| 117   | 266.4641 | 10.0823   | -42.0886  | 190.2201 | 6.6656    | -31.8256  |
| 118   | 190.2201 | 6.6656    | -31.8256  | 109.0086 | 3.5552    | -22.0889  |
| 119   | 109.0086 | 3.5552    | -22.0889  | 24.6730  | 0.7585    | -14.2134  |
| 120   | 24.6730  | 0.7585    | -14.2134  | -99.4342 | 41.7933   | -121.0937 |
| 121   | -99.4342 | 41.7933   | -121.0937 | 18.5532  | 83.2561   | -222.5421 |
| 122   | 18.5532  | 83.2561   | -222.5421 | 132.7775 | 79.8025   | -212.2772 |
| 123   | 132.7775 | 79.8025   | -212.2772 | 241.2629 | 76.0604   | -201.7641 |
| 124   | 241.2629 | 76.0604   | -201.7641 | 309.3742 | 69.9648   | -185.9577 |
| 125   | 309.3742 | 69.9648   | -185.9577 | 398.6743 | 65.6433   | -175.2513 |
| 126   | 398.6743 | 65.6433   | -175.2513 | 475.3027 | 61.1665   | -164.6295 |
| 127   | 475.3027 | 61.1665   | -164.6295 | 537.8147 | 56.5590   | -153.9218 |
| 128   | 537.8147 | 56.5590   | -153.9218 | 547.6265 | 49.4751   | -137.9556 |
| 129   | 547.6265 | 49.4751   | -137.9556 | 576.7632 | 44.6882   | -127.3235 |
| 130   | 576.7632 | 44.6882   | -127.3235 | 589.8092 | 39.9235   | -116.4767 |
| 131   | 589.8092 | 39.9235   | -116.4767 | 586.8926 | 35.1980   | -105.7771 |
| 132   | 586.8926 | 35.1980   | -105.7771 | 521.7134 | 28.2705   | -89.8878  |
| 133   | 521.7134 | 28.2705   | -89.8878  | 486.5544 | 23.8276   | -79.1795  |
| 134   | 486.5544 | 23.8276   | -79.1795  | 438.3885 | 19.5473   | -68.5025  |
| 135   | 438.3885 | 19.5473   | -68.5025  | 378.7767 | 15.4904   | -57.8096  |
| 136   | 378.7767 | 15.4904   | -57.8096  | 261.2419 | 9.8817    | -41.9773  |
| 137   | 261.2419 | 9.8817    | -41.9773  | 186.0069 | 6.5165    | -31.7201  |
| 138   | 186.0069 | 6.5165    | -31.7201  | 106.3230 | 3.4678    | -22.0112  |
| 139   | 106.3230 | 3.4678    | -22.0112  | 24.1003  | 0.7412    | -14.1128  |
| 140   | 24.1003  | 0.7412    | -14.1128  | -95.5934 | 41.8500   | -118.5996 |
| 141   | -95.5934 | 41.8500   | -118.5996 | 22.8787  | 84.8614   | -221.4792 |
| 142   | 22.8787  | 84.8614   | -221.4792 | 104.2719 | 81.5078   | -209.1863 |
| 143   | 104.2719 | 81.5078   | -209.1863 | 184.2883 | 77.8019   | -196.3914 |
| 144   | 184.2883 | 77.8019   | -196.3914 | 260.7302 | 73.7695   | -183.5981 |
| 145   | 260.7302 | 73.7695   | -183.5981 | 361.1652 | 71.6308   | -177.1690 |
| 146   | 361.1652 | 71.6308   | -177.1690 | 423.3827 | 67.1505   | -164.3626 |
| 147   | 423.3827 | 67.1505   | -164.3626 | 475.8414 | 62.3857   | -151.5133 |
| 148   | 475.8414 | 62.3857   | -151.5133 | 516.5886 | 57.3653   | -138.5502 |
| 149   | 516.5886 | 57.3653   | -138.5502 | 543.7416 | 52.1202   | -125.6642 |
| 150   | 543.7416 | 52.1202   | -125.6642 | 596.2330 | 49.4142   | -119.1443 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 596.2330 | 49.4142   | -119.1443 | 595.0613 | 43.8542   | -106.1299 |
| 152   | 595.0613 | 43.8542   | -106.1299 | 576.3196 | 38.1404   | -93.2645  |
| 153   | 576.3196 | 38.1404   | -93.2645  | 538.7662 | 32.2666   | -80.4873  |
| 154   | 538.7662 | 32.2666   | -80.4873  | 481.4435 | 26.2722   | -67.4917  |
| 155   | 481.4435 | 26.2722   | -67.4917  | 466.0185 | 23.2425   | -60.8371  |
| 156   | 466.0185 | 23.2425   | -60.8371  | 371.9628 | 17.1154   | -48.1308  |
| 157   | 371.9628 | 17.1154   | -48.1308  | 256.0786 | 10.9302   | -35.4019  |
| 158   | 256.0786 | 10.9302   | -35.4019  | -2.6568  | 0.7380    | -0.0088   |
| 159   | -2.6568  | 0.7380    | -0.0088   | -1.3286  | 0.7380    | -0.0095   |
| 160   | -1.3286  | 0.7380    | -0.0095   | 0.0000   | 0.7379    | -0.0098   |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0435    | 175.7542  | -574.4969 | 300.3995  | 149.1475  | -497.2235 |
| 2     | 300.3995  | 149.1475  | -497.2235 | 556.9435  | 135.8410  | -458.4673 |
| 3     | 556.9435  | 135.8410  | -458.4673 | 773.5970  | 111.6799  | -390.6928 |
| 4     | 773.5970  | 111.6799  | -390.6928 | 948.0182  | 85.0626   | -313.2853 |
| 5     | 948.0182  | 85.0626   | -313.2853 | 1081.2980 | 61.1427   | -246.4505 |
| 6     | 1081.2980 | 61.1427   | -246.4505 | 1175.4724 | 34.5516   | -168.9435 |
| 7     | 1175.4724 | 34.5516   | -168.9435 | 1226.5721 | 24.1264   | -141.4506 |
| 8     | 1226.5721 | 24.1264   | -141.4506 | 1238.1040 | -2.5009   | -63.9744  |
| 9     | 1238.1040 | -2.5009   | -63.9744  | 1238.8594 | 3.1179    | -58.3456  |
| 10    | 1238.8594 | 3.1179    | -58.3456  | 1238.8871 | -8.5761   | -27.9776  |
| 11    | 1238.8871 | -8.5761   | -27.9776  | 1203.1753 | -24.8535  | -17.6278  |
| 12    | 1203.1753 | -24.8535  | -17.6278  | 1131.9484 | -48.0402  | 83.5807   |
| 13    | 1131.9484 | -48.0402  | 83.5807   | 1023.8170 | -71.5601  | 150.4615  |
| 14    | 1023.8170 | -71.5601  | 150.4615  | 877.4876  | -95.3252  | 218.4134  |
| 15    | 877.4876  | -95.3252  | 218.4134  | 692.6730  | -115.2633 | 276.3970  |
| 16    | 692.6730  | -115.2633 | 276.3970  | 466.4688  | -132.6227 | 325.6703  |
| 17    | 466.4688  | -132.6227 | 325.6703  | 273.7131  | 8.9361    | -0.9521   |
| 18    | 273.7131  | 8.9361    | -0.9521   | 289.8005  | 8.9385    | -0.9489   |
| 19    | 289.8005  | 8.9385    | -0.9489   | 305.8910  | 8.9396    | -0.8335   |
| 20    | 305.8910  | 8.9396    | -0.8335   | 321.9890  | -11.6048  | -13.1964  |
| 21    | 321.9890  | -11.6048  | -13.1964  | 249.6774  | -32.1488  | -25.5810  |
| 22    | 249.6774  | -32.1488  | -25.5810  | 177.3466  | -32.1470  | -25.4824  |
| 23    | 177.3466  | -32.1470  | -25.4824  | 219.9233  | 152.7248  | -433.5525 |
| 24    | 219.9233  | 152.7248  | -433.5525 | 546.9285  | 130.1991  | -371.0088 |
| 25    | 546.9285  | 130.1991  | -371.0088 | 819.0564  | 107.6404  | -308.1328 |
| 26    | 819.0564  | 107.6404  | -308.1328 | 1037.4664 | 89.0076   | -259.3122 |
| 27    | 1037.4664 | 89.0076   | -259.3122 | 1199.1516 | 53.0827   | -157.5942 |
| 28    | 1199.1516 | 53.0827   | -157.5942 | 1302.0193 | 30.4867   | -94.7033  |
| 29    | 1302.0193 | 30.4867   | -94.7033  | 1348.8861 | 7.9584    | -31.4697  |
| 30    | 1348.8861 | 7.9584    | -31.4697  | 1400.1262 | 15.5835   | -30.2724  |
| 31    | 1400.1262 | 15.5835   | -30.2724  | 1407.9501 | -6.8650   | 32.6435   |
| 32    | 1407.9501 | -6.8650   | 32.6435   | 1360.1196 | -36.0453  | 115.2390  |
| 33    | 1360.1196 | -36.0453  | 115.2390  | 1254.4963 | -61.2162  | 182.6591  |
| 34    | 1254.4963 | -61.2162  | 182.6591  | 1092.9307 | -83.8353  | 245.7856  |
| 35    | 1092.9307 | -83.8353  | 245.7856  | 875.4080  | -106.4333 | 309.1411  |
| 36    | 875.4080  | -106.4333 | 309.1411  | 602.4379  | -135.6562 | 391.3153  |
| 37    | 602.4379  | -135.6562 | 391.3153  | 272.7095  | -160.7765 | 458.4300  |
| 38    | 272.7095  | -160.7765 | 458.4300  | 272.4517  | 8.9454    | -0.7312   |
| 39    | 272.4517  | 8.9454    | -0.7312   | 292.5840  | 8.9445    | -0.6785   |
| 40    | 292.5840  | 8.9445    | -0.6785   | 312.7150  | -11.4800  | -13.0837  |
| 41    | 312.7150  | -11.4800  | -13.0837  | 240.9655  | -31.9026  | -25.5370  |
| 42    | 240.9655  | -31.9026  | -25.5370  | 205.0900  | -6.6775   | 0.7337    |
| 43    | 205.0900  | -6.6775   | 0.7337    | 247.0054  | 151.8304  | -433.3508 |
| 44    | 247.0054  | 151.8304  | -433.3508 | 572.2377  | 129.2916  | -370.7999 |
| 45    | 572.2377  | 129.2916  | -370.7999 | 842.3170  | 106.7157  | -307.9109 |
| 46    | 842.3170  | 106.7157  | -307.9109 | 1058.3997 | 88.1234   | -259.2447 |
| 47    | 1058.3997 | 88.1234   | -259.2447 | 1217.8643 | 52.2383   | -157.5286 |
| 48    | 1217.8643 | 52.2383   | -157.5286 | 1318.5710 | 29.6593   | -94.4659  |
| 49    | 1318.5710 | 29.6593   | -94.4659  | 1363.2061 | 7.1017    | -31.6434  |
| 50    | 1363.2061 | 7.1017    | -31.6434  | 1413.0095 | 14.6846   | -30.1552  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 51    | 1413.0095 | 14.6846   | -30.1552  | 1418.9346 | -7.8161   | 32.7602   |
| 52    | 1418.9346 | -7.8161   | 32.7602   | 1369.0295 | -37.0249  | 115.0620  |
| 53    | 1369.0295 | -37.0249  | 115.0620  | 1261.0953 | -62.2351  | 183.0815  |
| 54    | 1261.0953 | -62.2351  | 183.0815  | 1097.1218 | -84.8643  | 246.2372  |
| 55    | 1097.1218 | -84.8643  | 246.2372  | 877.3577  | -107.4797 | 309.1210  |
| 56    | 877.3577  | -107.4797 | 309.1210  | 601.8688  | -136.7312 | 391.3001  |
| 57    | 601.8688  | -136.7312 | 391.3001  | 269.9918  | -161.7448 | 458.5421  |
| 58    | 269.9918  | -161.7448 | 458.5421  | 271.9553  | 8.8568    | -0.7934   |
| 59    | 271.9553  | 8.8568    | -0.7934   | 291.8781  | 8.8546    | -0.6556   |
| 60    | 291.8781  | 8.8546    | -0.6556   | 311.8039  | -11.5125  | -13.1302  |
| 61    | 311.8039  | -11.5125  | -13.1302  | 291.7104  | -8.8422   | 0.6517    |
| 62    | 291.7104  | -8.8422   | 0.6517    | 271.8156  | -8.8415   | 0.7890    |
| 63    | 271.8156  | -8.8415   | 0.7890    | 251.9185  | -8.8425   | 0.8718    |
| 64    | 251.9185  | -8.8425   | 0.8718    | 574.8437  | 129.2252  | -370.7159 |
| 65    | 574.8437  | 129.2252  | -370.7159 | 844.6257  | 106.6118  | -307.9324 |
| 66    | 844.6257  | 106.6118  | -307.9324 | 1060.4351 | 87.9666   | -259.1992 |
| 67    | 1060.4351 | 87.9666   | -259.1992 | 1219.5339 | 52.0628   | -157.4916 |
| 68    | 1219.5339 | 52.0628   | -157.4916 | 1319.7734 | 29.4794   | -94.6470  |
| 69    | 1319.7734 | 29.4794   | -94.6470  | 1364.0173 | 6.9902    | -31.6547  |
| 70    | 1364.0173 | 6.9902    | -31.6547  | 1413.6447 | 14.5606   | -29.8922  |
| 71    | 1413.6447 | 14.5606   | -29.8922  | 1419.3364 | -7.8845   | 33.0140   |
| 72    | 1419.3364 | -7.8845   | 33.0140   | 1369.2562 | -37.1029  | 115.1222  |
| 73    | 1369.2562 | -37.1029  | 115.1222  | 1261.0538 | -62.3335  | 183.1345  |
| 74    | 1261.0538 | -62.3335  | 183.1345  | 1096.9341 | -84.9176  | 246.2624  |
| 75    | 1096.9341 | -84.9176  | 246.2624  | 877.1125  | -107.5360 | 309.1685  |
| 76    | 877.1125  | -107.5360 | 309.1685  | 601.3577  | -136.7654 | 391.4689  |
| 77    | 601.3577  | -136.7654 | 391.4689  | 269.6687  | -161.7749 | 458.6577  |
| 78    | 269.6687  | -161.7749 | 458.6577  | 271.7379  | 8.8493    | -0.7734   |
| 79    | 271.7379  | 8.8493    | -0.7734   | 291.6502  | 8.8502    | -0.5971   |
| 80    | 291.6502  | 8.8502    | -0.5971   | 314.3193  | 11.5999   | 13.1452   |
| 81    | 314.3193  | 11.5999   | 13.1452   | 294.2338  | -8.9268   | 0.6547    |
| 82    | 294.2338  | -8.9268   | 0.6547    | 274.1444  | -8.9264   | 0.7448    |
| 83    | 274.1444  | -8.9264   | 0.7448    | 254.0656  | -8.9270   | 0.8632    |
| 84    | 254.0656  | -8.9270   | 0.8632    | 574.7220  | 129.1756  | -370.6914 |
| 85    | 574.7220  | 129.1756  | -370.6914 | 844.6357  | 106.5967  | -307.7798 |
| 86    | 844.6357  | 106.5967  | -307.7798 | 1060.2847 | 87.9671   | -259.3049 |
| 87    | 1060.2847 | 87.9671   | -259.3049 | 1219.3772 | 52.0831   | -157.6758 |
| 88    | 1219.3772 | 52.0831   | -157.6758 | 1319.8032 | 29.5084   | -94.2150  |
| 89    | 1319.8032 | 29.5084   | -94.2150  | 1364.0552 | 6.9441    | -31.2224  |
| 90    | 1364.0552 | 6.9441    | -31.2224  | 1413.5978 | 14.5095   | -30.1385  |
| 91    | 1413.5978 | 14.5095   | -30.1385  | 1419.0571 | -7.9819   | 33.0213   |
| 92    | 1419.0571 | -7.9819   | 33.0213   | 1368.9204 | -37.1376  | 115.3419  |
| 93    | 1368.9204 | -37.1376  | 115.3419  | 1260.8047 | -62.3371  | 182.8871  |
| 94    | 1260.8047 | -62.3371  | 182.8871  | 1096.7410 | -84.9130  | 246.2535  |
| 95    | 1096.7410 | -84.9130  | 246.2535  | 876.7783  | -107.5031 | 309.2944  |
| 96    | 876.7783  | -107.5031 | 309.2944  | 601.3141  | -136.7038 | 391.4772  |
| 97    | 601.3141  | -136.7038 | 391.4772  | 269.4566  | -161.7519 | 458.6693  |
| 98    | 269.4566  | -161.7519 | 458.6693  | 269.5035  | 8.7819    | -0.7574   |
| 99    | 269.5035  | 8.7819    | -0.7574   | 289.2514  | 8.7780    | -0.6244   |
| 100   | 289.2514  | 8.7780    | -0.6244   | 314.4174  | 11.5994   | 13.1456   |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | 314.4174  | 11.5994   | 13.1456   | 294.3196  | -8.9311   | 0.6247    |
| 102   | 294.3196  | -8.9311   | 0.6247    | 274.2291  | -8.9279   | 0.7095    |
| 103   | 274.2291  | -8.9279   | 0.7095    | 254.1413  | -8.9294   | 0.8398    |
| 104   | 254.1413  | -8.9294   | 0.8398    | 574.6788  | 129.1478  | -370.7410 |
| 105   | 574.6788  | 129.1478  | -370.7410 | 844.5286  | 106.5697  | -307.8474 |
| 106   | 844.5286  | 106.5697  | -307.8474 | 1060.2610 | 87.9317   | -259.1985 |
| 107   | 1060.2610 | 87.9317   | -259.1985 | 1219.2491 | 52.0410   | -157.4824 |
| 108   | 1219.2491 | 52.0410   | -157.4824 | 1319.4222 | 29.4225   | -94.6138  |
| 109   | 1319.4222 | 29.4225   | -94.6138  | 1363.5132 | 6.9128    | -31.5981  |
| 110   | 1363.5132 | 6.9128    | -31.5981  | 1413.1163 | 14.5035   | -30.0826  |
| 111   | 1413.1163 | 14.5035   | -30.0826  | 1418.6920 | -7.9958   | 32.8305   |
| 112   | 1418.6920 | -7.9958   | 32.8305   | 1368.3726 | -37.1862  | 115.1425  |
| 113   | 1368.3726 | -37.1862  | 115.1425  | 1259.9684 | -62.4519  | 182.9446  |
| 114   | 1259.9684 | -62.4519  | 182.9446  | 1095.5287 | -85.0693  | 246.3080  |
| 115   | 1095.5287 | -85.0693  | 246.3080  | 875.1946  | -107.6754 | 309.3489  |
| 116   | 875.1946  | -107.6754 | 309.3489  | 599.3922  | -136.8932 | 391.4386  |
| 117   | 599.3922  | -136.8932 | 391.4386  | 267.4609  | -161.9007 | 458.5378  |
| 118   | 267.4609  | -161.9007 | 458.5378  | 202.6880  | 6.5997    | -0.7803   |
| 119   | 202.6880  | 6.5997    | -0.7803   | 242.9418  | 32.1723   | 25.5716   |
| 120   | 242.9418  | 32.1723   | 25.5716   | 315.3292  | 11.5770   | 13.1142   |
| 121   | 315.3292  | 11.5770   | 13.1142   | 295.0338  | -9.0192   | 0.6565    |
| 122   | 295.0338  | -9.0192   | 0.6565    | 274.7419  | -9.0210   | 0.7436    |
| 123   | 274.7419  | -9.0210   | 0.7436    | 254.4501  | -9.0197   | 0.8313    |
| 124   | 254.4501  | -9.0197   | 0.8313    | 575.2974  | 128.1376  | -370.4991 |
| 125   | 575.2974  | 128.1376  | -370.4991 | 842.9088  | 105.5540  | -307.5026 |
| 126   | 842.9088  | 105.5540  | -307.5026 | 1056.2931 | 86.9436   | -259.0251 |
| 127   | 1056.2931 | 86.9436   | -259.0251 | 1212.9712 | 51.0545   | -157.2684 |
| 128   | 1212.9712 | 51.0545   | -157.2684 | 1311.0024 | 28.4823   | -94.1758  |
| 129   | 1311.0024 | 28.4823   | -94.1758  | 1353.0835 | 5.9616    | -31.4033  |
| 130   | 1353.0835 | 5.9616    | -31.4033  | 1401.4954 | 13.5895   | -29.7236  |
| 131   | 1401.4954 | 13.5895   | -29.7236  | 1404.5988 | -8.9175   | 33.1779   |
| 132   | 1404.5988 | -8.9175   | 33.1779   | 1351.8577 | -38.1287  | 115.2377  |
| 133   | 1351.8577 | -38.1287  | 115.2377  | 1240.7498 | -63.3851  | 183.1055  |
| 134   | 1240.7498 | -63.3851  | 183.1055  | 1074.0000 | -86.0343  | 246.2734  |
| 135   | 1074.0000 | -86.0343  | 246.2734  | 851.4636  | -108.6095 | 309.4124  |
| 136   | 851.4636  | -108.6095 | 309.4124  | 573.5561  | -137.8224 | 391.6440  |
| 137   | 573.5561  | -137.8224 | 391.6440  | 240.0211  | -162.8474 | 458.7753  |
| 138   | 240.0211  | -162.8474 | 458.7753  | 179.0068  | 32.4501   | 25.5455   |
| 139   | 179.0068  | 32.4501   | 25.5455   | 251.9924  | 32.4490   | 25.6145   |
| 140   | 251.9924  | 32.4490   | 25.6145   | 325.0082  | 11.7108   | 13.2712   |
| 141   | 325.0082  | 11.7108   | 13.2712   | 308.7558  | -9.0279   | 0.9505    |
| 142   | 308.7558  | -9.0279   | 0.9505    | 292.5062  | -9.0277   | 0.9538    |
| 143   | 292.5062  | -9.0277   | 0.9538    | 276.2581  | -9.0255   | 1.0078    |
| 144   | 276.2581  | -9.0255   | 1.0078    | 439.0916  | 129.3660  | -316.1017 |
| 145   | 439.0916  | 129.3660  | -316.1017 | 650.6133  | 102.7565  | -238.7168 |
| 146   | 650.6133  | 102.7565  | -238.7168 | 819.7204  | 76.1969   | -161.3054 |
| 147   | 819.7204  | 76.1969   | -161.3054 | 944.9669  | 62.9244   | -122.5007 |
| 148   | 944.9669  | 62.9244   | -122.5007 | 1026.3065 | 36.3204   | -44.8485  |
| 149   | 1026.3065 | 36.3204   | -44.8485  | 1107.9827 | 61.6666   | -101.0297 |
| 150   | 1107.9827 | 61.6666   | -101.0297 | 1210.8635 | 51.7677   | -75.9319  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 151   | 1210.8635 | 51.7677   | -75.9319 | 1271.7263 | 28.3207   | -11.0189 |
| 152   | 1271.7263 | 28.3207   | -11.0189 | 1293.4084 | 1.7323    | 66.4931  |
| 153   | 1293.4084 | 1.7323    | 66.4931  | 1276.0131 | -21.9982  | 131.8542 |
| 154   | 1276.0131 | -21.9982  | 131.8542 | 1217.6832 | -48.6391  | 209.5923 |
| 155   | 1217.6832 | -48.6391  | 209.5923 | 1119.4353 | -59.3037  | 237.9569 |
| 156   | 1119.4353 | -59.3037  | 237.9569 | 978.0941  | -85.9169  | 315.2648 |
| 157   | 978.0941  | -85.9169  | 315.2648 | 794.4566  | -110.0740 | 382.4600 |
| 158   | 794.4566  | -110.0740 | 382.4600 | 572.1698  | -136.6713 | 460.0085 |
| 159   | 572.1698  | -136.6713 | 460.0085 | 307.3918  | -163.2701 | 537.4533 |
| 160   | 307.3918  | -163.2701 | 537.4533 | 0.0453    | -155.0363 | 519.8613 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0003    | 8.8611    | -1.6755   | -58.0095   | -32.2350  | -30.8353  |
| 2     | -58.0095   | -32.2350  | -30.8353  | -116.0112  | -32.2303  | -30.8619  |
| 3     | -116.0112  | -32.2303  | -30.8619  | -174.0285  | -32.2242  | -30.9199  |
| 4     | -174.0285  | -32.2242  | -30.9199  | -232.0081  | -32.2270  | -30.9500  |
| 5     | -232.0081  | -32.2270  | -30.9500  | -290.0023  | -32.2319  | -31.0164  |
| 6     | -290.0023  | -32.2319  | -31.0164  | -348.0127  | -32.2253  | -31.0830  |
| 7     | -348.0127  | -32.2253  | -31.0830  | -406.0369  | -32.1993  | -31.2369  |
| 8     | -406.0369  | -32.1993  | -31.2369  | -463.9893  | -32.1908  | -31.2932  |
| 9     | -463.9893  | -32.1908  | -31.2932  | -521.9086  | -32.1830  | -31.4132  |
| 10    | -521.9086  | -32.1830  | -31.4132  | -579.8192  | -32.1786  | -31.6118  |
| 11    | -579.8192  | -32.1786  | -31.6118  | -637.7036  | -32.1848  | -31.7204  |
| 12    | -637.7036  | -32.1848  | -31.7204  | -695.6371  | -32.1725  | -31.8798  |
| 13    | -695.6371  | -32.1725  | -31.8798  | -753.5385  | -32.1587  | -32.0489  |
| 14    | -753.5385  | -32.1587  | -32.0489  | -811.4315  | -32.1585  | -32.3471  |
| 15    | -811.4315  | -32.1585  | -32.3471  | -869.3218  | -32.1731  | -32.3400  |
| 16    | -869.3218  | -32.1731  | -32.3400  | -927.2247  | -32.1702  | -32.7141  |
| 17    | -927.2247  | -32.1702  | -32.7141  | -985.0805  | -32.1703  | -33.0687  |
| 18    | -985.0805  | -32.1703  | -33.0687  | -1043.0046 | -32.1774  | -33.0797  |
| 19    | -1043.0046 | -32.1774  | -33.0797  | -1100.9026 | -32.1741  | -33.4949  |
| 20    | -1100.9026 | -32.1741  | -33.4949  | -1221.4550 | 2.3515    | -29.4539  |
| 21    | -1221.4550 | 2.3515    | -29.4539  | -822.4972  | 173.3519  | -421.1545 |
| 22    | -822.4972  | 173.3519  | -421.1545 | -739.3611  | 24.0683   | 24.5113   |
| 23    | -739.3611  | 24.0683   | 24.5113   | -685.2037  | 24.0686   | 24.2796   |
| 24    | -685.2037  | 24.0686   | 24.2796   | -631.0436  | 24.0713   | 24.2760   |
| 25    | -631.0436  | 24.0713   | 24.2760   | -576.8745  | 24.0769   | 24.0998   |
| 26    | -576.8745  | 24.0769   | 24.0998   | -522.7372  | 24.0723   | 23.7526   |
| 27    | -522.7372  | 24.0723   | 23.7526   | -468.5786  | 24.0682   | 23.5968   |
| 28    | -468.5786  | 24.0682   | 23.5968   | -414.4312  | 24.0734   | 23.5217   |
| 29    | -414.4312  | 24.0734   | 23.5217   | -360.2591  | 24.0769   | 23.3434   |
| 30    | -360.2591  | 24.0769   | 23.3434   | -401.2189  | -32.1505  | -25.7524  |
| 31    | -401.2189  | -32.1505  | -25.7524  | -473.5353  | -32.1515  | -25.9096  |
| 32    | -473.5353  | -32.1515  | -25.9096  | -545.8507  | -32.1543  | -26.1397  |
| 33    | -545.8507  | -32.1543  | -26.1397  | -618.2021  | -32.1659  | -26.1451  |
| 34    | -618.2021  | -32.1659  | -26.1451  | -690.6122  | -32.1777  | -26.3697  |
| 35    | -690.6122  | -32.1777  | -26.3697  | -763.0074  | -32.1810  | -26.8219  |
| 36    | -763.0074  | -32.1810  | -26.8219  | -835.4258  | -32.1827  | -26.9534  |
| 37    | -835.4258  | -32.1827  | -26.9534  | -907.8344  | -32.1744  | -27.2472  |
| 38    | -907.8344  | -32.1744  | -27.2472  | -980.1965  | -32.1669  | -27.5201  |
| 39    | -980.1965  | -32.1669  | -27.5201  | -1052.5907 | -32.1664  | -27.7119  |
| 40    | -1052.5907 | -32.1664  | -27.7119  | -1243.6942 | 7.7183    | -26.2809  |
| 41    | -1243.6942 | 7.7183    | -26.2809  | -1049.4347 | 31.8260   | 27.8228   |
| 42    | -1049.4347 | 31.8260   | 27.8228   | -977.8251  | 31.8253   | 27.4725   |
| 43    | -977.8251  | 31.8253   | 27.4725   | -906.2136  | 31.8288   | 27.1750   |
| 44    | -906.2136  | 31.8288   | 27.1750   | -834.5900  | 31.8319   | 27.0560   |
| 45    | -834.5900  | 31.8319   | 27.0560   | -762.9805  | 31.8197   | 26.8165   |
| 46    | -762.9805  | 31.8197   | 26.8165   | -691.4178  | 31.8144   | 26.4623   |
| 47    | -691.4178  | 31.8144   | 26.4623   | -619.8186  | 31.8096   | 26.2656   |
| 48    | -619.8186  | 31.8096   | 26.2656   | -548.2797  | 31.8052   | 26.0850   |
| 49    | -548.2797  | 31.8052   | 26.0850   | -476.6909  | 31.8215   | 25.9916   |
| 50    | -476.6909  | 31.8215   | 25.9916   | -405.0695  | -31.8890  | -25.7365  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | -405.0695  | -31.8890  | -25.7365 | -476.7985  | -31.8758  | -25.8656 |
| 52    | -476.7985  | -31.8758  | -25.8656 | -548.5209  | -31.8744  | -26.0359 |
| 53    | -548.5209  | -31.8744  | -26.0359 | -620.2053  | -31.8732  | -26.3050 |
| 54    | -620.2053  | -31.8732  | -26.3050 | -691.9198  | -31.8712  | -26.5145 |
| 55    | -691.9198  | -31.8712  | -26.5145 | -763.6152  | -31.8675  | -26.6040 |
| 56    | -763.6152  | -31.8675  | -26.6040 | -835.2767  | -31.8708  | -26.8936 |
| 57    | -835.2767  | -31.8708  | -26.8936 | -907.0062  | -31.8738  | -27.1507 |
| 58    | -907.0062  | -31.8738  | -27.1507 | -978.6720  | -31.8663  | -27.2942 |
| 59    | -978.6720  | -31.8663  | -27.2942 | -1050.3428 | -31.8598  | -27.7867 |
| 60    | -1050.3428 | -31.8598  | -27.7867 | -1244.9407 | 7.6726    | -26.2150 |
| 61    | -1244.9407 | 7.6726    | -26.2150 | -1058.6179 | 32.0774   | 27.8778  |
| 62    | -1058.6179 | 32.0774   | 27.8778  | -986.4641  | 32.0788   | 27.3764  |
| 63    | -986.4641  | 32.0788   | 27.3764  | -914.2793  | 32.0804   | 27.0760  |
| 64    | -914.2793  | 32.0804   | 27.0760  | -842.1019  | 32.0997   | 26.9533  |
| 65    | -842.1019  | 32.0997   | 26.9533  | -769.8542  | 32.1163   | 26.8117  |
| 66    | -769.8542  | 32.1163   | 26.8117  | -697.5953  | 32.1206   | 26.4528  |
| 67    | -697.5953  | 32.1206   | 26.4528  | -625.3217  | 32.1302   | 26.2302  |
| 68    | -625.3217  | 32.1302   | 26.2302  | -553.0139  | 32.1286   | 26.1595  |
| 69    | -553.0139  | 32.1286   | 26.1595  | -480.7710  | 32.1286   | 26.0009  |
| 70    | -480.7710  | 32.1286   | 26.0009  | -408.4880  | 32.1259   | 25.7900  |
| 71    | -408.4880  | 32.1259   | 25.7900  | -476.7841  | -31.8562  | -26.0030 |
| 72    | -476.7841  | -31.8562  | -26.0030 | -548.4297  | -31.8507  | -26.0922 |
| 73    | -548.4297  | -31.8507  | -26.0922 | -620.0815  | -31.8566  | -26.3735 |
| 74    | -620.0815  | -31.8566  | -26.3735 | -691.7576  | -31.8620  | -26.5465 |
| 75    | -691.7576  | -31.8620  | -26.5465 | -763.4057  | -31.8638  | -26.6906 |
| 76    | -763.4057  | -31.8638  | -26.6906 | -835.1113  | -31.8610  | -27.0816 |
| 77    | -835.1113  | -31.8610  | -27.0816 | -906.7651  | -31.8600  | -27.1828 |
| 78    | -906.7651  | -31.8600  | -27.1828 | -978.4509  | -31.8601  | -27.3651 |
| 79    | -978.4509  | -31.8601  | -27.3651 | -1050.1027 | -31.8568  | -28.0005 |
| 80    | -1050.1027 | -31.8568  | -28.0005 | -1244.9426 | 7.6638    | -26.3679 |
| 81    | -1244.9426 | 7.6638    | -26.3679 | -1059.1367 | 32.1244   | 27.8526  |
| 82    | -1059.1367 | 32.1244   | 27.8526  | -986.8481  | 32.1166   | 27.5270  |
| 83    | -986.8481  | 32.1166   | 27.5270  | -914.6133  | 32.1200   | 27.1081  |
| 84    | -914.6133  | 32.1200   | 27.1081  | -842.3523  | 32.1245   | 26.9382  |
| 85    | -842.3523  | 32.1245   | 26.9382  | -770.0784  | 32.1267   | 26.7105  |
| 86    | -770.0784  | 32.1267   | 26.7105  | -697.7986  | 32.1314   | 26.4455  |
| 87    | -697.7986  | 32.1314   | 26.4455  | -625.5168  | 32.1303   | 26.3460  |
| 88    | -625.5168  | 32.1303   | 26.3460  | -553.2622  | 32.1360   | 25.9752  |
| 89    | -553.2622  | 32.1360   | 25.9752  | -480.9572  | 32.1489   | 25.8023  |
| 90    | -480.9572  | 32.1489   | 25.8023  | -408.6168  | 32.1600   | 25.7984  |
| 91    | -408.6168  | 32.1600   | 25.7984  | -476.4384  | -31.8132  | -25.9848 |
| 92    | -476.4384  | -31.8132  | -25.9848 | -548.0631  | -31.8367  | -26.1168 |
| 93    | -548.0631  | -31.8367  | -26.1168 | -619.6887  | -31.8457  | -26.2132 |
| 94    | -619.6887  | -31.8457  | -26.2132 | -691.3300  | -31.8519  | -26.5336 |
| 95    | -691.3300  | -31.8519  | -26.5336 | -762.9955  | -31.8579  | -26.7555 |
| 96    | -762.9955  | -31.8579  | -26.7555 | -834.6677  | -31.8624  | -27.0047 |
| 97    | -834.6677  | -31.8624  | -27.0047 | -906.3441  | -31.8608  | -27.2936 |
| 98    | -906.3441  | -31.8608  | -27.2936 | -978.0607  | -31.8563  | -27.4174 |
| 99    | -978.0607  | -31.8563  | -27.4174 | -1049.6917 | -31.8476  | -27.8944 |
| 100   | -1049.6917 | -31.8476  | -27.8944 | -1244.8132 | 7.6643    | -26.4805 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1244.8132 | 7.6643    | -26.4805 | -1059.1318 | 32.1331   | 27.9494  |
| 102   | -1059.1318 | 32.1331   | 27.9494  | -986.8608  | 32.1260   | 27.6441  |
| 103   | -986.8608  | 32.1260   | 27.6441  | -914.6106  | 32.1273   | 27.1754  |
| 104   | -914.6106  | 32.1273   | 27.1754  | -842.3055  | 32.1342   | 27.0135  |
| 105   | -842.3055  | 32.1342   | 27.0135  | -770.0061  | 32.1343   | 26.7789  |
| 106   | -770.0061  | 32.1343   | 26.7789  | -697.7080  | 32.1358   | 26.4296  |
| 107   | -697.7080  | 32.1358   | 26.4296  | -625.4478  | 32.1455   | 26.2280  |
| 108   | -625.4478  | 32.1455   | 26.2280  | -553.1010  | 32.1589   | 26.1316  |
| 109   | -553.1010  | 32.1589   | 26.1316  | -480.7537  | 32.1543   | 25.9776  |
| 110   | -480.7537  | 32.1543   | 25.9776  | -408.4542  | 32.1419   | 25.8230  |
| 111   | -408.4542  | 32.1419   | 25.8230  | -472.6513  | -31.5625  | -25.8489 |
| 112   | -472.6513  | -31.5625  | -25.8489 | -543.6227  | -31.5508  | -26.0044 |
| 113   | -543.6227  | -31.5508  | -26.0044 | -614.5914  | -31.5474  | -26.1936 |
| 114   | -614.5914  | -31.5474  | -26.1936 | -685.5353  | -31.5448  | -26.5042 |
| 115   | -685.5353  | -31.5448  | -26.5042 | -756.4999  | -31.5443  | -26.7307 |
| 116   | -756.4999  | -31.5443  | -26.7307 | -827.4433  | -31.5473  | -26.8424 |
| 117   | -827.4433  | -31.5473  | -26.8424 | -898.4230  | -31.5521  | -26.9944 |
| 118   | -898.4230  | -31.5521  | -26.9944 | -969.4115  | -31.5558  | -27.4499 |
| 119   | -969.4115  | -31.5558  | -27.4499 | -1040.4165 | -31.5569  | -27.7547 |
| 120   | -1040.4165 | -31.5569  | -27.7547 | -1242.7454 | 7.5852    | -26.2005 |
| 121   | -1242.7454 | 7.5852    | -26.2005 | -1061.7218 | 32.4428   | 27.8503  |
| 122   | -1061.7218 | 32.4428   | 27.8503  | -988.7388  | 32.4458   | 27.5358  |
| 123   | -988.7388  | 32.4458   | 27.5358  | -915.7480  | 32.4482   | 27.2237  |
| 124   | -915.7480  | 32.4482   | 27.2237  | -842.7441  | 32.4477   | 27.0818  |
| 125   | -842.7441  | 32.4477   | 27.0818  | -769.7501  | 32.4395   | 26.6997  |
| 126   | -769.7501  | 32.4395   | 26.6997  | -696.7753  | 32.4275   | 26.4796  |
| 127   | -696.7753  | 32.4275   | 26.4796  | -623.8673  | 32.4154   | 26.2849  |
| 128   | -623.8673  | 32.4154   | 26.2849  | -550.9158  | 32.4210   | 26.0759  |
| 129   | -550.9158  | 32.4210   | 26.0759  | -477.9667  | 32.4344   | 26.0066  |
| 130   | -477.9667  | 32.4344   | 26.0066  | -405.0242  | 32.4353   | 25.8055  |
| 131   | -405.0242  | 32.4353   | 25.8055  | -356.2170  | -23.7829  | -24.7127 |
| 132   | -356.2170  | -23.7829  | -24.7127 | -409.6916  | -23.7761  | -24.7743 |
| 133   | -409.6916  | -23.7761  | -24.7743 | -463.1501  | -23.7759  | -24.9214 |
| 134   | -463.1501  | -23.7759  | -24.9214 | -516.6564  | -23.7739  | -25.0768 |
| 135   | -516.6564  | -23.7739  | -25.0768 | -570.1229  | -23.7722  | -25.3236 |
| 136   | -570.1229  | -23.7722  | -25.3236 | -623.5999  | -23.7714  | -25.5007 |
| 137   | -623.5999  | -23.7714  | -25.5007 | -677.0567  | -23.7684  | -25.6168 |
| 138   | -677.0567  | -23.7684  | -25.6168 | -730.5377  | -23.7716  | -25.8323 |
| 139   | -730.5377  | -23.7716  | -25.8323 | -835.6796  | -158.8462 | 372.0434 |
| 140   | -835.6796  | -158.8462 | 372.0434 | -1203.7456 | 12.9463   | -20.4201 |
| 141   | -1203.7456 | 12.9463   | -20.4201 | -1110.7515 | 32.4770   | 33.1553  |
| 142   | -1110.7515 | 32.4770   | 33.1553  | -1052.2906 | 32.4776   | 33.1413  |
| 143   | -1052.2906 | 32.4776   | 33.1413  | -993.8411  | 32.4938   | 32.9415  |
| 144   | -993.8411  | 32.4938   | 32.9415  | -935.3414  | 32.4950   | 32.5495  |
| 145   | -935.3414  | 32.4950   | 32.5495  | -876.8748  | 32.4748   | 32.4011  |
| 146   | -876.8748  | 32.4748   | 32.4011  | -818.4242  | 32.4580   | 32.2265  |
| 147   | -818.4242  | 32.4580   | 32.2265  | -760.0023  | 32.4465   | 32.0823  |
| 148   | -760.0023  | 32.4465   | 32.0823  | -701.6219  | 32.4503   | 31.7968  |
| 149   | -701.6219  | 32.4503   | 31.7968  | -643.2015  | 32.4631   | 31.6466  |
| 150   | -643.2015  | 32.4631   | 31.6466  | -584.7942  | 32.4706   | 31.5104  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 151   | -584.7942 | 32.4706   | 31.5104 | -526.3382 | 32.4678   | 31.2969 |
| 152   | -526.3382 | 32.4678   | 31.2969 | -467.9034 | 32.4667   | 31.2018 |
| 153   | -467.9034 | 32.4667   | 31.2018 | -409.4766 | 32.4923   | 31.2025 |
| 154   | -409.4766 | 32.4923   | 31.2025 | -351.0034 | 32.5189   | 31.0693 |
| 155   | -351.0034 | 32.5189   | 31.0693 | -292.5183 | 32.5196   | 30.8715 |
| 156   | -292.5183 | 32.5196   | 30.8715 | -233.9946 | 32.5182   | 30.8637 |
| 157   | -233.9946 | 32.5182   | 30.8637 | -175.4822 | 32.5153   | 30.8734 |
| 158   | -175.4822 | 32.5153   | 30.8734 | -116.9793 | 32.5042   | 30.8168 |
| 159   | -116.9793 | 32.5042   | 30.8168 | -58.5029  | 32.5005   | 30.7822 |
| 160   | -58.5029  | 32.5005   | 30.7822 | -0.0008   | -8.9320   | 1.7146  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0435     | 175.7542  | -574.4969 | 277.6534   | 154.2546  | -517.6530 |
| 2     | 277.6534   | 154.2546  | -517.6530 | 517.9808   | 143.8654  | -490.5015 |
| 3     | 517.9808   | 143.8654  | -490.5015 | 669.1519   | 123.8443  | -438.9872 |
| 4     | 669.1519   | 123.8443  | -438.9872 | 755.8613   | 104.9368  | -391.3198 |
| 5     | 755.8613   | 104.9368  | -391.3198 | 921.4224   | 88.1633   | -299.7690 |
| 6     | 921.4224   | 88.1633   | -299.7690 | 1026.8228  | 78.4349   | -275.5451 |
| 7     | 1026.8228  | 78.4349   | -275.5451 | 791.1875   | 62.7374   | -288.0750 |
| 8     | 791.1875   | 62.7374   | -288.0750 | 692.1193   | 47.9992   | -253.4840 |
| 9     | 692.1193   | 47.9992   | -253.4840 | 560.6287   | 34.5482   | -222.2131 |
| 10    | 560.6287   | 34.5482   | -222.2131 | 404.1595   | 22.4001   | -193.4694 |
| 11    | 404.1595   | 22.4001   | -193.4694 | 229.7807   | 11.5758   | -165.0208 |
| 12    | 229.7807   | 11.5758   | -165.0208 | 193.2836   | 8.9438    | -1.2831   |
| 13    | 193.2836   | 8.9438    | -1.2831   | 209.3786   | 8.9398    | -1.2341   |
| 14    | 209.3786   | 8.9398    | -1.2341   | 225.4629   | 8.9366    | -1.1518   |
| 15    | 225.4629   | 8.9366    | -1.1518   | 241.5437   | 8.9380    | -1.1539   |
| 16    | 241.5437   | 8.9380    | -1.1539   | 257.6324   | 8.9377    | -1.0510   |
| 17    | 257.6324   | 8.9377    | -1.0510   | 273.7131   | 8.9361    | -0.9521   |
| 18    | 273.7131   | 8.9361    | -0.9521   | 289.8005   | 8.9385    | -0.9489   |
| 19    | 289.8005   | 8.9385    | -0.9489   | 305.8910   | 8.9396    | -0.8335   |
| 20    | 305.8910   | 8.9396    | -0.8335   | -1129.9507 | 105.1509  | -363.1228 |
| 21    | -1129.9507 | 105.1509  | -363.1228 | -653.7068  | 223.3149  | -641.2388 |
| 22    | -653.7068  | 223.3149  | -641.2388 | -232.6754  | 204.7280  | -593.3206 |
| 23    | -232.6754  | 204.7280  | -593.3206 | 88.0867    | 176.7920  | -521.0315 |
| 24    | 88.0867    | 176.7920  | -521.0315 | 377.4711   | 158.3533  | -473.1441 |
| 25    | 377.4711   | 158.3533  | -473.1441 | 603.5656   | 140.2296  | -426.0175 |
| 26    | 603.5656   | 140.2296  | -426.0175 | 766.8304   | 122.5932  | -381.7898 |
| 27    | 766.8304   | 122.5932  | -381.7898 | 788.6169   | 97.2484   | -321.7082 |
| 28    | 788.6169   | 97.2484   | -321.7082 | 823.3037   | 81.2887   | -285.4903 |
| 29    | 823.3037   | 81.2887   | -285.4903 | 805.8987   | 66.1873   | -252.1494 |
| 30    | 805.8987   | 66.1873   | -252.1494 | 741.5300   | 52.0266   | -222.2120 |
| 31    | 741.5300   | 52.0266   | -222.2120 | 533.8441   | 32.7139   | -182.4309 |
| 32    | 533.8441   | 32.7139   | -182.4309 | -197.7999  | 24.0709   | 23.0816   |
| 33    | -197.7999  | 24.0709   | 23.0816   | -143.6607  | 24.0624   | 23.0779   |
| 34    | -143.6607  | 24.0624   | 23.0779   | -89.5338   | 24.0565   | 23.0492   |
| 35    | -89.5338   | 24.0565   | 23.0492   | -35.4440   | 24.0460   | 23.0079   |
| 36    | -35.4440   | 24.0460   | 23.0079   | 18.6522    | 24.0471   | 22.9947   |
| 37    | 18.6522    | 24.0471   | 22.9947   | 72.7751    | 24.0541   | 23.0233   |
| 38    | 72.7751    | 24.0541   | 23.0233   | 126.8820   | 24.0539   | 23.0373   |
| 39    | 126.8820   | 24.0539   | 23.0373   | 181.0081   | 24.0539   | 23.0779   |
| 40    | 181.0081   | 24.0539   | 23.0779   | -1097.0435 | 104.7153  | -359.8973 |
| 41    | -1097.0435 | 104.7153  | -359.8973 | -622.2574  | 222.4016  | -641.1523 |
| 42    | -622.2574  | 222.4016  | -641.1523 | -203.4668  | 203.8161  | -593.2042 |
| 43    | -203.4668  | 203.8161  | -593.2042 | 114.2395   | 175.9310  | -520.8695 |
| 44    | 114.2395   | 175.9310  | -520.8695 | 400.4485   | 157.5303  | -472.9665 |
| 45    | 400.4485   | 157.5303  | -472.9665 | 623.1498   | 139.4870  | -425.8577 |
| 46    | 623.1498   | 139.4870  | -425.8577 | 783.1272   | 121.8932  | -381.7584 |
| 47    | 783.1272   | 121.8932  | -381.7584 | 801.0455   | 96.6962   | -321.6683 |
| 48    | 801.0455   | 96.6962   | -321.6683 | 833.0027   | 80.7985   | -285.3680 |
| 49    | 833.0027   | 80.7985   | -285.3680 | 812.9909   | 65.7785   | -252.2999 |
| 50    | 812.9909   | 65.7785   | -252.2999 | 746.4763   | 51.6782   | -222.1565 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 746.4763   | 51.6782   | -222.1565 | 536.5312   | 32.4891   | -182.4156 |
| 52    | 536.5312   | 32.4891   | -182.4156 | -261.7814  | 31.8568   | 25.6628   |
| 53    | -261.7814  | 31.8568   | 25.6628   | -190.1227  | 31.8513   | 25.5488   |
| 54    | -190.1227  | 31.8513   | 25.5488   | -118.4491  | 31.8470   | 25.4999   |
| 55    | -118.4491  | 31.8470   | 25.4999   | -46.7919   | 31.8548   | 25.4809   |
| 56    | -46.7919   | 31.8548   | 25.4809   | 24.8815    | 31.8571   | 25.4888   |
| 57    | 24.8815    | 31.8571   | 25.4888   | 96.5766    | 31.8567   | 25.4960   |
| 58    | 96.5766    | 31.8567   | 25.4960   | 168.2451   | 31.8617   | 25.5213   |
| 59    | 168.2451   | 31.8617   | 25.5213   | 239.9264   | 31.8619   | 25.6265   |
| 60    | 239.9264   | 31.8619   | 25.6265   | -1094.1846 | 104.8397  | -359.8276 |
| 61    | -1094.1846 | 104.8397  | -359.8276 | -619.2361  | 222.3405  | -640.9833 |
| 62    | -619.2361  | 222.3405  | -640.9833 | -200.5246  | 203.7675  | -593.1166 |
| 63    | -200.5246  | 203.7675  | -593.1166 | 116.8965   | 175.8647  | -520.8016 |
| 64    | 116.8965   | 175.8647  | -520.8016 | 402.7922   | 157.4496  | -472.9050 |
| 65    | 402.7922   | 157.4496  | -472.9050 | 625.0570   | 139.3787  | -425.9084 |
| 66    | 625.0570   | 139.3787  | -425.9084 | 784.6557   | 121.7851  | -381.7517 |
| 67    | 784.6557   | 121.7851  | -381.7517 | 802.0804   | 96.5552   | -321.6660 |
| 68    | 802.0804   | 96.5552   | -321.6660 | 833.6094   | 80.6985   | -285.4963 |
| 69    | 833.6094   | 80.6985   | -285.4963 | 813.3126   | 65.7090   | -252.2928 |
| 70    | 813.3126   | 65.7090   | -252.2928 | 746.6367   | 51.6359   | -222.0322 |
| 71    | 746.6367   | 51.6359   | -222.0322 | 536.5869   | 32.4590   | -182.3413 |
| 72    | 536.5869   | 32.4590   | -182.3413 | -263.9431  | 32.1340   | 25.6217   |
| 73    | -263.9431  | 32.1340   | 25.6217   | -191.6292  | 32.1269   | 25.5150   |
| 74    | -191.6292  | 32.1269   | 25.5150   | -119.3367  | 32.1246   | 25.4611   |
| 75    | -119.3367  | 32.1246   | 25.4611   | -47.0877   | 32.1266   | 25.4536   |
| 76    | -47.0877   | 32.1266   | 25.4536   | 25.2047    | 32.1258   | 25.4488   |
| 77    | 25.2047    | 32.1258   | 25.4488   | 97.4758    | 32.1281   | 25.4417   |
| 78    | 97.4758    | 32.1281   | 25.4417   | 169.7654   | 32.1287   | 25.4803   |
| 79    | 169.7654   | 32.1287   | 25.4803   | 242.0375   | 32.1281   | 25.6108   |
| 80    | 242.0375   | 32.1281   | 25.6108   | -1093.8425 | 104.8078  | -360.0011 |
| 81    | -1093.8425 | 104.8078  | -360.0011 | -619.0279  | 222.2847  | -641.0704 |
| 82    | -619.0279  | 222.2847  | -641.0704 | -200.4084  | 203.7108  | -593.1294 |
| 83    | -200.4084  | 203.7108  | -593.1294 | 116.8308   | 175.8166  | -520.7478 |
| 84    | 116.8308   | 175.8166  | -520.7478 | 402.6794   | 157.4277  | -472.9070 |
| 85    | 402.6794   | 157.4277  | -472.9070 | 625.0961   | 139.3732  | -425.7615 |
| 86    | 625.0961   | 139.3732  | -425.7615 | 784.5438   | 121.7835  | -381.8433 |
| 87    | 784.5438   | 121.7835  | -381.8433 | 801.9604   | 96.6079   | -321.7540 |
| 88    | 801.9604   | 96.6079   | -321.7540 | 833.6841   | 80.7024   | -285.1857 |
| 89    | 833.6841   | 80.7024   | -285.1857 | 813.4313   | 65.7001   | -252.0474 |
| 90    | 813.4313   | 65.7001   | -252.0474 | 746.6096   | 51.6040   | -222.1898 |
| 91    | 746.6096   | 51.6040   | -222.1898 | 536.5296   | 32.4457   | -182.3315 |
| 92    | 536.5296   | 32.4457   | -182.3315 | -263.9066  | 32.1505   | 25.5214   |
| 93    | -263.9066  | 32.1505   | 25.5214   | -191.5995  | 32.1450   | 25.5068   |
| 94    | -191.5995  | 32.1450   | 25.5068   | -119.3083  | 32.1367   | 25.4272   |
| 95    | -119.3083  | 32.1367   | 25.4272   | -47.0089   | 32.1315   | 25.3963   |
| 96    | -47.0089   | 32.1315   | 25.3963   | 25.2567    | 32.1298   | 25.3957   |
| 97    | 25.2567    | 32.1298   | 25.3957   | 97.5465    | 32.1271   | 25.4230   |
| 98    | 97.5465    | 32.1271   | 25.4230   | 169.8547   | 32.1305   | 25.4362   |
| 99    | 169.8547   | 32.1305   | 25.4362   | 242.1270   | 32.1339   | 25.5481   |
| 100   | 242.1270   | 32.1339   | 25.5481   | -1093.4321 | 104.7931  | -360.1552 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1093.4321 | 104.7931  | -360.1552 | -618.7998  | 222.2468  | -641.1907 |
| 102   | -618.7998  | 222.2468  | -641.1907 | -200.3843  | 203.6707  | -593.1465 |
| 103   | -200.3843  | 203.6707  | -593.1465 | 116.8226   | 175.7775  | -520.8339 |
| 104   | 116.8226   | 175.7775  | -520.8339 | 402.6813   | 157.3815  | -472.9246 |
| 105   | 402.6813   | 157.3815  | -472.9246 | 625.0334   | 139.3555  | -425.8177 |
| 106   | 625.0334   | 139.3555  | -425.8177 | 784.5747   | 121.7679  | -381.7283 |
| 107   | 784.5747   | 121.7679  | -381.7283 | 801.9266   | 96.5435   | -321.6317 |
| 108   | 801.9266   | 96.5435   | -321.6317 | 833.4909   | 80.6940   | -285.4772 |
| 109   | 833.4909   | 80.6940   | -285.4772 | 813.2755   | 65.6830   | -252.2319 |
| 110   | 813.2755   | 65.6830   | -252.2319 | 746.7885   | 51.6442   | -222.1236 |
| 111   | 746.7885   | 51.6442   | -222.1236 | 537.1324   | 32.4818   | -182.3580 |
| 112   | 537.1324   | 32.4818   | -182.3580 | -263.7687  | 32.1703   | 25.6108   |
| 113   | -263.7687  | 32.1703   | 25.6108   | -191.3831  | 32.1876   | 25.5440   |
| 114   | -191.3831  | 32.1876   | 25.5440   | -118.9845  | 32.1891   | 25.4594   |
| 115   | -118.9845  | 32.1891   | 25.4594   | -46.5922   | 32.1812   | 25.4347   |
| 116   | -46.5922   | 32.1812   | 25.4347   | 25.8072    | 32.1782   | 25.4307   |
| 117   | 25.8072    | 32.1782   | 25.4307   | 98.1761    | 32.1713   | 25.4457   |
| 118   | 98.1761    | 32.1713   | 25.4457   | 170.5564   | 32.1722   | 25.5154   |
| 119   | 170.5564   | 32.1722   | 25.5154   | 242.9418   | 32.1723   | 25.5716   |
| 120   | 242.9418   | 32.1723   | 25.5716   | -1084.1949 | 104.4589  | -359.7316 |
| 121   | -1084.1949 | 104.4589  | -359.7316 | -611.2678  | 221.2524  | -640.9658 |
| 122   | -611.2678  | 221.2524  | -640.9658 | -194.9127  | 202.6290  | -592.9089 |
| 123   | -194.9127  | 202.6290  | -592.9089 | 119.8954   | 174.7321  | -520.5869 |
| 124   | 119.8954   | 174.7321  | -520.5869 | 403.2891   | 156.3775  | -472.6007 |
| 125   | 403.2891   | 156.3775  | -472.6007 | 623.5229   | 138.3975  | -425.4213 |
| 126   | 623.5229   | 138.3975  | -425.4213 | 781.2073   | 120.9303  | -381.4476 |
| 127   | 781.2073   | 120.9303  | -381.4476 | 797.7633   | 95.9307   | -321.1595 |
| 128   | 797.7633   | 95.9307   | -321.1595 | 829.4226   | 80.2234   | -284.7561 |
| 129   | 829.4226   | 80.2234   | -284.7561 | 810.5299   | 65.4379   | -251.5388 |
| 130   | 810.5299   | 65.4379   | -251.5388 | 746.8897   | 51.6652   | -221.1115 |
| 131   | 746.8897   | 51.6652   | -221.1115 | 544.8180   | 33.0007   | -181.1056 |
| 132   | 544.8180   | 33.0007   | -181.1056 | -259.0342  | 32.4492   | 25.6450   |
| 133   | -259.0342  | 32.4492   | 25.6450   | -186.0259  | 32.4490   | 25.5716   |
| 134   | -186.0259  | 32.4490   | 25.5716   | -113.0153  | 32.4455   | 25.5211   |
| 135   | -113.0153  | 32.4455   | 25.5211   | -40.0218   | 32.4477   | 25.4949   |
| 136   | -40.0218   | 32.4477   | 25.4949   | 32.9762    | 32.4529   | 25.4830   |
| 137   | 32.9762    | 32.4529   | 25.4830   | 105.9849   | 32.4539   | 25.5001   |
| 138   | 105.9849   | 32.4539   | 25.5001   | 179.0068   | 32.4501   | 25.5455   |
| 139   | 179.0068   | 32.4501   | 25.5455   | 251.9924   | 32.4490   | 25.6145   |
| 140   | 251.9924   | 32.4490   | 25.6145   | -837.3817  | 99.3534   | -306.3843 |
| 141   | -837.3817  | 99.3534   | -306.3843 | -452.7461  | 195.8763  | -509.3856 |
| 142   | -452.7461  | 195.8763  | -509.3856 | -112.0809  | 182.5797  | -470.8248 |
| 143   | -112.0809  | 182.5797  | -470.8248 | -240.9431  | 164.3626  | -360.7852 |
| 144   | -240.9431  | 164.3626  | -360.7852 | 55.7276    | 149.5612  | -326.7463 |
| 145   | 55.7276    | 149.5612  | -326.7463 | 324.5516   | 141.6911  | -308.3563 |
| 146   | 324.5516   | 141.6911  | -308.3563 | 573.6133   | 125.0536  | -268.9760 |
| 147   | 573.6133   | 125.0536  | -268.9760 | 790.4956   | 107.2349  | -225.7362 |
| 148   | 790.4956   | 107.2349  | -225.7362 | 967.6640   | 88.2772   | -178.5159 |
| 149   | 967.6640   | 88.2772   | -178.5159 | 1097.8163  | 68.2415   | -127.6606 |
| 150   | 1097.8163  | 68.2415   | -127.6606 | 1195.1680  | 57.8251   | -100.6846 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 151   | 1195.1680 | 57.8251   | -100.6846 | 1222.4138 | 36.2915   | -43.9100 |
| 152   | 1222.4138 | 36.2915   | -43.9100  | -467.9034 | 32.4667   | 31.2018  |
| 153   | -467.9034 | 32.4667   | 31.2018   | -409.4766 | 32.4923   | 31.2025  |
| 154   | -409.4766 | 32.4923   | 31.2025   | -351.0034 | 32.5189   | 31.0693  |
| 155   | -351.0034 | 32.5189   | 31.0693   | -292.5183 | 32.5196   | 30.8715  |
| 156   | -292.5183 | 32.5196   | 30.8715   | -233.9946 | 32.5182   | 30.8637  |
| 157   | -233.9946 | 32.5182   | 30.8637   | -175.4822 | 32.5153   | 30.8734  |
| 158   | -175.4822 | 32.5153   | 30.8734   | -116.9793 | 32.5042   | 30.8168  |
| 159   | -116.9793 | 32.5042   | 30.8168   | -58.5029  | 32.5005   | 30.7822  |
| 160   | -58.5029  | 32.5005   | 30.7822   | 0.0048    | 32.5016   | 30.7693  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | 0.0016     | -32.2361  | -30.8356 | -58.0095   | -32.2350  | -30.8353 |
| 2     | -58.0095   | -32.2350  | -30.8353 | -116.0112  | -32.2303  | -30.8619 |
| 3     | -116.0112  | -32.2303  | -30.8619 | -174.0285  | -32.2242  | -30.9199 |
| 4     | -174.0285  | -32.2242  | -30.9199 | -232.0081  | -32.2270  | -30.9500 |
| 5     | -232.0081  | -32.2270  | -30.9500 | -290.0023  | -32.2319  | -31.0164 |
| 6     | -290.0023  | -32.2319  | -31.0164 | -348.0127  | -32.2253  | -31.0830 |
| 7     | -348.0127  | -32.2253  | -31.0830 | 588.6989   | -35.6294  | 101.8650 |
| 8     | 588.6989   | -35.6294  | 101.8650 | 709.1284   | -47.7876  | 132.2715 |
| 9     | 709.1284   | -47.7876  | 132.2715 | 812.1222   | -61.5865  | 164.6022 |
| 10    | 812.1222   | -61.5865  | 164.6022 | 874.5562   | -68.9747  | 176.8549 |
| 11    | 874.5562   | -68.9747  | 176.8549 | 814.6635   | -82.5131  | 211.9234 |
| 12    | 814.6635   | -82.5131  | 211.9234 | 798.9104   | -96.0557  | 243.3459 |
| 13    | 798.9104   | -96.0557  | 243.3459 | 748.8599   | -110.3918 | 281.0527 |
| 14    | 748.8599   | -110.3918 | 281.0527 | 664.6829   | -126.1176 | 322.7958 |
| 15    | 664.6829   | -126.1176 | 322.7958 | 540.9586   | -136.5302 | 348.8873 |
| 16    | 540.9586   | -136.5302 | 348.8873 | 325.2641   | -152.2053 | 392.4204 |
| 17    | 325.2641   | -152.2053 | 392.4204 | 115.1702   | -171.1552 | 443.8454 |
| 18    | 115.1702   | -171.1552 | 443.8454 | -147.2646  | -191.2545 | 498.9047 |
| 19    | -147.2646  | -191.2545 | 498.9047 | -465.3308  | -212.4102 | 557.5477 |
| 20    | -465.3308  | -212.4102 | 557.5477 | -847.1730  | -99.6604  | 307.2285 |
| 21    | -847.1730  | -99.6604  | 307.2285 | 249.6774   | -32.1488  | -25.5810 |
| 22    | 249.6774   | -32.1488  | -25.5810 | 177.3466   | -32.1470  | -25.4824 |
| 23    | 177.3466   | -32.1470  | -25.4824 | 105.0235   | -32.1474  | -25.4289 |
| 24    | 105.0235   | -32.1474  | -25.4289 | 32.6898    | -32.1460  | -25.4287 |
| 25    | 32.6898    | -32.1460  | -25.4287 | -39.6287   | -32.1430  | -25.4391 |
| 26    | -39.6287   | -32.1430  | -25.4391 | -111.9402  | -32.1397  | -25.4869 |
| 27    | -111.9402  | -32.1397  | -25.4869 | -184.2488  | -32.1369  | -25.5238 |
| 28    | -184.2488  | -32.1369  | -25.5238 | -256.5550  | -32.1446  | -25.5644 |
| 29    | -256.5550  | -32.1446  | -25.5644 | 649.0227   | -39.4499  | 197.6978 |
| 30    | 649.0227   | -39.4499  | 197.6978 | 750.3705   | -52.2524  | 225.2122 |
| 31    | 750.3705   | -52.2524  | 225.2122 | 813.3463   | -66.1136  | 255.3452 |
| 32    | 813.3463   | -66.1136  | 255.3452 | 921.3596   | -82.0735  | 286.6725 |
| 33    | 921.3596   | -82.0735  | 286.6725 | 879.5391   | -104.8477 | 343.2278 |
| 34    | 879.5391   | -104.8477 | 343.2278 | 780.8312   | -121.7211 | 383.7516 |
| 35    | 780.8312   | -121.7211 | 383.7516 | 621.7229   | -139.2194 | 427.5747 |
| 36    | 621.7229   | -139.2194 | 427.5747 | 453.0576   | -159.7523 | 478.7683 |
| 37    | 453.0576   | -159.7523 | 478.7683 | 157.1563   | -184.9025 | 546.0732 |
| 38    | 157.1563   | -184.9025 | 546.0732 | -200.5979  | -203.5309 | 594.4751 |
| 39    | -200.5979  | -203.5309 | 594.4751 | -618.2346  | -222.1542 | 642.4485 |
| 40    | -618.2346  | -222.1542 | 642.4485 | -1092.4708 | -104.7885 | 360.5291 |
| 41    | -1092.4708 | -104.7885 | 360.5291 | 240.9655   | -31.9026  | -25.5370 |
| 42    | 240.9655   | -31.9026  | -25.5370 | 169.1904   | -31.9018  | -25.4644 |
| 43    | 169.1904   | -31.9018  | -25.4644 | 97.3979    | -31.9037  | -25.4213 |
| 44    | 97.3979    | -31.9037  | -25.4213 | 25.6231    | -31.9051  | -25.4076 |
| 45    | 25.6231    | -31.9051  | -25.4076 | -46.1401   | -31.9093  | -25.4202 |
| 46    | -46.1401   | -31.9093  | -25.4202 | -117.9132  | -31.9177  | -25.4528 |
| 47    | -117.9132  | -31.9177  | -25.4528 | -189.7103  | -31.9142  | -25.4909 |
| 48    | -189.7103  | -31.9142  | -25.4909 | -261.4949  | -31.9105  | -25.5640 |
| 49    | -261.4949  | -31.9105  | -25.5640 | 644.1516   | -39.0822  | 198.6912 |
| 50    | 644.1516   | -39.0822  | 198.6912 | 750.4486   | -52.1859  | 226.0331 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 750.4486   | -52.1859  | 226.0331 | 816.4079   | -66.3313  | 256.0334 |
| 52    | 816.4079   | -66.3313  | 256.0334 | 926.6250   | -82.6539  | 286.8907 |
| 53    | 926.6250   | -82.6539  | 286.8907 | 884.3822   | -105.5912 | 343.7540 |
| 54    | 884.3822   | -105.5912 | 343.7540 | 784.3436   | -122.6286 | 384.2574 |
| 55    | 784.3436   | -122.6286 | 384.2574 | 623.5792   | -140.2263 | 427.7015 |
| 56    | 623.5792   | -140.2263 | 427.7015 | 452.4950   | -160.8035 | 478.7952 |
| 57    | 452.4950   | -160.8035 | 478.7952 | 154.1917   | -185.9438 | 546.2556 |
| 58    | 154.1917   | -185.9438 | 546.2556 | -205.8305  | -204.5835 | 594.4723 |
| 59    | -205.8305  | -204.5835 | 594.4723 | -625.7341  | -223.1606 | 642.3599 |
| 60    | -625.7341  | -223.1606 | 642.3599 | -1101.6411 | -105.1519 | 360.5740 |
| 61    | -1101.6411 | -105.1519 | 360.5740 | 240.0821   | -31.8800  | -25.6205 |
| 62    | 240.0821   | -31.8800  | -25.6205 | 168.3654   | -31.8813  | -25.5166 |
| 63    | 168.3654   | -31.8813  | -25.5166 | 96.6233    | -31.8774  | -25.4761 |
| 64    | 96.6233    | -31.8774  | -25.4761 | 24.9268    | -31.8696  | -25.4598 |
| 65    | 24.9268    | -31.8696  | -25.4598 | -46.7612   | -31.8651  | -25.4664 |
| 66    | -46.7612   | -31.8651  | -25.4664 | -118.4432  | -31.8638  | -25.5175 |
| 67    | -118.4432  | -31.8638  | -25.5175 | -190.1261  | -31.8610  | -25.5574 |
| 68    | -190.1261  | -31.8610  | -25.5574 | -261.7952  | -31.8584  | -25.5909 |
| 69    | -261.7952  | -31.8584  | -25.5909 | 643.9332   | -39.0840  | 198.6532 |
| 70    | 643.9332   | -39.0840  | 198.6532 | 750.3790   | -52.2285  | 226.1579 |
| 71    | 750.3790   | -52.2285  | 226.1579 | 816.4249   | -66.3849  | 256.1892 |
| 72    | 816.4249   | -66.3849  | 256.1892 | 926.7652   | -82.7036  | 286.9628 |
| 73    | 926.7652   | -82.7036  | 286.9628 | 884.3462   | -105.6416 | 343.8058 |
| 74    | 884.3462   | -105.6416 | 343.8058 | 784.2092   | -122.6708 | 384.3195 |
| 75    | 784.2092   | -122.6708 | 384.3195 | 623.4058   | -140.2646 | 427.7353 |
| 76    | 623.4058   | -140.2646 | 427.7353 | 451.9732   | -160.8787 | 478.9620 |
| 77    | 451.9732   | -160.8787 | 478.9620 | 153.8448   | -186.0161 | 546.3712 |
| 78    | 153.8448   | -186.0161 | 546.3712 | -206.4276  | -204.6328 | 594.5289 |
| 79    | -206.4276  | -204.6328 | 594.5289 | -626.4816  | -223.2105 | 642.4103 |
| 80    | -626.4816  | -223.2105 | 642.4103 | -1102.3149 | -105.1469 | 360.5200 |
| 81    | -1102.3149 | -105.1469 | 360.5200 | 239.9214   | -31.8495  | -25.5889 |
| 82    | 239.9214   | -31.8495  | -25.5889 | 168.2515   | -31.8518  | -25.5242 |
| 83    | 168.2515   | -31.8518  | -25.5242 | 96.6006    | -31.8505  | -25.4687 |
| 84    | 96.6006    | -31.8505  | -25.4687 | 24.9545    | -31.8502  | -25.4433 |
| 85    | 24.9545    | -31.8502  | -25.4433 | -46.7096   | -31.8479  | -25.4676 |
| 86    | -46.7096   | -31.8479  | -25.4676 | -118.3360  | -31.8424  | -25.4724 |
| 87    | -118.3360  | -31.8424  | -25.4724 | -190.0046  | -31.8451  | -25.5167 |
| 88    | -190.0046  | -31.8451  | -25.5167 | -261.6536  | -31.8432  | -25.6602 |
| 89    | -261.6536  | -31.8432  | -25.6602 | 643.9099   | -39.0976  | 198.8900 |
| 90    | 643.9099   | -39.0976  | 198.8900 | 750.4457   | -52.2566  | 226.0681 |
| 91    | 750.4457   | -52.2566  | 226.0681 | 816.3094   | -66.4084  | 256.1536 |
| 92    | 816.3094   | -66.4084  | 256.1536 | 926.4838   | -82.6866  | 287.1240 |
| 93    | 926.4838   | -82.6866  | 287.1240 | 884.2314   | -105.6618 | 343.6376 |
| 94    | 884.2314   | -105.6618 | 343.6376 | 784.0955   | -122.6431 | 384.2664 |
| 95    | 784.0955   | -122.6431 | 384.2664 | 623.0687   | -140.2531 | 427.8367 |
| 96    | 623.0687   | -140.2531 | 427.8367 | 451.9559   | -160.8193 | 478.9738 |
| 97    | 451.9559   | -160.8193 | 478.9738 | 153.6493   | -185.9883 | 546.3727 |
| 98    | 153.6493   | -185.9883 | 546.3727 | -206.6342  | -204.6099 | 594.6774 |
| 99    | -206.6342  | -204.6099 | 594.6774 | -626.4116  | -223.1921 | 642.4911 |
| 100   | -626.4116  | -223.1921 | 642.4911 | -1102.3271 | -105.1369 | 360.4664 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1102.3271 | -105.1369 | 360.4664 | 237.9404   | -31.5890  | -25.5065 |
| 102   | 237.9404   | -31.5890  | -25.5065 | 166.8719   | -31.5904  | -25.4546 |
| 103   | 166.8719   | -31.5904  | -25.4546 | 95.8068    | -31.5891  | -25.3852 |
| 104   | 95.8068    | -31.5891  | -25.3852 | 24.7258    | -31.5888  | -25.3710 |
| 105   | 24.7258    | -31.5888  | -25.3710 | -46.3502   | -31.5915  | -25.3867 |
| 106   | -46.3502   | -31.5915  | -25.3867 | -117.4262  | -31.5902  | -25.4172 |
| 107   | -117.4262  | -31.5902  | -25.4172 | -188.4662  | -31.5821  | -25.4582 |
| 108   | -188.4662  | -31.5821  | -25.4582 | -259.5141  | -31.5770  | -25.4886 |
| 109   | -259.5141  | -31.5770  | -25.4886 | 643.7771   | -39.1170  | 198.7048 |
| 110   | 643.7771   | -39.1170  | 198.7048 | 750.2128   | -52.2545  | 226.0979 |
| 111   | 750.2128   | -52.2545  | 226.0979 | 816.1512   | -66.4177  | 256.0642 |
| 112   | 816.1512   | -66.4177  | 256.0642 | 926.2104   | -82.7567  | 286.9653 |
| 113   | 926.2104   | -82.7567  | 286.9653 | 883.6536   | -105.7401 | 343.6586 |
| 114   | 883.6536   | -105.7401 | 343.6586 | 783.1567   | -122.7862 | 384.3257 |
| 115   | 783.1567   | -122.7862 | 384.3257 | 621.7108   | -140.3940 | 427.8918 |
| 116   | 621.7108   | -140.3940 | 427.8918 | 450.1495   | -160.9722 | 478.9643 |
| 117   | 450.1495   | -160.9722 | 478.9643 | 151.6326   | -186.1469 | 546.2690 |
| 118   | 151.6326   | -186.1469 | 546.2690 | -209.1301  | -204.7522 | 594.4879 |
| 119   | -209.1301  | -204.7522 | 594.4879 | -629.2396  | -223.3182 | 642.5569 |
| 120   | -629.2396  | -223.3182 | 642.5569 | -1105.3188 | -105.0484 | 360.5889 |
| 121   | -1105.3188 | -105.0484 | 360.5889 | 178.8802   | -23.7815  | -24.4255 |
| 122   | 178.8802   | -23.7815  | -24.4255 | 125.3791   | -23.7821  | -24.3853 |
| 123   | 125.3791   | -23.7821  | -24.3853 | 71.8802    | -23.7811  | -24.3479 |
| 124   | 71.8802    | -23.7811  | -24.3479 | 18.3803    | -23.7775  | -24.3451 |
| 125   | 18.3803    | -23.7775  | -24.3451 | -35.1274   | -23.7795  | -24.3544 |
| 126   | -35.1274   | -23.7795  | -24.3544 | -88.6455   | -23.7903  | -24.3565 |
| 127   | -88.6455   | -23.7903  | -24.3565 | -142.1499  | -23.7984  | -24.3996 |
| 128   | -142.1499  | -23.7984  | -24.3996 | -195.6788  | -23.7973  | -24.4524 |
| 129   | -195.6788  | -23.7973  | -24.4524 | 640.6951   | -39.3813  | 198.7337 |
| 130   | 640.6951   | -39.3813  | 198.7337 | 745.3300   | -52.6169  | 226.2337 |
| 131   | 745.3300   | -52.6169  | 226.2337 | 809.0114   | -66.8631  | 256.2795 |
| 132   | 809.0114   | -66.8631  | 256.2795 | 915.8085   | -83.3174  | 287.0057 |
| 133   | 915.8085   | -83.3174  | 287.0057 | 870.2352   | -106.4146 | 343.7529 |
| 134   | 870.2352   | -106.4146 | 343.7529 | 766.5381   | -123.4963 | 384.2335 |
| 135   | 766.5381   | -123.4963 | 384.2335 | 601.7074   | -141.1876 | 427.8600 |
| 136   | 601.7074   | -141.1876 | 427.8600 | 425.9774   | -161.8705 | 479.0690 |
| 137   | 425.9774   | -161.8705 | 479.0690 | 124.2307   | -187.0798 | 546.4152 |
| 138   | 124.2307   | -187.0798 | 546.4152 | -239.3010  | -205.7144 | 594.6856 |
| 139   | -239.3010  | -205.7144 | 594.6856 | -661.5318  | -224.2906 | 642.6949 |
| 140   | -661.5318  | -224.2906 | 642.6949 | -1139.0376 | -105.5027 | 363.7103 |
| 141   | -1139.0376 | -105.5027 | 363.7103 | 308.7558   | -9.0279   | 0.9505   |
| 142   | 308.7558   | -9.0279   | 0.9505   | 292.5062   | -9.0277   | 0.9538   |
| 143   | 292.5062   | -9.0277   | 0.9538   | 276.2581   | -9.0255   | 1.0078   |
| 144   | 276.2581   | -9.0255   | 1.0078   | 260.0017   | -9.0273   | 1.1188   |
| 145   | 260.0017   | -9.0273   | 1.1188   | 243.7470   | -9.0307   | 1.1609   |
| 146   | 243.7470   | -9.0307   | 1.1609   | 227.4959   | -9.0250   | 1.2092   |
| 147   | 227.4959   | -9.0250   | 1.2092   | 211.2610   | -9.0182   | 1.2483   |
| 148   | 211.2610   | -9.0182   | 1.2483   | 195.0338   | -9.0156   | 1.3298   |
| 149   | 195.0338   | -9.0156   | 1.3298   | 339.0783   | -17.0851  | 177.7599 |
| 150   | 339.0783   | -17.0851  | 177.7599 | 409.4423   | -22.7017  | 193.7316 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 409.4423 | -22.7017  | 193.7316 | 566.4788 | -34.9313  | 226.0479 |
| 152   | 566.4788 | -34.9313  | 226.0479 | 698.3744 | -48.4274  | 258.5383 |
| 153   | 698.3744 | -48.4274  | 258.5383 | 797.7943 | -63.2244  | 292.8987 |
| 154   | 797.7943 | -63.2244  | 292.8987 | 857.2050 | -79.2966  | 330.8903 |
| 155   | 857.2050 | -79.2966  | 330.8903 | 790.5639 | -87.7933  | 351.6478 |
| 156   | 790.5639 | -87.7933  | 351.6478 | 760.9812 | -105.6586 | 394.9903 |
| 157   | 760.9812 | -105.6586 | 394.9903 | 673.3405 | -124.5947 | 441.9369 |
| 158   | 673.3405 | -124.5947 | 441.9369 | 521.0529 | -144.6281 | 492.8896 |
| 159   | 521.0529 | -144.6281 | 492.8896 | 298.4417 | -165.6869 | 547.4867 |
| 160   | 298.4417 | -165.6869 | 547.4867 | 0.0450   | -176.5683 | 576.1538 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | 0.0027     | -0.0027   | 1.9918   | 12.4637    | -0.4668   | 4.9425   |
| 2     | 12.4637    | -0.4668   | 4.9425   | 69.7991    | -2.7779   | 13.7362  |
| 3     | 69.7991    | -2.7779   | 13.7362  | 162.1192   | -6.9259   | 26.4397  |
| 4     | 162.1192   | -6.9259   | 26.4397  | 279.6122   | -12.9015  | 43.0278  |
| 5     | 279.6122   | -12.9015  | 43.0278  | 329.8631   | -16.5571  | 52.8321  |
| 6     | 329.8631   | -16.5571  | 52.8321  | 459.3063   | -25.2121  | 75.3326  |
| 7     | 459.3063   | -25.2121  | 75.3326  | 588.6989   | -35.6294  | 101.8650 |
| 8     | 588.6989   | -35.6294  | 101.8650 | 709.1284   | -47.7876  | 132.2715 |
| 9     | 709.1284   | -47.7876  | 132.2715 | 812.1222   | -61.5865  | 164.6022 |
| 10    | 812.1222   | -61.5865  | 164.6022 | 787.2557   | -68.6471  | 180.5632 |
| 11    | 787.2557   | -68.6471  | 180.5632 | 814.6635   | -82.5131  | 211.9234 |
| 12    | 814.6635   | -82.5131  | 211.9234 | 798.9104   | -96.0557  | 243.3459 |
| 13    | 798.9104   | -96.0557  | 243.3459 | 748.8599   | -110.3918 | 281.0527 |
| 14    | 748.8599   | -110.3918 | 281.0527 | 664.6829   | -126.1176 | 322.7958 |
| 15    | 664.6829   | -126.1176 | 322.7958 | 540.9586   | -136.5302 | 348.8873 |
| 16    | 540.9586   | -136.5302 | 348.8873 | 325.2641   | -152.2053 | 392.4204 |
| 17    | 325.2641   | -152.2053 | 392.4204 | 115.1702   | -171.1552 | 443.8454 |
| 18    | 115.1702   | -171.1552 | 443.8454 | -147.2646  | -191.2545 | 498.9047 |
| 19    | -147.2646  | -191.2545 | 498.9047 | -465.3308  | -212.4102 | 557.5477 |
| 20    | -465.3308  | -212.4102 | 557.5477 | -847.1730  | -99.6604  | 307.2285 |
| 21    | -847.1730  | -99.6604  | 307.2285 | -746.7910  | 22.6466   | 31.8381  |
| 22    | -746.7910  | 22.6466   | 31.8381  | -627.6320  | 20.4251   | 38.6298  |
| 23    | -627.6320  | 20.4251   | 38.6298  | -486.8911  | 17.1067   | 48.4483  |
| 24    | -486.8911  | 17.1067   | 48.4483  | -330.2350  | 12.6319   | 61.4809  |
| 25    | -330.2350  | 12.6319   | 61.4809  | -83.6933   | 3.6876    | 86.6597  |
| 26    | -83.6933   | 3.6876    | 86.6597  | 92.0421    | -3.7906   | 107.3412 |
| 27    | 92.0421    | -3.7906   | 107.3412 | 260.8838   | -12.4832  | 131.2050 |
| 28    | 260.8838   | -12.4832  | 131.2050 | 415.5085   | -22.3824  | 157.4681 |
| 29    | 415.5085   | -22.3824  | 157.4681 | 649.0227   | -39.4499  | 197.6978 |
| 30    | 649.0227   | -39.4499  | 197.6978 | 750.3705   | -52.2524  | 225.2122 |
| 31    | 750.3705   | -52.2524  | 225.2122 | 813.3463   | -66.1136  | 255.3452 |
| 32    | 813.3463   | -66.1136  | 255.3452 | 831.2452   | -80.9597  | 288.5059 |
| 33    | 831.2452   | -80.9597  | 288.5059 | 879.5391   | -104.8477 | 343.2278 |
| 34    | 879.5391   | -104.8477 | 343.2278 | 780.8312   | -121.7211 | 383.7516 |
| 35    | 780.8312   | -121.7211 | 383.7516 | 621.7229   | -139.2194 | 427.5747 |
| 36    | 621.7229   | -139.2194 | 427.5747 | 453.0576   | -159.7523 | 478.7683 |
| 37    | 453.0576   | -159.7523 | 478.7683 | 157.1563   | -184.9025 | 546.0732 |
| 38    | 157.1563   | -184.9025 | 546.0732 | -200.5979  | -203.5309 | 594.4751 |
| 39    | -200.5979  | -203.5309 | 594.4751 | -618.2346  | -222.1542 | 642.4485 |
| 40    | -618.2346  | -222.1542 | 642.4485 | -1092.4708 | -104.7885 | 360.5291 |
| 41    | -1092.4708 | -104.7885 | 360.5291 | -932.2839  | 28.2663   | 35.7910  |
| 42    | -932.2839  | 28.2663   | 35.7910  | -775.3430  | 25.2266   | 42.1911  |
| 43    | -775.3430  | 25.2266   | 42.1911  | -602.2694  | 21.1507   | 51.5825  |
| 44    | -602.2694  | 21.1507   | 51.5825  | -418.2827  | 15.9862   | 64.1880  |
| 45    | -418.2827  | 15.9862   | 64.1880  | -141.8661  | 6.1138    | 88.8878  |
| 46    | -141.8661  | 6.1138    | 88.8878  | 51.2878    | -1.9104   | 109.2791 |
| 47    | 51.2878    | -1.9104   | 109.2791 | 234.1102   | -11.0949  | 132.8797 |
| 48    | 234.1102   | -11.0949  | 132.8797 | 399.6798   | -21.4366  | 158.9709 |
| 49    | 399.6798   | -21.4366  | 158.9709 | 644.1516   | -39.0822  | 198.6912 |
| 50    | 644.1516   | -39.0822  | 198.6912 | 750.4486   | -52.1859  | 226.0331 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 750.4486   | -52.1859  | 226.0331 | 816.4079   | -66.3313  | 256.0334 |
| 52    | 816.4079   | -66.3313  | 256.0334 | 835.7052   | -81.4279  | 288.8036 |
| 53    | 835.7052   | -81.4279  | 288.8036 | 884.3822   | -105.5912 | 343.7540 |
| 54    | 884.3822   | -105.5912 | 343.7540 | 784.3436   | -122.6286 | 384.2574 |
| 55    | 784.3436   | -122.6286 | 384.2574 | 623.5792   | -140.2263 | 427.7015 |
| 56    | 623.5792   | -140.2263 | 427.7015 | 452.4950   | -160.8035 | 478.7952 |
| 57    | 452.4950   | -160.8035 | 478.7952 | 154.1917   | -185.9438 | 546.2556 |
| 58    | 154.1917   | -185.9438 | 546.2556 | -205.8305  | -204.5835 | 594.4723 |
| 59    | -205.8305  | -204.5835 | 594.4723 | -625.7341  | -223.1606 | 642.3599 |
| 60    | -625.7341  | -223.1606 | 642.3599 | -1101.6411 | -105.1519 | 360.5740 |
| 61    | -1101.6411 | -105.1519 | 360.5740 | -939.8997  | 28.4741   | 35.8380  |
| 62    | -939.8997  | 28.4741   | 35.8380  | -781.8156  | 25.4142   | 42.1172  |
| 63    | -781.8156  | 25.4142   | 42.1172  | -607.5934  | 21.3177   | 51.5209  |
| 64    | -607.5934  | 21.3177   | 51.5209  | -422.5212  | 16.1420   | 64.1405  |
| 65    | -422.5212  | 16.1420   | 64.1405  | -144.7398  | 6.2339    | 88.8904  |
| 66    | -144.7398  | 6.2339    | 88.8904  | 49.2803    | -1.8184   | 109.2766 |
| 67    | 49.2803    | -1.8184   | 109.2766 | 232.8297   | -11.0368  | 132.8810 |
| 68    | 232.8297   | -11.0368  | 132.8810 | 398.9348   | -21.4152  | 158.9050 |
| 69    | 398.9348   | -21.4152  | 158.9050 | 643.9332   | -39.0840  | 198.6532 |
| 70    | 643.9332   | -39.0840  | 198.6532 | 750.3790   | -52.2285  | 226.1579 |
| 71    | 750.3790   | -52.2285  | 226.1579 | 816.4249   | -66.3849  | 256.1892 |
| 72    | 816.4249   | -66.3849  | 256.1892 | 835.8086   | -81.4930  | 288.8721 |
| 73    | 835.8086   | -81.4930  | 288.8721 | 884.3462   | -105.6416 | 343.8058 |
| 74    | 884.3462   | -105.6416 | 343.8058 | 784.2092   | -122.6708 | 384.3195 |
| 75    | 784.2092   | -122.6708 | 384.3195 | 623.4058   | -140.2646 | 427.7353 |
| 76    | 623.4058   | -140.2646 | 427.7353 | 451.9732   | -160.8787 | 478.9620 |
| 77    | 451.9732   | -160.8787 | 478.9620 | 153.8448   | -186.0161 | 546.3712 |
| 78    | 153.8448   | -186.0161 | 546.3712 | -206.4276  | -204.6328 | 594.5289 |
| 79    | -206.4276  | -204.6328 | 594.5289 | -626.4816  | -223.2105 | 642.4103 |
| 80    | -626.4816  | -223.2105 | 642.4103 | -1102.3149 | -105.1469 | 360.5200 |
| 81    | -1102.3149 | -105.1469 | 360.5200 | -940.2793  | 28.5081   | 35.8177  |
| 82    | -940.2793  | 28.5081   | 35.8177  | -782.0256  | 25.4432   | 42.2399  |
| 83    | -782.0256  | 25.4432   | 42.2399  | -607.7438  | 21.3396   | 51.5426  |
| 84    | -607.7438  | 21.3396   | 51.5426  | -422.6053  | 16.1484   | 64.1393  |
| 85    | -422.6053  | 16.1484   | 64.1393  | -144.8033  | 6.2366    | 88.8698  |
| 86    | -144.8033  | 6.2366    | 88.8698  | 49.2684    | -1.8171   | 109.2728 |
| 87    | 49.2684    | -1.8171   | 109.2728 | 232.8232   | -11.0306  | 132.8271 |
| 88    | 232.8232   | -11.0306  | 132.8271 | 398.8992   | -21.4086  | 159.0235 |
| 89    | 398.8992   | -21.4086  | 159.0235 | 643.9099   | -39.0976  | 198.8900 |
| 90    | 643.9099   | -39.0976  | 198.8900 | 750.4457   | -52.2566  | 226.0681 |
| 91    | 750.4457   | -52.2566  | 226.0681 | 816.3094   | -66.4084  | 256.1536 |
| 92    | 816.3094   | -66.4084  | 256.1536 | 835.5623   | -81.4863  | 289.0442 |
| 93    | 835.5623   | -81.4863  | 289.0442 | 884.2314   | -105.6618 | 343.6376 |
| 94    | 884.2314   | -105.6618 | 343.6376 | 784.0955   | -122.6431 | 384.2664 |
| 95    | 784.0955   | -122.6431 | 384.2664 | 623.0687   | -140.2531 | 427.8367 |
| 96    | 623.0687   | -140.2531 | 427.8367 | 451.9559   | -160.8193 | 478.9738 |
| 97    | 451.9559   | -160.8193 | 478.9738 | 153.6493   | -185.9883 | 546.3727 |
| 98    | 153.6493   | -185.9883 | 546.3727 | -206.6342  | -204.6099 | 594.6774 |
| 99    | -206.6342  | -204.6099 | 594.6774 | -626.4116  | -223.1921 | 642.4911 |
| 100   | -626.4116  | -223.1921 | 642.4911 | -1102.3271 | -105.1369 | 360.4664 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1102.3271 | -105.1369 | 360.4664 | -940.2703  | 28.5163   | 35.9018  |
| 102   | -940.2703  | 28.5163   | 35.9018  | -782.0408  | 25.4469   | 42.3283  |
| 103   | -782.0408  | 25.4469   | 42.3283  | -607.7671  | 21.3457   | 51.5826  |
| 104   | -607.7671  | 21.3457   | 51.5826  | -422.6067  | 16.1558   | 64.1723  |
| 105   | -422.6067  | 16.1558   | 64.1723  | -144.7995  | 6.2375    | 88.8856  |
| 106   | -144.7995  | 6.2375    | 88.8856  | 49.2451    | -1.8170   | 109.2860 |
| 107   | 49.2451    | -1.8170   | 109.2860 | 232.7881   | -11.0358  | 132.8934 |
| 108   | 232.7881   | -11.0358  | 132.8934 | 398.8828   | -21.4212  | 158.9395 |
| 109   | 398.8828   | -21.4212  | 158.9395 | 643.7771   | -39.1170  | 198.7048 |
| 110   | 643.7771   | -39.1170  | 198.7048 | 750.2128   | -52.2545  | 226.0979 |
| 111   | 750.2128   | -52.2545  | 226.0979 | 816.1512   | -66.4177  | 256.0642 |
| 112   | 816.1512   | -66.4177  | 256.0642 | 835.2907   | -81.5193  | 288.8957 |
| 113   | 835.2907   | -81.5193  | 288.8957 | 883.6536   | -105.7401 | 343.6586 |
| 114   | 883.6536   | -105.7401 | 343.6586 | 783.1567   | -122.7862 | 384.3257 |
| 115   | 783.1567   | -122.7862 | 384.3257 | 621.7108   | -140.3940 | 427.8918 |
| 116   | 621.7108   | -140.3940 | 427.8918 | 450.1495   | -160.9722 | 478.9643 |
| 117   | 450.1495   | -160.9722 | 478.9643 | 151.6326   | -186.1469 | 546.2690 |
| 118   | 151.6326   | -186.1469 | 546.2690 | -209.1301  | -204.7522 | 594.4879 |
| 119   | -209.1301  | -204.7522 | 594.4879 | -629.2396  | -223.3182 | 642.5569 |
| 120   | -629.2396  | -223.3182 | 642.5569 | -1105.3188 | -105.0484 | 360.5889 |
| 121   | -1105.3188 | -105.0484 | 360.5889 | -942.6025  | 28.7943   | 35.8100  |
| 122   | -942.6025  | 28.7943   | 35.8100  | -783.5770  | 25.7017   | 42.2427  |
| 123   | -783.5770  | 25.7017   | 42.2427  | -608.5714  | 21.5593   | 51.6198  |
| 124   | -608.5714  | 21.5593   | 51.6198  | -422.9158  | 16.3179   | 64.2168  |
| 125   | -422.9158  | 16.3179   | 64.2168  | -144.8686  | 6.3038    | 88.8925  |
| 126   | -144.8686  | 6.3038    | 88.8925  | 49.0873    | -1.8180   | 109.3117 |
| 127   | 49.0873    | -1.8180   | 109.3117 | 232.1760   | -11.1083  | 132.9119 |
| 128   | 232.1760   | -11.1083  | 132.9119 | 397.4283   | -21.5697  | 159.0318 |
| 129   | 397.4283   | -21.5697  | 159.0318 | 640.6951   | -39.3813  | 198.7337 |
| 130   | 640.6951   | -39.3813  | 198.7337 | 745.3300   | -52.6169  | 226.2337 |
| 131   | 745.3300   | -52.6169  | 226.2337 | 809.0114   | -66.8631  | 256.2795 |
| 132   | 809.0114   | -66.8631  | 256.2795 | 825.6588   | -82.0702  | 288.9299 |
| 133   | 825.6588   | -82.0702  | 288.9299 | 870.2352   | -106.4146 | 343.7529 |
| 134   | 870.2352   | -106.4146 | 343.7529 | 766.5381   | -123.4963 | 384.2335 |
| 135   | 766.5381   | -123.4963 | 384.2335 | 601.7074   | -141.1876 | 427.8600 |
| 136   | 601.7074   | -141.1876 | 427.8600 | 425.9774   | -161.8705 | 479.0690 |
| 137   | 425.9774   | -161.8705 | 479.0690 | 124.2307   | -187.0798 | 546.4152 |
| 138   | 124.2307   | -187.0798 | 546.4152 | -239.3010  | -205.7144 | 594.6856 |
| 139   | -239.3010  | -205.7144 | 594.6856 | -661.5318  | -224.2906 | 642.6949 |
| 140   | -661.5318  | -224.2906 | 642.6949 | -1139.0376 | -105.5027 | 363.7103 |
| 141   | -1139.0376 | -105.5027 | 363.7103 | -1026.1832 | 30.0009   | 40.0196  |
| 142   | -1026.1832 | 30.0009   | 40.0196  | -888.1767  | 27.4171   | 46.5070  |
| 143   | -888.1767  | 27.4171   | 46.5070  | -728.0914  | 23.8015   | 56.3172  |
| 144   | -728.0914  | 23.8015   | 56.3172  | -549.3066  | 19.0855   | 69.7585  |
| 145   | -549.3066  | 19.0855   | 69.7585  | -439.5891  | 16.3023   | 77.9349  |
| 146   | -439.5891  | 16.3023   | 77.9349  | -247.0071  | 9.8060    | 97.1866  |
| 147   | -247.0071  | 9.8060    | 97.1866  | -49.0804   | 2.1135    | 120.2209 |
| 148   | -49.0804   | 2.1135    | 120.2209 | 148.3328   | -6.8426   | 147.0788 |
| 149   | 148.3328   | -6.8426   | 147.0788 | 339.0783   | -17.0851  | 177.7599 |
| 150   | 339.0783   | -17.0851  | 177.7599 | 409.4423   | -22.7017  | 193.7316 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 409.4423 | -22.7017  | 193.7316 | 566.4788 | -34.9313  | 226.0479 |
| 152   | 566.4788 | -34.9313  | 226.0479 | 698.3744 | -48.4274  | 258.5383 |
| 153   | 698.3744 | -48.4274  | 258.5383 | 797.7943 | -63.2244  | 292.8987 |
| 154   | 797.7943 | -63.2244  | 292.8987 | 857.2050 | -79.2966  | 330.8903 |
| 155   | 857.2050 | -79.2966  | 330.8903 | 790.5639 | -87.7933  | 351.6478 |
| 156   | 790.5639 | -87.7933  | 351.6478 | 760.9812 | -105.6586 | 394.9903 |
| 157   | 760.9812 | -105.6586 | 394.9903 | 673.3405 | -124.5947 | 441.9369 |
| 158   | 673.3405 | -124.5947 | 441.9369 | 521.0529 | -144.6281 | 492.8896 |
| 159   | 521.0529 | -144.6281 | 492.8896 | 298.4417 | -165.6869 | 547.4867 |
| 160   | 298.4417 | -165.6869 | 547.4867 | 0.0450   | -176.5683 | 576.1538 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0435     | 175.7542  | -574.4969 | 277.6534   | 154.2546  | -517.6530 |
| 2     | 277.6534   | 154.2546  | -517.6530 | 517.9808   | 143.8654  | -490.5015 |
| 3     | 517.9808   | 143.8654  | -490.5015 | 669.1519   | 123.8443  | -438.9872 |
| 4     | 669.1519   | 123.8443  | -438.9872 | 755.8613   | 104.9368  | -391.3198 |
| 5     | 755.8613   | 104.9368  | -391.3198 | 784.7589   | 87.1615   | -347.2903 |
| 6     | 784.7589   | 87.1615   | -347.2903 | 762.6743   | 70.5838   | -307.0323 |
| 7     | 762.6743   | 70.5838   | -307.0323 | 791.1875   | 62.7374   | -288.0750 |
| 8     | 791.1875   | 62.7374   | -288.0750 | 692.1193   | 47.9992   | -253.4840 |
| 9     | 692.1193   | 47.9992   | -253.4840 | 560.6287   | 34.5482   | -222.2131 |
| 10    | 560.6287   | 34.5482   | -222.2131 | 404.1595   | 22.4001   | -193.4694 |
| 11    | 404.1595   | 22.4001   | -193.4694 | 229.7807   | 11.5758   | -165.0208 |
| 12    | 229.7807   | 11.5758   | -165.0208 | 144.1046   | 6.6470    | -150.9430 |
| 13    | 144.1046   | 6.6470    | -150.9430 | -52.0480   | -2.2347   | -123.7663 |
| 14    | -52.0480   | -2.2347   | -123.7663 | -248.2558  | -9.8520   | -100.1900 |
| 15    | -248.2558  | -9.8520   | -100.1900 | -438.9052  | -16.2523  | -80.3046  |
| 16    | -438.9052  | -16.2523  | -80.3046  | -618.7581  | -21.4797  | -64.3734  |
| 17    | -618.7581  | -21.4797  | -64.3734  | -724.3817  | -23.6586  | -57.9689  |
| 18    | -724.3817  | -23.6586  | -57.9689  | -882.6534  | -27.2330  | -47.4471  |
| 19    | -882.6534  | -27.2330  | -47.4471  | -1018.8477 | -29.7750  | -40.8337  |
| 20    | -1018.8477 | -29.7750  | -40.8337  | -1129.9507 | 105.1509  | -363.1228 |
| 21    | -1129.9507 | 105.1509  | -363.1228 | -653.7068  | 223.3149  | -641.2388 |
| 22    | -653.7068  | 223.3149  | -641.2388 | -232.6754  | 204.7280  | -593.3206 |
| 23    | -232.6754  | 204.7280  | -593.3206 | 88.0867    | 176.7920  | -521.0315 |
| 24    | 88.0867    | 176.7920  | -521.0315 | 377.4711   | 158.3533  | -473.1441 |
| 25    | 377.4711   | 158.3533  | -473.1441 | 603.5656   | 140.2296  | -426.0175 |
| 26    | 603.5656   | 140.2296  | -426.0175 | 766.8304   | 122.5932  | -381.7898 |
| 27    | 766.8304   | 122.5932  | -381.7898 | 788.6169   | 97.2484   | -321.7082 |
| 28    | 788.6169   | 97.2484   | -321.7082 | 823.3037   | 81.2887   | -285.4903 |
| 29    | 823.3037   | 81.2887   | -285.4903 | 805.8987   | 66.1873   | -252.1494 |
| 30    | 805.8987   | 66.1873   | -252.1494 | 741.5300   | 52.0266   | -222.2120 |
| 31    | 741.5300   | 52.0266   | -222.2120 | 533.8441   | 32.7139   | -182.4309 |
| 32    | 533.8441   | 32.7139   | -182.4309 | 393.4276   | 21.2022   | -158.6655 |
| 33    | 393.4276   | 21.2022   | -158.6655 | 228.3971   | 10.8348   | -135.3915 |
| 34    | 228.3971   | 10.8348   | -135.3915 | 45.9927    | 1.6219    | -112.4007 |
| 35    | 45.9927    | 1.6219    | -112.4007 | -233.5648  | -10.0059  | -82.2665  |
| 36    | -233.5648  | -10.0059  | -82.2665  | -422.1269  | -16.3064  | -66.0890  |
| 37    | -422.1269  | -16.3064  | -66.0890  | -606.0027  | -21.4789  | -53.1169  |
| 38    | -606.0027  | -21.4789  | -53.1169  | -779.1686  | -25.5655  | -43.2570  |
| 39    | -779.1686  | -25.5655  | -43.2570  | -974.1170  | -29.7654  | -33.7672  |
| 40    | -974.1170  | -29.7654  | -33.7672  | -1097.0435 | 104.7153  | -359.8973 |
| 41    | -1097.0435 | 104.7153  | -359.8973 | -622.2574  | 222.4016  | -641.1523 |
| 42    | -622.2574  | 222.4016  | -641.1523 | -203.4668  | 203.8161  | -593.2042 |
| 43    | -203.4668  | 203.8161  | -593.2042 | 114.2395   | 175.9310  | -520.8695 |
| 44    | 114.2395   | 175.9310  | -520.8695 | 400.4485   | 157.5303  | -472.9665 |
| 45    | 400.4485   | 157.5303  | -472.9665 | 623.1498   | 139.4870  | -425.8577 |
| 46    | 623.1498   | 139.4870  | -425.8577 | 783.1272   | 121.8932  | -381.7584 |
| 47    | 783.1272   | 121.8932  | -381.7584 | 801.0455   | 96.6962   | -321.6683 |
| 48    | 801.0455   | 96.6962   | -321.6683 | 833.0027   | 80.7985   | -285.3680 |
| 49    | 833.0027   | 80.7985   | -285.3680 | 812.9909   | 65.7785   | -252.2999 |
| 50    | 812.9909   | 65.7785   | -252.2999 | 746.4763   | 51.6782   | -222.1565 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 746.4763   | 51.6782   | -222.1565 | 536.5312   | 32.4891   | -182.4156 |
| 52    | 536.5312   | 32.4891   | -182.4156 | 394.7649   | 21.0437   | -158.6855 |
| 53    | 394.7649   | 21.0437   | -158.6855 | 228.8920   | 10.7520   | -135.2780 |
| 54    | 228.8920   | 10.7520   | -135.2780 | 45.9845    | 1.6167    | -112.3445 |
| 55    | 45.9845    | 1.6167    | -112.3445 | -233.8047  | -9.8976   | -82.1736  |
| 56    | -233.8047  | -9.8976   | -82.1736  | -422.1089  | -16.1466  | -66.0438  |
| 57    | -422.1089  | -16.1466  | -66.0438  | -605.4884  | -21.2733  | -53.0510  |
| 58    | -605.4884  | -21.2733  | -53.0510  | -778.0052  | -25.3178  | -43.0732  |
| 59    | -778.0052  | -25.3178  | -43.0732  | -972.0635  | -29.4762  | -33.8408  |
| 60    | -972.0635  | -29.4762  | -33.8408  | -1094.1846 | 104.8397  | -359.8276 |
| 61    | -1094.1846 | 104.8397  | -359.8276 | -619.2361  | 222.3405  | -640.9833 |
| 62    | -619.2361  | 222.3405  | -640.9833 | -200.5246  | 203.7675  | -593.1166 |
| 63    | -200.5246  | 203.7675  | -593.1166 | 116.8965   | 175.8647  | -520.8016 |
| 64    | 116.8965   | 175.8647  | -520.8016 | 402.7922   | 157.4496  | -472.9050 |
| 65    | 402.7922   | 157.4496  | -472.9050 | 625.0570   | 139.3787  | -425.9084 |
| 66    | 625.0570   | 139.3787  | -425.9084 | 784.6557   | 121.7851  | -381.7517 |
| 67    | 784.6557   | 121.7851  | -381.7517 | 802.0804   | 96.5552   | -321.6660 |
| 68    | 802.0804   | 96.5552   | -321.6660 | 833.6094   | 80.6985   | -285.4963 |
| 69    | 833.6094   | 80.6985   | -285.4963 | 813.3126   | 65.7090   | -252.2928 |
| 70    | 813.3126   | 65.7090   | -252.2928 | 746.6367   | 51.6359   | -222.0322 |
| 71    | 746.6367   | 51.6359   | -222.0322 | 536.5869   | 32.4590   | -182.3413 |
| 72    | 536.5869   | 32.4590   | -182.3413 | 394.7531   | 21.0295   | -158.7109 |
| 73    | 394.7531   | 21.0295   | -158.7109 | 228.8616   | 10.7413   | -135.3004 |
| 74    | 228.8616   | 10.7413   | -135.3004 | 45.9760    | 1.6152    | -112.3761 |
| 75    | 45.9760    | 1.6152    | -112.3761 | -233.7865  | -9.9042   | -82.2166  |
| 76    | -233.7865  | -9.9042   | -82.2166  | -422.0486  | -16.1415  | -66.1440  |
| 77    | -422.0486  | -16.1415  | -66.1440  | -605.3453  | -21.2692  | -53.0734  |
| 78    | -605.3453  | -21.2692  | -53.0734  | -777.8621  | -25.3163  | -43.1351  |
| 79    | -777.8621  | -25.3163  | -43.1351  | -971.8535  | -29.4734  | -34.0350  |
| 80    | -971.8535  | -29.4734  | -34.0350  | -1093.8425 | 104.8078  | -360.0011 |
| 81    | -1093.8425 | 104.8078  | -360.0011 | -619.0279  | 222.2847  | -641.0704 |
| 82    | -619.0279  | 222.2847  | -641.0704 | -200.4084  | 203.7108  | -593.1294 |
| 83    | -200.4084  | 203.7108  | -593.1294 | 116.8308   | 175.8166  | -520.7478 |
| 84    | 116.8308   | 175.8166  | -520.7478 | 402.6794   | 157.4277  | -472.9070 |
| 85    | 402.6794   | 157.4277  | -472.9070 | 625.0961   | 139.3732  | -425.7615 |
| 86    | 625.0961   | 139.3732  | -425.7615 | 784.5438   | 121.7835  | -381.8433 |
| 87    | 784.5438   | 121.7835  | -381.8433 | 801.9604   | 96.6079   | -321.7540 |
| 88    | 801.9604   | 96.6079   | -321.7540 | 833.6841   | 80.7024   | -285.1857 |
| 89    | 833.6841   | 80.7024   | -285.1857 | 813.4313   | 65.7001   | -252.0474 |
| 90    | 813.4313   | 65.7001   | -252.0474 | 746.6096   | 51.6040   | -222.1898 |
| 91    | 746.6096   | 51.6040   | -222.1898 | 536.5296   | 32.4457   | -182.3315 |
| 92    | 536.5296   | 32.4457   | -182.3315 | 394.7894   | 21.0349   | -158.6624 |
| 93    | 394.7894   | 21.0349   | -158.6624 | 228.9015   | 10.7519   | -135.3453 |
| 94    | 228.9015   | 10.7519   | -135.3453 | 46.0758    | 1.6195    | -112.3656 |
| 95    | 46.0758    | 1.6195    | -112.3656 | -233.5880  | -9.8953   | -82.2276  |
| 96    | -233.5880  | -9.8953   | -82.2276  | -421.7957  | -16.1446  | -66.0997  |
| 97    | -421.7957  | -16.1446  | -66.0997  | -605.0763  | -21.2752  | -53.1376  |
| 98    | -605.0763  | -21.2752  | -53.1376  | -777.5542  | -25.3134  | -43.1701  |
| 99    | -777.5542  | -25.3134  | -43.1701  | -971.5107  | -29.4709  | -33.9363  |
| 100   | -971.5107  | -29.4709  | -33.9363  | -1093.4321 | 104.7931  | -360.1552 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1093.4321 | 104.7931  | -360.1552 | -618.7998  | 222.2468  | -641.1907 |
| 102   | -618.7998  | 222.2468  | -641.1907 | -200.3843  | 203.6707  | -593.1465 |
| 103   | -200.3843  | 203.6707  | -593.1465 | 116.8226   | 175.7775  | -520.8339 |
| 104   | 116.8226   | 175.7775  | -520.8339 | 402.6813   | 157.3815  | -472.9246 |
| 105   | 402.6813   | 157.3815  | -472.9246 | 625.0334   | 139.3555  | -425.8177 |
| 106   | 625.0334   | 139.3555  | -425.8177 | 784.5747   | 121.7679  | -381.7283 |
| 107   | 784.5747   | 121.7679  | -381.7283 | 801.9266   | 96.5435   | -321.6317 |
| 108   | 801.9266   | 96.5435   | -321.6317 | 833.4909   | 80.6940   | -285.4772 |
| 109   | 833.4909   | 80.6940   | -285.4772 | 813.2755   | 65.6830   | -252.2319 |
| 110   | 813.2755   | 65.6830   | -252.2319 | 746.7885   | 51.6442   | -222.1236 |
| 111   | 746.7885   | 51.6442   | -222.1236 | 537.1324   | 32.4818   | -182.3580 |
| 112   | 537.1324   | 32.4818   | -182.3580 | 395.7391   | 21.0788   | -158.6617 |
| 113   | 395.7391   | 21.0788   | -158.6617 | 230.3586   | 10.8174   | -135.2832 |
| 114   | 230.3586   | 10.8174   | -135.2832 | 48.1876    | 1.7172    | -112.3147 |
| 115   | 48.1876    | 1.7172    | -112.3147 | -230.3781  | -9.7507   | -82.1900  |
| 116   | -230.3781  | -9.7507   | -82.1900  | -417.5950  | -15.9634  | -65.9991  |
| 117   | -417.5950  | -15.9634  | -65.9991  | -599.7845  | -21.0701  | -52.9282  |
| 118   | -599.7845  | -21.0701  | -52.9282  | -771.0361  | -25.0867  | -43.1909  |
| 119   | -771.0361  | -25.0867  | -43.1909  | -963.4263  | -29.2148  | -33.8040  |
| 120   | -963.4263  | -29.2148  | -33.8040  | -1084.1949 | 104.4589  | -359.7316 |
| 121   | -1084.1949 | 104.4589  | -359.7316 | -611.2678  | 221.2524  | -640.9658 |
| 122   | -611.2678  | 221.2524  | -640.9658 | -194.9127  | 202.6290  | -592.9089 |
| 123   | -194.9127  | 202.6290  | -592.9089 | 119.8954   | 174.7321  | -520.5869 |
| 124   | 119.8954   | 174.7321  | -520.5869 | 403.2891   | 156.3775  | -472.6007 |
| 125   | 403.2891   | 156.3775  | -472.6007 | 623.5229   | 138.3975  | -425.4213 |
| 126   | 623.5229   | 138.3975  | -425.4213 | 781.2073   | 120.9303  | -381.4476 |
| 127   | 781.2073   | 120.9303  | -381.4476 | 797.7633   | 95.9307   | -321.1595 |
| 128   | 797.7633   | 95.9307   | -321.1595 | 829.4226   | 80.2234   | -284.7561 |
| 129   | 829.4226   | 80.2234   | -284.7561 | 810.5299   | 65.4379   | -251.5388 |
| 130   | 810.5299   | 65.4379   | -251.5388 | 746.8897   | 51.6652   | -221.1115 |
| 131   | 746.8897   | 51.6652   | -221.1115 | 544.8180   | 33.0007   | -181.1056 |
| 132   | 544.8180   | 33.0007   | -181.1056 | 411.4611   | 21.9990   | -157.2341 |
| 133   | 411.4611   | 21.9990   | -157.2341 | 257.0707   | 12.1971   | -133.5981 |
| 134   | 257.0707   | 12.1971   | -133.5981 | 89.0835    | 3.6037    | -110.3804 |
| 135   | 89.0835    | 3.6037    | -110.3804 | -164.6028  | -7.0066   | -79.8137  |
| 136   | -164.6028  | -7.0066   | -79.8137  | -328.8874  | -12.5826  | -63.3510  |
| 137   | -328.8874  | -12.5826  | -63.3510  | -483.5746  | -16.9847  | -49.9343  |
| 138   | -483.5746  | -16.9847  | -49.9343  | -622.3408  | -20.2475  | -39.6570  |
| 139   | -622.3408  | -20.2475  | -39.6570  | -762.5267  | -23.1176  | -29.5835  |
| 140   | -762.5267  | -23.1176  | -29.5835  | -837.3817  | 99.3534   | -306.3843 |
| 141   | -837.3817  | 99.3534   | -306.3843 | -452.7461  | 195.8763  | -509.3856 |
| 142   | -452.7461  | 195.8763  | -509.3856 | -112.0809  | 182.5797  | -470.8248 |
| 143   | -112.0809  | 182.5797  | -470.8248 | 184.6457   | 155.9872  | -393.4525 |
| 144   | 184.6457   | 155.9872  | -393.4525 | 55.7276    | 149.5612  | -326.7463 |
| 145   | 55.7276    | 149.5612  | -326.7463 | 324.5516   | 141.6911  | -308.3563 |
| 146   | 324.5516   | 141.6911  | -308.3563 | 573.6133   | 125.0536  | -268.9760 |
| 147   | 573.6133   | 125.0536  | -268.9760 | 790.4956   | 107.2349  | -225.7362 |
| 148   | 790.4956   | 107.2349  | -225.7362 | 967.6640   | 88.2772   | -178.5159 |
| 149   | 967.6640   | 88.2772   | -178.5159 | 1097.8163  | 68.2415   | -127.6606 |
| 150   | 1097.8163  | 68.2415   | -127.6606 | 1195.1680  | 57.8251   | -100.6846 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 151   | 1195.1680 | 57.8251   | -100.6846 | 1222.4138 | 36.2915   | -43.9100 |
| 152   | 1222.4138 | 36.2915   | -43.9100  | -2.7728   | 0.1924    | -0.0030  |
| 153   | -2.7728   | 0.1924    | -0.0030   | -2.4476   | 0.1942    | -0.0031  |
| 154   | -2.4476   | 0.1942    | -0.0031   | -19.8820  | 1.8410    | -0.0038  |
| 155   | -19.8820  | 1.8410    | -0.0038   | -19.8734  | 2.2085    | -0.0157  |
| 156   | -19.8734  | 2.2085    | -0.0157   | -16.4357  | 2.2838    | -0.0168  |
| 157   | -16.4357  | 2.2838    | -0.0168   | -11.4784  | 2.1259    | -0.0159  |
| 158   | -11.4784  | 2.1259    | -0.0159   | -7.9482   | 2.2082    | -0.0197  |
| 159   | -7.9482   | 2.2082    | -0.0197   | -3.9748   | 2.2078    | -0.0221  |
| 160   | -3.9748   | 2.2078    | -0.0221   | 0.0002    | 2.2079    | -0.0230  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====     | =====     | =====     |
| 1     | 0.0555    | 182.7852  | -662.4031 | 378.7047  | 202.0517  | -629.7892 |
| 2     | 378.7047  | 202.0517  | -629.7892 | 709.4558  | 172.0456  | -544.8748 |
| 3     | 709.4558  | 172.0456  | -544.8748 | 993.8772  | 145.0767  | -474.4020 |
| 4     | 993.8772  | 145.0767  | -474.4020 | 1234.0083 | 115.0669  | -389.5027 |
| 5     | 1234.0083 | 115.0669  | -389.5027 | 1426.2129 | 92.5732   | -325.6169 |
| 6     | 1426.2129 | 92.5732   | -325.6169 | 1572.4180 | 73.3382   | -276.3297 |
| 7     | 1572.4180 | 73.3382   | -276.3297 | 1671.4888 | 43.2781   | -190.9383 |
| 8     | 1671.4888 | 43.2781   | -190.9383 | 1726.7595 | 16.6338   | -120.5150 |
| 9     | 1726.7595 | 16.6338   | -120.5150 | 1735.6749 | -13.3784  | -35.3945  |
| 10    | 1735.6749 | -13.3784  | -35.3945  | 1701.9977 | -32.2527  | 14.2551   |
| 11    | 1701.9977 | -32.2527  | 14.2551   | 1619.8459 | -50.8793  | 63.5081   |
| 12    | 1619.8459 | -50.8793  | 63.5081   | 1495.2687 | -80.8723  | 148.6166  |
| 13    | 1495.2687 | -80.8723  | 148.6166  | 1328.3806 | -106.8183 | 219.0686  |
| 14    | 1328.3806 | -106.8183 | 219.0686  | 1119.1921 | -132.4922 | 291.7983  |
| 15    | 1119.1921 | -132.4922 | 291.7983  | 870.7480  | -150.9059 | 343.8608  |
| 16    | 870.7480  | -150.9059 | 343.8608  | 578.2902  | -169.6015 | 397.0142  |
| 17    | 578.2902  | -169.6015 | 397.0142  | 299.6436  | 9.7819    | -1.4015   |
| 18    | 299.6436  | 9.7819    | -1.4015   | 317.2571  | 9.7848    | -1.3979   |
| 19    | 317.2571  | 9.7848    | -1.3979   | 334.8719  | 9.7861    | -1.2712   |
| 20    | 334.8719  | 9.7861    | -1.2712   | 352.4966  | -12.7157  | -18.1176  |
| 21    | 352.4966  | -12.7157  | -18.1176  | 273.2850  | -35.2158  | -34.9888  |
| 22    | 273.2850  | -35.2158  | -34.9888  | 194.0537  | -35.2142  | -34.8811  |
| 23    | 194.0537  | -35.2142  | -34.8811  | 340.0868  | 191.6815  | -585.9964 |
| 24    | 340.0868  | 191.6815  | -585.9964 | 729.0381  | 155.4660  | -490.0083 |
| 25    | 729.0381  | 155.4660  | -490.0083 | 1039.5752 | 117.9572  | -383.7518 |
| 26    | 1039.5752 | 117.9572  | -383.7518 | 1277.3315 | 89.3979   | -308.9656 |
| 27    | 1277.3315 | 89.3979   | -308.9656 | 1441.0731 | 59.3914   | -223.8173 |
| 28    | 1441.0731 | 59.3914   | -223.8173 | 1532.6213 | 23.5208   | -129.0572 |
| 29    | 1532.6213 | 23.5208   | -129.0572 | 1547.2998 | -12.1679  | -34.5648  |
| 30    | 1547.2998 | -12.1679  | -34.5648  | 1580.6372 | 37.9693   | -39.8808  |
| 31    | 1580.6372 | 37.9693   | -39.8808  | 1628.5330 | 9.8981    | 33.2973   |
| 32    | 1628.5330 | 9.8981    | 33.2973   | 1605.7407 | -27.6045  | 140.0465  |
| 33    | 1605.7407 | -27.6045  | 140.0465  | 1506.7079 | -63.3404  | 234.6762  |
| 34    | 1506.7079 | -63.3404  | 234.6762  | 1334.1432 | -93.3156  | 319.8462  |
| 35    | 1334.1432 | -93.3156  | 319.8462  | 1089.7621 | -121.7466 | 394.7809  |
| 36    | 1089.7621 | -121.7466 | 394.7809  | 770.7867  | -159.2528 | 500.9582  |
| 37    | 770.7867  | -159.2528 | 500.9582  | 375.4829  | -195.4147 | 597.1204  |
| 38    | 375.4829  | -195.4147 | 597.1204  | 298.2798  | 9.7922    | -1.0967   |
| 39    | 298.2798  | 9.7922    | -1.0967   | 320.3165  | 9.7922    | -1.0392   |
| 40    | 320.3165  | 9.7922    | -1.0392   | 342.3603  | -12.5791  | -17.9632  |
| 41    | 342.3603  | -12.5791  | -17.9632  | 285.3527  | -8.6561   | 0.6349    |
| 42    | 285.3527  | -8.6561   | 0.6349    | 265.8736  | -8.6568   | 0.7306    |
| 43    | 265.8736  | -8.6568   | 0.7306    | 370.0616  | 190.6787  | -585.7362 |
| 44    | 370.0616  | 190.6787  | -585.7362 | 756.6540  | 154.4555  | -489.6973 |
| 45    | 756.6540  | 154.4555  | -489.6973 | 1064.8838 | 116.9588  | -383.4373 |
| 46    | 1064.8838 | 116.9588  | -383.4373 | 1300.1384 | 88.4389   | -308.8389 |
| 47    | 1300.1384 | 88.4389   | -308.8389 | 1461.7428 | 58.4589   | -223.6682 |
| 48    | 1461.7428 | 58.4589   | -223.6682 | 1550.9158 | 22.5691   | -128.7243 |
| 49    | 1550.9158 | 22.5691   | -128.7243 | 1563.1367 | -13.1075  | -34.7515  |
| 50    | 1563.1367 | -13.1075  | -34.7515  | 1577.3345 | 38.3143   | -38.3846  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====     | =====     | =====     |
| 51    | 1577.3345 | 38.3143   | -38.3846  | 1628.0659 | 10.0402   | 34.6476   |
| 52    | 1628.0659 | 10.0402   | 34.6476   | 1605.5906 | -27.4820  | 141.0908  |
| 53    | 1605.5906 | -27.4820  | 141.0908  | 1507.7485 | -63.4445  | 236.3217  |
| 54    | 1507.7485 | -63.4445  | 236.3217  | 1335.2861 | -92.0578  | 310.8185  |
| 55    | 1335.2861 | -92.0578  | 310.8185  | 1090.6294 | -122.0827 | 395.7437  |
| 56    | 1090.6294 | -122.0827 | 395.7437  | 770.8109  | -159.5716 | 501.9504  |
| 57    | 770.8109  | -159.5716 | 501.9504  | 374.4454  | -195.8358 | 598.1765  |
| 58    | 374.4454  | -195.8358 | 598.1765  | 297.7422  | 9.6981    | -1.1648   |
| 59    | 297.7422  | 9.6981    | -1.1648   | 319.5605  | 9.6954    | -1.0145   |
| 60    | 319.5605  | 9.6954    | -1.0145   | 349.8198  | 12.9326   | 18.2232   |
| 61    | 349.8198  | 12.9326   | 18.2232   | 327.4824  | -9.9247   | 1.0150    |
| 62    | 327.4824  | -9.9247   | 1.0150    | 305.1512  | -9.9236   | 1.1694    |
| 63    | 305.1512  | -9.9236   | 1.1694    | 373.1270  | 190.5950  | -585.6615 |
| 64    | 373.1270  | 190.5950  | -585.6615 | 759.5096  | 154.3642  | -489.6219 |
| 65    | 759.5096  | 154.3642  | -489.6219 | 1067.4481 | 116.8411  | -383.4961 |
| 66    | 1067.4481 | 116.8411  | -383.4961 | 1302.3773 | 88.2835   | -308.8494 |
| 67    | 1302.3773 | 88.2835   | -308.8494 | 1463.6294 | 58.2789   | -223.6898 |
| 68    | 1463.6294 | 58.2789   | -223.6898 | 1552.3423 | 22.3895   | -128.9869 |
| 69    | 1552.3423 | 22.3895   | -128.9869 | 1564.1133 | -13.2826  | -34.7962  |
| 70    | 1564.1133 | -13.2826  | -34.7962  | 1576.8923 | 38.2951   | -38.0898  |
| 71    | 1576.8923 | 38.2951   | -38.0898  | 1627.7043 | 10.0020   | 34.9562   |
| 72    | 1627.7043 | 10.0020   | 34.9562   | 1605.2662 | -25.9405  | 129.6961  |
| 73    | 1605.2662 | -25.9405  | 129.6961  | 1507.3186 | -63.4755  | 236.3809  |
| 74    | 1507.3186 | -63.4755  | 236.3809  | 1334.8853 | -92.0557  | 310.8516  |
| 75    | 1334.8853 | -92.0557  | 310.8516  | 1090.2883 | -122.0681 | 395.7853  |
| 76    | 1090.2883 | -122.0681 | 395.7853  | 770.2931  | -159.5684 | 502.1619  |
| 77    | 770.2931  | -159.5684 | 502.1619  | 374.1902  | -195.8560 | 598.3105  |
| 78    | 374.1902  | -195.8560 | 598.3105  | 297.6126  | 9.6936    | -1.1425   |
| 79    | 297.6126  | 9.6936    | -1.1425   | 319.4196  | 9.6925    | -0.9502   |
| 80    | 319.4196  | 9.6925    | -0.9502   | 350.8661  | 12.9597   | 18.2608   |
| 81    | 350.8661  | 12.9597   | 18.2608   | 328.4487  | -9.9653   | 1.0237    |
| 82    | 328.4487  | -9.9653   | 1.0237    | 306.0209  | -9.9631   | 1.1233    |
| 83    | 306.0209  | -9.9631   | 1.1233    | 373.0709  | 190.5570  | -585.5994 |
| 84    | 373.0709  | 190.5570  | -585.5994 | 759.3997  | 154.3562  | -489.5922 |
| 85    | 759.3997  | 154.3562  | -489.5922 | 1067.4541 | 116.8273  | -383.2806 |
| 86    | 1067.4541 | 116.8273  | -383.2806 | 1302.2869 | 88.2617   | -308.9260 |
| 87    | 1302.2869 | 88.2617   | -308.9260 | 1463.4976 | 58.2660   | -223.8931 |
| 88    | 1463.4976 | 58.2660   | -223.8931 | 1552.3835 | 22.3963   | -128.4619 |
| 89    | 1552.3835 | 22.3963   | -128.4619 | 1564.2643 | -13.2639  | -34.2502  |
| 90    | 1564.2643 | -13.2639  | -34.2502  | 1576.8809 | 38.2325   | -38.4073  |
| 91    | 1576.8809 | 38.2325   | -38.4073  | 1627.3837 | 9.9367    | 34.9122   |
| 92    | 1627.3837 | 9.9367    | 34.9122   | 1604.8760 | -25.9888  | 129.9121  |
| 93    | 1604.8760 | -25.9888  | 129.9121  | 1507.1171 | -63.4509  | 236.0257  |
| 94    | 1507.1171 | -63.4509  | 236.0257  | 1334.6389 | -92.0773  | 310.7801  |
| 95    | 1334.6389 | -92.0773  | 310.7801  | 1089.8973 | -122.0387 | 395.9230  |
| 96    | 1089.8973 | -122.0387 | 395.9230  | 770.2511  | -159.5237 | 502.1387  |
| 97    | 770.2511  | -159.5237 | 502.1387  | 373.9564  | -195.8116 | 598.2959  |
| 98    | 373.9564  | -195.8116 | 598.2959  | 296.8633  | 9.6740    | -1.1216   |
| 99    | 296.8633  | 9.6740    | -1.1216   | 318.6192  | 9.6719    | -0.9766   |
| 100   | 318.6192  | 9.6719    | -0.9766   | 350.8365  | 12.9555   | 18.2628   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | 350.8365  | 12.9555   | 18.2628   | 328.4131  | -9.9660   | 0.9900    |
| 102   | 328.4131  | -9.9660   | 0.9900    | 305.9948  | -9.9634   | 1.0847    |
| 103   | 305.9948  | -9.9634   | 1.0847    | 372.8857  | 190.5663  | -585.6620 |
| 104   | 372.8857  | 190.5663  | -585.6620 | 759.3044  | 154.3372  | -489.6066 |
| 105   | 759.3044  | 154.3372  | -489.6066 | 1067.3701 | 116.8484  | -383.3300 |
| 106   | 1067.3701 | 116.8484  | -383.3300 | 1302.4451 | 88.3159   | -308.7495 |
| 107   | 1302.4451 | 88.3159   | -308.7495 | 1463.6591 | 58.3007   | -223.5750 |
| 108   | 1463.6591 | 58.3007   | -223.5750 | 1552.5613 | 22.4437   | -128.8682 |
| 109   | 1552.5613 | 22.4437   | -128.8682 | 1564.4983 | -13.2336  | -34.6431  |
| 110   | 1564.4983 | -13.2336  | -34.6431  | 1576.2754 | 38.2714   | -38.3335  |
| 111   | 1576.2754 | 38.2714   | -38.3335  | 1626.8887 | 9.9214    | 34.7118   |
| 112   | 1626.8887 | 9.9214    | 34.7118   | 1604.1803 | -27.6000  | 141.1669  |
| 113   | 1604.1803 | -27.6000  | 141.1669  | 1506.1205 | -63.5593  | 236.1219  |
| 114   | 1506.1205 | -63.5593  | 236.1219  | 1333.3020 | -92.2325  | 310.8978  |
| 115   | 1333.3020 | -92.2325  | 310.8978  | 1088.1455 | -122.2337 | 396.0270  |
| 116   | 1088.1455 | -122.2337 | 396.0270  | 768.1242  | -159.7022 | 502.1189  |
| 117   | 768.1242  | -159.7022 | 502.1189  | 371.6806  | -195.9883 | 598.1653  |
| 118   | 371.6806  | -195.9883 | 598.1653  | 190.2242  | 35.9240   | 35.3632   |
| 119   | 190.2242  | 35.9240   | 35.3632   | 271.0381  | 35.9218   | 35.4257   |
| 120   | 271.0381  | 35.9218   | 35.4257   | 351.8662  | 12.9296   | 18.2247   |
| 121   | 351.8662  | 12.9296   | 18.2247   | 329.2137  | -10.0622  | 1.0241    |
| 122   | 329.2137  | -10.0622  | 1.0241    | 306.5753  | -10.0618  | 1.1217    |
| 123   | 306.5753  | -10.0618  | 1.1217    | 373.9767  | 190.1486  | -584.6434 |
| 124   | 373.9767  | 190.1486  | -584.6434 | 759.2662  | 154.0919  | -488.4153 |
| 125   | 759.2662  | 154.0919  | -488.4153 | 1066.8964 | 116.6065  | -382.0021 |
| 126   | 1066.8964 | 116.6065  | -382.0021 | 1301.9618 | 88.2547   | -307.5405 |
| 127   | 1301.9618 | 88.2547   | -307.5405 | 1463.1355 | 60.0976   | -233.6703 |
| 128   | 1463.1355 | 60.0976   | -233.6703 | 1553.4373 | 22.6162   | -127.2434 |
| 129   | 1553.4373 | 22.6162   | -127.2434 | 1567.8943 | -12.8671  | -33.1802  |
| 130   | 1567.8943 | -12.8671  | -33.1802  | 1562.5232 | 37.1527   | -37.8189  |
| 131   | 1562.5232 | 37.1527   | -37.8189  | 1610.4529 | 8.8509    | 35.1863   |
| 132   | 1610.4529 | 8.8509    | 35.1863   | 1585.3623 | -28.6456  | 141.3324  |
| 133   | 1585.3623 | -28.6456  | 141.3324  | 1484.6372 | -64.6162  | 236.3593  |
| 134   | 1484.6372 | -64.6162  | 236.3593  | 1309.2798 | -93.2645  | 310.8636  |
| 135   | 1309.2798 | -93.2645  | 310.8636  | 1061.7559 | -123.2824 | 396.1312  |
| 136   | 1061.7559 | -123.2824 | 396.1312  | 739.2906  | -160.7903 | 502.3806  |
| 137   | 739.2906  | -160.7903 | 502.3806  | 340.2229  | -197.0713 | 598.4415  |
| 138   | 340.2229  | -197.0713 | 598.4415  | 199.6511  | 36.2309   | 35.3980   |
| 139   | 199.6511  | 36.2309   | 35.3980   | 281.1407  | 36.2307   | 35.4742   |
| 140   | 281.1407  | 36.2307   | 35.4742   | 362.6642  | 13.0798   | 18.4317   |
| 141   | 362.6642  | 13.0798   | 18.4317   | 344.5298  | -10.0728  | 1.4152    |
| 142   | 344.5298  | -10.0728  | 1.4152    | 326.3969  | -10.0733  | 1.4181    |
| 143   | 326.3969  | -10.0733  | 1.4181    | 308.2665  | -10.0731  | 1.4812    |
| 144   | 308.2665  | -10.0731  | 1.4812    | 290.1215  | -10.0751  | 1.6019    |
| 145   | 290.1215  | -10.0751  | 1.6019    | 271.9898  | -10.0759  | 1.6497    |
| 146   | 271.9898  | -10.0759  | 1.6497    | 253.8545  | -10.0716  | 1.7051    |
| 147   | 253.8545  | -10.0716  | 1.7051    | 533.8334  | 152.2716  | -239.1532 |
| 148   | 533.8334  | 152.2716  | -239.1532 | 780.9211  | 122.2572  | -154.1457 |
| 149   | 780.9211  | 122.2572  | -154.1457 | 981.6699  | 93.7083   | -81.8295  |
| 150   | 981.6699  | 93.7083   | -81.8295  | 1135.3533 | 78.7013   | -39.2072  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 151   | 1135.3533 | 78.7013   | -39.2072 | 1238.0422 | 48.6732   | 46.0173  |
| 152   | 1238.0422 | 48.6732   | 46.0173  | 1293.6375 | 19.6562   | 119.3094 |
| 153   | 1293.6375 | 19.6562   | 119.3094 | 1302.0431 | -10.3564  | 204.0517 |
| 154   | 1302.0431 | -10.3564  | 204.0517 | 1262.2582 | -40.4034  | 289.2862 |
| 155   | 1262.2582 | -40.4034  | 289.2862 | 1174.3369 | -55.4184  | 332.4058 |
| 156   | 1174.3369 | -55.4184  | 332.4058 | 1035.5782 | -85.4075  | 417.1765 |
| 157   | 1035.5782 | -85.4075  | 417.1765 | 848.8615  | -115.4014 | 501.8859 |
| 158   | 848.8615  | -115.4014 | 501.8859 | 613.8773  | -145.4030 | 586.9312 |
| 159   | 613.8773  | -145.4030 | 586.9312 | 330.9645  | -175.3964 | 671.8646 |
| 160   | 330.9645  | -175.3964 | 671.8646 | 0.0651    | -190.3872 | 714.3076 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0002    | 5.8399    | -1.1457   | -63.5645   | -35.3204  | -42.2123  |
| 2     | -63.5645   | -35.3204  | -42.2123  | -127.1074  | -35.3179  | -42.2400  |
| 3     | -127.1074  | -35.3179  | -42.2400  | -190.6890  | -35.3110  | -42.3040  |
| 4     | -190.6890  | -35.3110  | -42.3040  | -254.2165  | -35.3042  | -42.3354  |
| 5     | -254.2165  | -35.3042  | -42.3354  | -317.7565  | -35.3102  | -42.4137  |
| 6     | -317.7565  | -35.3102  | -42.4137  | -381.3276  | -35.3228  | -42.4826  |
| 7     | -381.3276  | -35.3228  | -42.4826  | -444.8963  | -35.3093  | -42.6441  |
| 8     | -444.8963  | -35.3093  | -42.6441  | -508.4085  | -35.2765  | -42.7066  |
| 9     | -508.4085  | -35.2765  | -42.7066  | -571.8727  | -35.2489  | -42.8388  |
| 10    | -571.8727  | -35.2489  | -42.8388  | -635.3215  | -35.2507  | -43.0682  |
| 11    | -635.3215  | -35.2507  | -43.0682  | -698.7488  | -35.2640  | -43.2020  |
| 12    | -698.7488  | -35.2640  | -43.2020  | -762.2154  | -35.2556  | -43.3623  |
| 13    | -762.2154  | -35.2556  | -43.3623  | -825.6716  | -35.2467  | -43.5439  |
| 14    | -825.6716  | -35.2467  | -43.5439  | -889.0925  | -35.2543  | -43.8717  |
| 15    | -889.0925  | -35.2543  | -43.8717  | -952.5382  | -35.2554  | -43.8676  |
| 16    | -952.5382  | -35.2554  | -43.8676  | -1015.9670 | -35.2510  | -44.2683  |
| 17    | -1015.9670 | -35.2510  | -44.2683  | -1079.3773 | -35.2525  | -44.6595  |
| 18    | -1079.3773 | -35.2525  | -44.6595  | -1440.0477 | -250.0441 | 490.1243  |
| 19    | -1440.0477 | -250.0441 | 490.1243  | -1906.5188 | -261.0465 | 516.2503  |
| 20    | -1906.5188 | -261.0465 | 516.2503  | -2396.8818 | -3.8647   | -35.6661  |
| 21    | -2396.8818 | -3.8647   | -35.6661  | -1787.7004 | 263.7222  | -616.9863 |
| 22    | -1787.7004 | 263.7222  | -616.9863 | -1208.6346 | 253.2051  | -593.6720 |
| 23    | -1208.6346 | 253.2051  | -593.6720 | -887.7036  | 31.1923   | 26.3021   |
| 24    | -887.7036  | 31.1923   | 26.3021   | -817.5173  | 31.1891   | 26.3076   |
| 25    | -817.5173  | 31.1891   | 26.3076   | -747.3375  | 31.1911   | 26.0772   |
| 26    | -747.3375  | 31.1911   | 26.0772   | -677.1802  | 31.1919   | 25.6237   |
| 27    | -677.1802  | 31.1919   | 25.6237   | -607.0119  | 31.1908   | 25.4162   |
| 28    | -607.0119  | 31.1908   | 25.4162   | -536.8429  | 31.1908   | 25.3259   |
| 29    | -536.8429  | 31.1908   | 25.3259   | -466.6581  | 31.1848   | 25.0901   |
| 30    | -466.6581  | 31.1848   | 25.0901   | -439.7136  | -35.2216  | -35.1657  |
| 31    | -439.7136  | -35.2216  | -35.1657  | -518.9337  | -35.2200  | -35.3460  |
| 32    | -518.9337  | -35.2200  | -35.3460  | -598.1479  | -35.2104  | -35.6106  |
| 33    | -598.1479  | -35.2104  | -35.6106  | -677.3973  | -35.2342  | -35.6138  |
| 34    | -677.3973  | -35.2342  | -35.6138  | -756.7181  | -35.2585  | -35.8533  |
| 35    | -756.7181  | -35.2585  | -35.8533  | -836.0173  | -35.2611  | -36.3568  |
| 36    | -836.0173  | -35.2611  | -36.3568  | -915.3458  | -35.2596  | -36.4921  |
| 37    | -915.3458  | -35.2596  | -36.4921  | -994.6625  | -35.2525  | -36.8132  |
| 38    | -994.6625  | -35.2525  | -36.8132  | -1337.5469 | -249.9265 | 562.1498  |
| 39    | -1337.5469 | -249.9265 | 562.1498  | -1914.2212 | -260.0162 | 583.8348  |
| 40    | -1914.2212 | -260.0162 | 583.8348  | -2523.9280 | 4.1267    | -16.8179  |
| 41    | -2523.9280 | 4.1267    | -16.8179  | -1887.8628 | 277.1837  | -637.6005 |
| 42    | -1887.8628 | 277.1837  | -637.6005 | -1286.0254 | 255.7667  | -590.5811 |
| 43    | -1286.0254 | 255.7667  | -590.5811 | -1018.1494 | 35.7477   | 37.1945   |
| 44    | -1018.1494 | 35.7477   | 37.1945   | -937.7106  | 35.7536   | 37.0531   |
| 45    | -937.7106  | 35.7536   | 37.0531   | -857.2778  | 35.7526   | 36.7812   |
| 46    | -857.2778  | 35.7526   | 36.7812   | -776.8606  | 35.7488   | 36.3822   |
| 47    | -776.8606  | 35.7488   | 36.3822   | -696.4370  | 35.7354   | 36.1580   |
| 48    | -696.4370  | 35.7354   | 36.1580   | -616.0905  | 35.7284   | 35.9564   |
| 49    | -616.0905  | 35.7284   | 35.9564   | -535.6716  | 35.7470   | 35.8554   |
| 50    | -535.6716  | 35.7470   | 35.8554   | -455.2162  | 35.7598   | 35.7163   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | -455.2162  | 35.7598   | 35.7163   | -522.5394  | -34.9265  | -35.2966  |
| 52    | -522.5394  | -34.9265  | -35.2966  | -601.0925  | -34.9128  | -35.4881  |
| 53    | -601.0925  | -34.9128  | -35.4881  | -679.6201  | -34.9194  | -35.7826  |
| 54    | -679.6201  | -34.9194  | -35.7826  | -758.1863  | -34.9167  | -36.0056  |
| 55    | -758.1863  | -34.9167  | -36.0056  | -836.7150  | -34.9002  | -36.1244  |
| 56    | -836.7150  | -34.9002  | -36.1244  | -915.2180  | -34.8961  | -36.4341  |
| 57    | -915.2180  | -34.8961  | -36.4341  | -993.7971  | -34.9032  | -36.7186  |
| 58    | -993.7971  | -34.9032  | -36.7186  | -1341.0259 | -250.6205 | 562.3433  |
| 59    | -1341.0259 | -250.6205 | 562.3433  | -1919.0271 | -260.6595 | 583.6011  |
| 60    | -1919.0271 | -260.6595 | 583.6011  | -2529.0173 | 3.9312    | -16.6873  |
| 61    | -2529.0173 | 3.9312    | -16.6873  | -1891.7759 | 277.3198  | -637.3602 |
| 62    | -1891.7759 | 277.3198  | -637.3602 | -1288.7045 | 255.8715  | -590.5939 |
| 63    | -1288.7045 | 255.8715  | -590.5939 | -1021.4235 | 35.8410   | 37.1098   |
| 64    | -1021.4235 | 35.8410   | 37.1098   | -940.7781  | 35.8577   | 36.9639   |
| 65    | -940.7781  | 35.8577   | 36.9639   | -860.0980  | 35.8723   | 36.8153   |
| 66    | -860.0980  | 35.8723   | 36.8153   | -779.3745  | 35.8783   | 36.4207   |
| 67    | -779.3745  | 35.8783   | 36.4207   | -698.6592  | 35.8851   | 36.1613   |
| 68    | -698.6592  | 35.8851   | 36.1613   | -617.9001  | 35.8901   | 36.0847   |
| 69    | -617.9001  | 35.8901   | 36.0847   | -537.1976  | 35.8912   | 35.9102   |
| 70    | -537.1976  | 35.8912   | 35.9102   | -456.4664  | 35.8917   | 35.6744   |
| 71    | -456.4664  | 35.8917   | 35.6744   | -522.5417  | -34.9033  | -35.4454  |
| 72    | -522.5417  | -34.9033  | -35.4454  | -601.0250  | -34.8897  | -35.5462  |
| 73    | -601.0250  | -34.8897  | -35.5462  | -679.5059  | -34.8853  | -35.8600  |
| 74    | -679.5059  | -34.8853  | -35.8600  | -758.0302  | -34.8946  | -36.0527  |
| 75    | -758.0302  | -34.8946  | -36.0527  | -836.5358  | -34.9045  | -36.2019  |
| 76    | -836.5358  | -34.9045  | -36.2019  | -915.0803  | -34.9067  | -36.6305  |
| 77    | -915.0803  | -34.9067  | -36.6305  | -993.5824  | -34.9061  | -36.7462  |
| 78    | -993.5824  | -34.9061  | -36.7462  | -1341.3704 | -250.6530 | 562.3492  |
| 79    | -1341.3704 | -250.6530 | 562.3492  | -1919.4612 | -260.6894 | 583.4142  |
| 80    | -1919.4612 | -260.6894 | 583.4142  | -2529.2061 | 3.9097    | -16.9718  |
| 81    | -2529.2061 | 3.9097    | -16.9718  | -1891.8884 | 277.2953  | -637.4835 |
| 82    | -1891.8884 | 277.2953  | -637.4835 | -1288.7426 | 255.8457  | -590.4099 |
| 83    | -1288.7426 | 255.8457  | -590.4099 | -1021.3619 | 35.8682   | 37.1413   |
| 84    | -1021.3619 | 35.8682   | 37.1413   | -940.6936  | 35.8677   | 36.9562   |
| 85    | -940.6936  | 35.8677   | 36.9562   | -859.9924  | 35.8737   | 36.6953   |
| 86    | -859.9924  | 35.8737   | 36.6953   | -779.2959  | 35.8799   | 36.4117   |
| 87    | -779.2959  | 35.8799   | 36.4117   | -698.5931  | 35.8710   | 36.2971   |
| 88    | -698.5931  | 35.8710   | 36.2971   | -617.9144  | 35.8718   | 35.8818   |
| 89    | -617.9144  | 35.8718   | 35.8818   | -537.2081  | 35.8844   | 35.6875   |
| 90    | -537.2081  | 35.8844   | 35.6875   | -456.4327  | 35.9063   | 35.6806   |
| 91    | -456.4327  | 35.9063   | 35.6806   | -522.3320  | -34.8662  | -35.4204  |
| 92    | -522.3320  | -34.8662  | -35.4204  | -600.8273  | -34.8897  | -35.5659  |
| 93    | -600.8273  | -34.8897  | -35.5659  | -679.3276  | -34.9042  | -35.6758  |
| 94    | -679.3276  | -34.9042  | -35.6758  | -757.8253  | -34.9190  | -36.0159  |
| 95    | -757.8253  | -34.9190  | -36.0159  | -836.3857  | -34.9227  | -36.2755  |
| 96    | -836.3857  | -34.9227  | -36.2755  | -914.9161  | -34.9233  | -36.5452  |
| 97    | -914.9161  | -34.9233  | -36.5452  | -993.4687  | -34.9190  | -36.8587  |
| 98    | -993.4687  | -34.9190  | -36.8587  | -1341.3215 | -250.6268 | 562.4166  |
| 99    | -1341.3215 | -250.6268 | 562.4166  | -1919.0747 | -260.6666 | 583.6185  |
| 100   | -1919.0747 | -260.6666 | 583.6185  | -2528.8459 | 3.9070    | -17.2187  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -2528.8459 | 3.9070    | -17.2187  | -1891.7048 | 277.2682  | -637.5083 |
| 102   | -1891.7048 | 277.2682  | -637.5083 | -1288.7512 | 255.8120  | -590.3256 |
| 103   | -1288.7512 | 255.8120  | -590.3256 | -1021.3936 | 35.8759   | 37.2201   |
| 104   | -1021.3936 | 35.8759   | 37.2201   | -940.6610  | 35.8802   | 37.0433   |
| 105   | -940.6610  | 35.8802   | 37.0433   | -859.9315  | 35.8719   | 36.7741   |
| 106   | -859.9315  | 35.8719   | 36.7741   | -779.2491  | 35.8794   | 36.3935   |
| 107   | -779.2491  | 35.8794   | 36.3935   | -698.5215  | 35.8971   | 36.1565   |
| 108   | -698.5215  | 35.8971   | 36.1565   | -617.7552  | 35.9014   | 36.0431   |
| 109   | -617.7552  | 35.9014   | 36.0431   | -536.9789  | 35.8929   | 35.8752   |
| 110   | -536.9789  | 35.8929   | 35.8752   | -456.2581  | 35.8924   | 35.7066   |
| 111   | -456.2581  | 35.8924   | 35.7066   | -521.1689  | -34.7935  | -35.2394  |
| 112   | -521.1689  | -34.7935  | -35.2394  | -599.3788  | -34.7706  | -35.4116  |
| 113   | -599.3788  | -34.7706  | -35.4116  | -677.6144  | -34.7682  | -35.6223  |
| 114   | -677.6144  | -34.7682  | -35.6223  | -755.8018  | -34.7560  | -35.9689  |
| 115   | -755.8018  | -34.7560  | -35.9689  | -834.0021  | -34.7571  | -36.2218  |
| 116   | -834.0021  | -34.7571  | -36.2218  | -912.2045  | -34.7781  | -36.3271  |
| 117   | -912.2045  | -34.7781  | -36.3271  | -990.4550  | -34.7851  | -36.5022  |
| 118   | -990.4550  | -34.7851  | -36.5022  | -1337.0815 | -250.5356 | 562.1656  |
| 119   | -1337.0815 | -250.5356 | 562.1656  | -1914.2292 | -260.5551 | 583.8340  |
| 120   | -1914.2292 | -260.5551 | 583.8340  | -2522.6582 | 3.6624    | -16.6020  |
| 121   | -2522.6582 | 3.6624    | -16.6020  | -1886.7307 | 276.5745  | -637.4301 |
| 122   | -1886.7307 | 276.5745  | -637.4301 | -1284.7920 | 255.0173  | -590.2390 |
| 123   | -1284.7920 | 255.0173  | -590.2390 | -1022.6646 | 36.2222   | 37.2691   |
| 124   | -1022.6646 | 36.2222   | 37.2691   | -941.1578  | 36.2262   | 37.1136   |
| 125   | -941.1578  | 36.2262   | 37.1136   | -859.6497  | 36.2136   | 36.6817   |
| 126   | -859.6497  | 36.2136   | 36.6817   | -778.1807  | 36.2095   | 36.4390   |
| 127   | -778.1807  | 36.2095   | 36.4390   | -696.7521  | 36.2057   | 36.2235   |
| 128   | -696.7521  | 36.2057   | 36.2235   | -615.3289  | 36.1948   | 35.9906   |
| 129   | -615.3289  | 36.1948   | 35.9906   | -533.8755  | 36.2000   | 35.9239   |
| 130   | -533.8755  | 36.2000   | 35.9239   | -452.4395  | 36.2161   | 35.6867   |
| 131   | -452.4395  | 36.2161   | 35.6867   | -370.9117  | 36.2226   | 35.5478   |
| 132   | -370.9117  | 36.2226   | 35.5478   | -289.4309  | 36.2239   | 35.5061   |
| 133   | -289.4309  | 36.2239   | 35.5061   | -207.9074  | 36.2220   | 35.4252   |
| 134   | -207.9074  | 36.2220   | 35.4252   | -126.3988  | 36.2246   | 35.3677   |
| 135   | -126.3988  | 36.2246   | 35.3677   | -44.8909   | 36.2308   | 35.3381   |
| 136   | -44.8909   | 36.2308   | 35.3381   | -244.1649  | -205.2325 | 472.3970  |
| 137   | -244.1649  | -205.2325 | 472.3970  | -721.5034  | -226.8995 | 520.6687  |
| 138   | -721.5034  | -226.8995 | 520.6687  | -1241.3842 | -237.2227 | 543.4403  |
| 139   | -1241.3842 | -237.2227 | 543.4403  | -1791.2562 | -247.1934 | 565.2806  |
| 140   | -1791.2562 | -247.1934 | 565.2806  | -2372.9106 | 10.9895   | 7.6651    |
| 141   | -2372.9106 | 10.9895   | 7.6651    | -1861.3151 | 276.8173  | -565.9291 |
| 142   | -1861.3151 | 276.8173  | -565.9291 | -1374.5508 | 265.1361  | -537.1888 |
| 143   | -1374.5508 | 265.1361  | -537.1888 | -1109.7971 | 36.2719   | 45.1062   |
| 144   | -1109.7971 | 36.2719   | 45.1062   | -1044.4883 | 36.2675   | 44.6693   |
| 145   | -1044.4883 | 36.2675   | 44.6693   | -979.2170  | 36.2826   | 44.4929   |
| 146   | -979.2170  | 36.2826   | 44.4929   | -913.8931  | 36.2615   | 44.2956   |
| 147   | -913.8931  | 36.2615   | 44.2956   | -848.6949  | 36.2348   | 44.1443   |
| 148   | -848.6949  | 36.2348   | 44.1443   | -783.5003  | 36.2522   | 43.8234   |
| 149   | -783.5003  | 36.2522   | 43.8234   | -718.2460  | 36.2441   | 43.6511   |
| 150   | -718.2460  | 36.2441   | 43.6511   | -653.0394  | 36.2487   | 43.5181   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 151   | -653.0394 | 36.2487   | 43.5181 | -587.7705 | 36.2713   | 43.2626 |
| 152   | -587.7705 | 36.2713   | 43.2626 | -522.4956 | 36.2561   | 43.1487 |
| 153   | -522.4956 | 36.2561   | 43.1487 | -457.2640 | 36.2646   | 43.1674 |
| 154   | -457.2640 | 36.2646   | 43.1674 | -391.9606 | 36.2798   | 43.0210 |
| 155   | -391.9606 | 36.2798   | 43.0210 | -326.6632 | 36.2869   | 42.7958 |
| 156   | -326.6632 | 36.2869   | 42.7958 | -261.2996 | 36.2972   | 42.7884 |
| 157   | -261.2996 | 36.2972   | 42.7884 | -195.9660 | 36.2961   | 42.7982 |
| 158   | -195.9660 | 36.2961   | 42.7982 | -130.6305 | 36.3002   | 42.7304 |
| 159   | -130.6305 | 36.3002   | 42.7304 | -65.3286  | 36.2968   | 42.6950 |
| 160   | -65.3286  | 36.2968   | 42.6950 | -0.0013   | -8.0202   | 3.8346  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0471     | 217.0596  | -672.1660 | 369.1852   | 205.1013  | -644.3983 |
| 2     | 369.1852   | 205.1013  | -644.3983 | 654.3966   | 181.7555  | -588.6588 |
| 3     | 654.3966   | 181.7555  | -588.6588 | 860.2937   | 159.2354  | -532.7197 |
| 4     | 860.2937   | 159.2354  | -532.7197 | 991.5502   | 137.6452  | -474.7779 |
| 5     | 991.5502   | 137.6452  | -474.7779 | 1155.9973  | 119.2445  | -422.3846 |
| 6     | 1155.9973  | 119.2445  | -422.3846 | 1215.0197  | 104.1265  | -378.6150 |
| 7     | 1215.0197  | 104.1265  | -378.6150 | 1240.9788  | 80.5622   | -312.3314 |
| 8     | 1240.9788  | 80.5622   | -312.3314 | 1229.8542  | 56.1389   | -246.2227 |
| 9     | 1229.8542  | 56.1389   | -246.2227 | 1178.5173  | 30.9497   | -179.8194 |
| 10    | 1178.5173  | 30.9497   | -179.8194 | 1153.3727  | 10.6258   | -125.0819 |
| 11    | 1153.3727  | 10.6258   | -125.0819 | 193.9818   | 9.7913    | -1.8079   |
| 12    | 193.9818   | 9.7913    | -1.8079   | 211.5945   | 9.7901    | -1.7618   |
| 13    | 211.5945   | 9.7901    | -1.7618   | 229.2139   | 9.7831    | -1.7120   |
| 14    | 229.2139   | 9.7831    | -1.7120   | 246.8206   | 9.7800    | -1.6188   |
| 15    | 246.8206   | 9.7800    | -1.6188   | 264.4288   | 9.7837    | -1.6221   |
| 16    | 264.4288   | 9.7837    | -1.6221   | 282.0411   | 9.7827    | -1.5087   |
| 17    | 282.0411   | 9.7827    | -1.5087   | 299.6436   | 9.7819    | -1.4015   |
| 18    | 299.6436   | 9.7819    | -1.4015   | 317.2571   | 9.7848    | -1.3979   |
| 19    | 317.2571   | 9.7848    | -1.3979   | 334.8719   | 9.7861    | -1.2712   |
| 20    | 334.8719   | 9.7861    | -1.2712   | -1269.5919 | 123.2126  | -442.6690 |
| 21    | -1269.5919 | 123.2126  | -442.6690 | -1716.5955 | 293.1216  | -688.8493 |
| 22    | -1716.5955 | 293.1216  | -688.8493 | -1163.7750 | 273.8838  | -641.6701 |
| 23    | -1163.7750 | 273.8838  | -641.6701 | -638.7094  | 253.2050  | -594.0465 |
| 24    | -638.7094  | 253.2050  | -594.0465 | -151.4605  | 223.6724  | -524.1173 |
| 25    | -151.4605  | 223.6724  | -524.1173 | 268.2851   | 195.7738  | -466.4153 |
| 26    | 268.2851   | 195.7738  | -466.4153 | 650.0450   | 170.8131  | -409.6569 |
| 27    | 650.0450   | 170.8131  | -409.6569 | 965.5947   | 144.8787  | -349.6547 |
| 28    | 965.5947   | 144.8787  | -349.6547 | 1208.6467  | 110.6470  | -265.3913 |
| 29    | 1208.6467  | 110.6470  | -265.3913 | 1339.4636  | 76.8238   | -186.7467 |
| 30    | 1339.4636  | 76.8238   | -186.7467 | 1411.8297  | 48.7123   | -119.9808 |
| 31    | 1411.8297  | 48.7123   | -119.9808 | -326.3267  | 31.1882   | 24.9159   |
| 32    | -326.3267  | 31.1882   | 24.9159   | -256.1556  | 31.1877   | 24.7487   |
| 33    | -256.1556  | 31.1877   | 24.7487   | -185.9911  | 31.1766   | 24.7441   |
| 34    | -185.9911  | 31.1766   | 24.7441   | -115.8667  | 31.1651   | 24.7089   |
| 35    | -115.8667  | 31.1651   | 24.7089   | -45.7808   | 31.1570   | 24.6541   |
| 36    | -45.7808   | 31.1570   | 24.6541   | 24.3187    | 31.1632   | 24.6345   |
| 37    | 24.3187    | 31.1632   | 24.6345   | 94.4476    | 31.1680   | 24.6754   |
| 38    | 94.4476    | 31.1680   | 24.6754   | 164.5531   | 31.1675   | 24.6954   |
| 39    | 164.5531   | 31.1675   | 24.6954   | 234.6870   | 31.1683   | 24.7487   |
| 40    | 234.6870   | 31.1683   | 24.7487   | -1232.5122 | 122.7153  | -438.7300 |
| 41    | -1232.5122 | 122.7153  | -438.7300 | -1851.3689 | 297.2423  | -684.9941 |
| 42    | -1851.3689 | 297.2423  | -684.9941 | -1263.9740 | 277.1840  | -638.1532 |
| 43    | -1263.9740 | 277.1840  | -638.1532 | -710.2059  | 255.7624  | -590.9009 |
| 44    | -710.2059  | 255.7624  | -590.9009 | -199.8907  | 225.5695  | -521.4680 |
| 45    | -199.8907  | 225.5695  | -521.4680 | 244.2374   | 196.8498  | -464.3531 |
| 46    | 244.2374   | 196.8498  | -464.3531 | 638.5018   | 171.4387  | -408.0089 |
| 47    | 638.5018   | 171.4387  | -408.0089 | 963.2896   | 145.1328  | -348.2760 |
| 48    | 963.2896   | 145.1328  | -348.2760 | 1212.6757  | 110.5480  | -264.1330 |
| 49    | 1212.6757  | 110.5480  | -264.1330 | 1348.8975  | 76.3475   | -186.2450 |
| 50    | 1348.8975  | 76.3475   | -186.2450 | 1422.4495  | 47.9690   | -119.3750 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 1422.4495  | 47.9690   | -119.3750 | -374.7668  | 35.7759   | 35.5725   |
| 52    | -374.7668  | 35.7759   | 35.5725   | -294.2657  | 35.7845   | 35.4838   |
| 53    | -294.2657  | 35.7845   | 35.4838   | -213.7752  | 35.7821   | 35.3549   |
| 54    | -213.7752  | 35.7821   | 35.3549   | -133.2577  | 35.7863   | 35.2996   |
| 55    | -133.2577  | 35.7863   | 35.2996   | -52.7612   | 35.7899   | 35.2831   |
| 56    | -52.7612   | 35.7899   | 35.2831   | 27.7473    | 35.7883   | 35.2925   |
| 57    | 27.7473    | 35.7883   | 35.2925   | 108.2827   | 35.7845   | 35.3012   |
| 58    | 108.2827   | 35.7845   | 35.3012   | 188.7840   | 35.7885   | 35.3300   |
| 59    | 188.7840   | 35.7885   | 35.3300   | 269.3000   | 35.7915   | 35.4473   |
| 60    | 269.3000   | 35.7915   | 35.4473   | -1229.3376 | 122.8550  | -438.6571 |
| 61    | -1229.3376 | 122.8550  | -438.6571 | -1856.2522 | 297.4053  | -684.7582 |
| 62    | -1856.2522 | 297.4053  | -684.7582 | -1267.5391 | 277.3168  | -638.1685 |
| 63    | -1267.5391 | 277.3168  | -638.1685 | -712.6919  | 255.8698  | -590.9158 |
| 64    | -712.6919  | 255.8698  | -590.9158 | -201.4512  | 225.6271  | -521.4926 |
| 65    | -201.4512  | 225.6271  | -521.4926 | 243.6432   | 196.8525  | -464.3968 |
| 66    | 243.6432   | 196.8525  | -464.3968 | 638.5024   | 171.3568  | -407.9855 |
| 67    | 638.5024   | 171.3568  | -407.9855 | 963.5970   | 145.0136  | -348.2645 |
| 68    | 963.5970   | 145.0136  | -348.2645 | 1213.0189  | 110.4267  | -264.2957 |
| 69    | 1213.0189  | 110.4267  | -264.2957 | 1349.3870  | 76.2190   | -186.2115 |
| 70    | 1349.3870  | 76.2190   | -186.2115 | 1422.8635  | 47.9004   | -119.1174 |
| 71    | 1422.8635  | 47.9004   | -119.1174 | -375.7640  | 35.8932   | 35.5252   |
| 72    | -375.7640  | 35.8932   | 35.5252   | -295.0163  | 35.8964   | 35.4828   |
| 73    | -295.0163  | 35.8964   | 35.4828   | -214.2466  | 35.8878   | 35.3659   |
| 74    | -214.2466  | 35.8878   | 35.3659   | -133.4939  | 35.8809   | 35.3016   |
| 75    | -133.4939  | 35.8809   | 35.3016   | -52.8062   | 35.8838   | 35.2929   |
| 76    | -52.8062   | 35.8838   | 35.2929   | 27.9542    | 35.8846   | 35.2920   |
| 77    | 27.9542    | 35.8846   | 35.2920   | 108.6630   | 35.8825   | 35.2824   |
| 78    | 108.6630   | 35.8825   | 35.2824   | 189.4070   | 35.8840   | 35.3274   |
| 79    | 189.4070   | 35.8840   | 35.3274   | 270.1320   | 35.8853   | 35.4715   |
| 80    | 270.1320   | 35.8853   | 35.4715   | -1228.9856 | 122.8242  | -438.8641 |
| 81    | -1228.9856 | 122.8242  | -438.8641 | -1856.4399 | 297.3859  | -684.8847 |
| 82    | -1856.4399 | 297.3859  | -684.8847 | -1267.6233 | 277.2964  | -637.9884 |
| 83    | -1267.6233 | 277.2964  | -637.9884 | -712.8777  | 255.8424  | -590.8140 |
| 84    | -712.8777  | 255.8424  | -590.8140 | -201.6404  | 225.6053  | -521.4795 |
| 85    | -201.6404  | 225.6053  | -521.4795 | 243.7199   | 196.8393  | -464.2830 |
| 86    | 243.7199   | 196.8393  | -464.2830 | 638.3354   | 171.3900  | -408.1174 |
| 87    | 638.3354   | 171.3900  | -408.1174 | 963.4278   | 145.0530  | -348.3568 |
| 88    | 963.4278   | 145.0530  | -348.3568 | 1213.0984  | 110.4312  | -263.8558 |
| 89    | 1213.0984  | 110.4312  | -263.8558 | 1349.4890  | 76.2028   | -185.8192 |
| 90    | 1349.4890  | 76.2028   | -185.8192 | 1422.7720  | 47.8189   | -119.3725 |
| 91    | 1422.7720  | 47.8189   | -119.3725 | -375.6296  | 35.9055   | 35.5042   |
| 92    | -375.6296  | 35.9055   | 35.5042   | -294.8593  | 35.8924   | 35.3676   |
| 93    | -294.8593  | 35.8924   | 35.3676   | -214.1188  | 35.8857   | 35.3614   |
| 94    | -214.1188  | 35.8857   | 35.3614   | -133.4177  | 35.8734   | 35.2689   |
| 95    | -133.4177  | 35.8734   | 35.2689   | -52.6957   | 35.8678   | 35.2387   |
| 96    | -52.6957   | 35.8678   | 35.2387   | 27.9876    | 35.8700   | 35.2341   |
| 97    | 27.9876    | 35.8700   | 35.2341   | 108.7048   | 35.8723   | 35.2658   |
| 98    | 108.7048   | 35.8723   | 35.2658   | 189.4317   | 35.8742   | 35.2798   |
| 99    | 189.4317   | 35.8742   | 35.2798   | 270.1221   | 35.8778   | 35.4033   |
| 100   | 270.1221   | 35.8778   | 35.4033   | -1228.9392 | 122.8232  | -439.0002 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1228.9392 | 122.8232  | -439.0002 | -1856.2728 | 297.3639  | -684.9092 |
| 102   | -1856.2728 | 297.3639  | -684.9092 | -1267.6711 | 277.2675  | -637.8983 |
| 103   | -1267.6711 | 277.2675  | -637.8983 | -712.9275  | 255.8035  | -590.8518 |
| 104   | -712.9275  | 255.8035  | -590.8518 | -201.5893  | 225.5674  | -521.4541 |
| 105   | -201.5893  | 225.5674  | -521.4541 | 243.6469   | 196.8006  | -464.3193 |
| 106   | 243.6469   | 196.8006  | -464.3193 | 638.4147   | 171.3543  | -408.0073 |
| 107   | 638.4147   | 171.3543  | -408.0073 | 963.2913   | 144.9868  | -348.2465 |
| 108   | 963.2913   | 144.9868  | -348.2465 | 1212.5769  | 110.3822  | -264.2966 |
| 109   | 1212.5769  | 110.3822  | -264.2966 | 1348.8208  | 76.1367   | -186.1574 |
| 110   | 1348.8208  | 76.1367   | -186.1574 | 1422.2611  | 47.8134   | -119.3107 |
| 111   | 1422.2611  | 47.8134   | -119.3107 | -375.5141  | 35.9202   | 35.5843   |
| 112   | -375.5141  | 35.9202   | 35.5843   | -294.7011  | 35.9293   | 35.4634   |
| 113   | -294.7011  | 35.9293   | 35.4634   | -213.8896  | 35.9272   | 35.3979   |
| 114   | -213.8896  | 35.9272   | 35.3979   | -133.0745  | 35.9321   | 35.3062   |
| 115   | -133.0745  | 35.9321   | 35.3062   | -52.2253   | 35.9300   | 35.2740   |
| 116   | -52.2253   | 35.9300   | 35.2740   | 28.6027    | 35.9284   | 35.2684   |
| 117   | 28.6027    | 35.9284   | 35.2684   | 109.4059   | 35.9269   | 35.2863   |
| 118   | 109.4059   | 35.9269   | 35.2863   | 190.2242   | 35.9240   | 35.3632   |
| 119   | 190.2242   | 35.9240   | 35.3632   | 271.0381   | 35.9218   | 35.4257   |
| 120   | 271.0381   | 35.9218   | 35.4257   | -1225.0764 | 122.6882  | -438.0918 |
| 121   | -1225.0764 | 122.6882  | -438.0918 | -1852.1027 | 296.7770  | -684.8574 |
| 122   | -1852.1027 | 296.7770  | -684.8574 | -1264.2356 | 276.5743  | -637.8337 |
| 123   | -1264.2356 | 276.5743  | -637.8337 | -710.8505  | 255.0153  | -590.6372 |
| 124   | -710.8505  | 255.0153  | -590.6372 | -201.3107  | 224.6959  | -521.1277 |
| 125   | -201.3107  | 224.6959  | -521.1277 | 241.9168   | 195.8145  | -463.9969 |
| 126   | 241.9168   | 195.8145  | -463.9969 | 634.1712   | 170.2838  | -407.7618 |
| 127   | 634.1712   | 170.2838  | -407.7618 | 956.3749   | 143.9309  | -347.9327 |
| 128   | 956.3749   | 143.9309  | -347.9327 | 1203.2595  | 109.3005  | -263.7974 |
| 129   | 1203.2595  | 109.3005  | -263.7974 | 1337.1591  | 75.0676   | -185.8809 |
| 130   | 1337.1591  | 75.0676   | -185.8809 | 1408.5916  | 46.7613   | -118.7090 |
| 131   | 1408.5916  | 46.7613   | -118.7090 | -370.9117  | 36.2226   | 35.5478   |
| 132   | -370.9117  | 36.2226   | 35.5478   | -289.4309  | 36.2239   | 35.5061   |
| 133   | -289.4309  | 36.2239   | 35.5061   | -207.9074  | 36.2220   | 35.4252   |
| 134   | -207.9074  | 36.2220   | 35.4252   | -126.3988  | 36.2246   | 35.3677   |
| 135   | -126.3988  | 36.2246   | 35.3677   | -44.8909   | 36.2308   | 35.3381   |
| 136   | -44.8909   | 36.2308   | 35.3381   | 36.6041    | 36.2303   | 35.3298   |
| 137   | 36.6041    | 36.2303   | 35.3298   | 118.1195   | 36.2327   | 35.3477   |
| 138   | 118.1195   | 36.2327   | 35.3477   | 199.6511   | 36.2309   | 35.3980   |
| 139   | 199.6511   | 36.2309   | 35.3980   | 281.1407   | 36.2307   | 35.4742   |
| 140   | 281.1407   | 36.2307   | 35.4742   | -2309.0090 | 33.2586   | -47.4559  |
| 141   | -2309.0090 | 33.2586   | -47.4559  | -1830.9781 | 298.7355  | -623.3651 |
| 142   | -1830.9781 | 298.7355  | -623.3651 | -1362.9756 | 276.8162  | -566.0367 |
| 143   | -1362.9756 | 276.8162  | -566.0367 | -915.2933  | 252.9794  | -508.4362 |
| 144   | -915.2933  | 252.9794  | -508.4362 | -498.4524  | 227.2398  | -451.0975 |
| 145   | -498.4524  | 227.2398  | -451.0975 | -113.1550  | 213.6781  | -421.3289 |
| 146   | -113.1550  | 213.6781  | -421.3289 | 223.0829   | 184.6498  | -348.2690 |
| 147   | 223.0829   | 184.6498  | -348.2690 | 522.5751   | 154.6744  | -263.4242 |
| 148   | 522.5751   | 154.6744  | -263.4242 | 773.9940   | 124.6673  | -178.4177 |
| 149   | 773.9940   | 124.6673  | -178.4177 | 977.4160   | 94.6720   | -93.5071  |
| 150   | 977.4160   | 94.6720   | -93.5071  | 1132.8589  | 79.6833   | -50.8855  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| 151   | 1132.8589 | 79.6833   | -50.8855 | 1237.3154 | 49.6585   | 34.3371 |
| 152   | 1237.3154 | 49.6585   | 34.3371  | -522.4956 | 36.2561   | 43.1487 |
| 153   | -522.4956 | 36.2561   | 43.1487  | -457.2640 | 36.2646   | 43.1674 |
| 154   | -457.2640 | 36.2646   | 43.1674  | -391.9606 | 36.2798   | 43.0210 |
| 155   | -391.9606 | 36.2798   | 43.0210  | -326.6632 | 36.2869   | 42.7958 |
| 156   | -326.6632 | 36.2869   | 42.7958  | -261.2996 | 36.2972   | 42.7884 |
| 157   | -261.2996 | 36.2972   | 42.7884  | -195.9660 | 36.2961   | 42.7982 |
| 158   | -195.9660 | 36.2961   | 42.7982  | -130.6305 | 36.3002   | 42.7304 |
| 159   | -130.6305 | 36.3002   | 42.7304  | -65.3286  | 36.2968   | 42.6950 |
| 160   | -65.3286  | 36.2968   | 42.6950  | 0.0050    | 36.2943   | 42.6806 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| ===== | =====      | =====     | =====    | =====      | =====     | =====    |
| 1     | 0.0028     | -35.3232  | -42.2118 | -63.5645   | -35.3204  | -42.2123 |
| 2     | -63.5645   | -35.3204  | -42.2123 | -127.1074  | -35.3179  | -42.2400 |
| 3     | -127.1074  | -35.3179  | -42.2400 | -190.6890  | -35.3110  | -42.3040 |
| 4     | -190.6890  | -35.3110  | -42.3040 | -254.2165  | -35.3042  | -42.3354 |
| 5     | -254.2165  | -35.3042  | -42.3354 | -317.7565  | -35.3102  | -42.4137 |
| 6     | -317.7565  | -35.3102  | -42.4137 | -381.3276  | -35.3228  | -42.4826 |
| 7     | -381.3276  | -35.3228  | -42.4826 | 663.9352   | -40.1879  | 111.7153 |
| 8     | 663.9352   | -40.1879  | 111.7153 | 799.7650   | -53.8807  | 145.0699 |
| 9     | 799.7650   | -53.8807  | 145.0699 | 915.8669   | -69.4540  | 182.7182 |
| 10    | 915.8669   | -69.4540  | 182.7182 | 957.9659   | -81.8762  | 99.1852  |
| 11    | 957.9659   | -81.8762  | 99.1852  | 806.4490   | -103.2775 | 154.0262 |
| 12    | 806.4490   | -103.2775 | 154.0262 | 628.6417   | -131.3892 | 221.4144 |
| 13    | 628.6417   | -131.3892 | 221.4144 | 402.8384   | -159.7963 | 288.8688 |
| 14    | 402.8384   | -159.7963 | 288.8688 | 126.3456   | -187.9196 | 351.0742 |
| 15    | 126.3456   | -187.9196 | 351.0742 | -201.0373  | -206.6818 | 388.1534 |
| 16    | -201.0373  | -206.6818 | 388.1534 | -584.7948  | -226.6087 | 436.7578 |
| 17    | -584.7948  | -226.6087 | 436.7578 | -989.8790  | -250.0455 | 490.2010 |
| 18    | -989.8790  | -250.0455 | 490.2010 | -1417.5505 | -271.5699 | 543.7001 |
| 19    | -1417.5505 | -271.5699 | 543.7001 | -1857.2144 | -291.1799 | 596.3789 |
| 20    | -1857.2144 | -291.1799 | 596.3789 | -1063.0342 | -122.1999 | 362.3627 |
| 21    | -1063.0342 | -122.1999 | 362.3627 | 273.2850   | -35.2158  | -34.9888 |
| 22    | 273.2850   | -35.2158  | -34.9888 | 194.0537   | -35.2142  | -34.8811 |
| 23    | 194.0537   | -35.2142  | -34.8811 | 114.8283   | -35.2120  | -34.8230 |
| 24    | 114.8283   | -35.2120  | -34.8230 | 35.5989    | -35.2117  | -34.8198 |
| 25    | 35.5989    | -35.2117  | -34.8198 | -43.6245   | -35.2125  | -34.8345 |
| 26    | -43.6245   | -35.2125  | -34.8345 | -122.8309  | -35.2103  | -34.8878 |
| 27    | -122.8309  | -35.2103  | -34.8878 | -202.0338  | -35.2176  | -34.9252 |
| 28    | -202.0338  | -35.2176  | -34.9252 | -281.2610  | -35.2246  | -34.9690 |
| 29    | -281.2610  | -35.2246  | -34.9690 | 596.7153   | -35.4477  | 236.6888 |
| 30    | 596.7153   | -35.4477  | 236.6888 | 1384.7512  | -50.4686  | 112.9337 |
| 31    | 1384.7512  | -50.4686  | 112.9337 | 1293.1047  | -78.3461  | 179.7932 |
| 32    | 1293.1047  | -78.3461  | 179.7932 | 1136.7279  | -111.4698 | 254.3643 |
| 33    | 1136.7279  | -111.4698 | 254.3643 | 877.7290   | -145.1099 | 335.1193 |
| 34    | 877.7290   | -145.1099 | 335.1193 | 548.3090   | -170.3424 | 391.4746 |
| 35    | 548.3090   | -170.3424 | 391.4746 | 155.0056   | -194.5453 | 444.4575 |
| 36    | 155.0056   | -194.5453 | 444.4575 | -280.4570  | -221.2305 | 496.5085 |
| 37    | -280.4570  | -221.2305 | 496.5085 | -775.1437  | -249.9294 | 562.3124 |
| 38    | -775.1437  | -249.9294 | 562.3124 | -1305.5667 | -269.7568 | 606.3436 |
| 39    | -1305.5667 | -269.7568 | 606.3436 | -1862.6660 | -288.1508 | 649.9275 |
| 40    | -1862.6660 | -288.1508 | 649.9275 | -1259.3214 | -124.8381 | 444.6406 |
| 41    | -1259.3214 | -124.8381 | 444.6406 | 263.7583   | -34.9510  | -34.9394 |
| 42    | 263.7583   | -34.9510  | -34.9394 | 185.1303   | -34.9493  | -34.8596 |
| 43    | 185.1303   | -34.9493  | -34.8596 | 106.4837   | -34.9505  | -34.8126 |
| 44    | 106.4837   | -34.9505  | -34.8126 | 27.8549    | -34.9498  | -34.7992 |
| 45    | 27.8549    | -34.9498  | -34.7992 | -50.7578   | -34.9450  | -34.8153 |
| 46    | -50.7578   | -34.9450  | -34.8153 | -129.3698  | -34.9515  | -34.8479 |
| 47    | -129.3698  | -34.9515  | -34.8479 | -208.0298  | -34.9607  | -34.8924 |
| 48    | -208.0298  | -34.9607  | -34.8924 | -286.6667  | -34.9594  | -34.9717 |
| 49    | -286.6667  | -34.9594  | -34.9717 | -365.3206  | -34.9536  | -35.0194 |
| 50    | -365.3206  | -34.9536  | -35.0194 | 1398.9928  | -51.5177  | 113.0967 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| ===== | =====      | =====     | =====    | =====      | =====     | =====    |
| 51    | 1398.9928  | -51.5177  | 113.0967 | 1305.0984  | -79.3992  | 179.9745 |
| 52    | 1305.0984  | -79.3992  | 179.9745 | 1146.0726  | -112.4920 | 254.1977 |
| 53    | 1146.0726  | -112.4920 | 254.1977 | 884.2361   | -146.1456 | 335.4280 |
| 54    | 884.2361   | -146.1456 | 335.4280 | 552.1396   | -171.3383 | 391.8289 |
| 55    | 552.1396   | -171.3383 | 391.8289 | 156.6545   | -195.5054 | 444.6519 |
| 56    | 156.6545   | -195.5054 | 444.6519 | -280.9361  | -222.0396 | 496.4920 |
| 57    | -280.9361  | -222.0396 | 496.4920 | -777.1699  | -250.6208 | 562.5505 |
| 58    | -777.1699  | -250.6208 | 562.5505 | -1308.5294 | -270.3448 | 606.5179 |
| 59    | -1308.5294 | -270.3448 | 606.5179 | -1866.2960 | -288.6336 | 649.7072 |
| 60    | -1866.2960 | -288.6336 | 649.7072 | -1263.2246 | -125.0145 | 445.1729 |
| 61    | -1263.2246 | -125.0145 | 445.1729 | 262.8023   | -34.9272  | -35.0312 |
| 62    | 262.8023   | -34.9272  | -35.0312 | 184.2357   | -34.9265  | -34.9183 |
| 63    | 184.2357   | -34.9265  | -34.9183 | 105.6492   | -34.9244  | -34.8727 |
| 64    | 105.6492   | -34.9244  | -34.8727 | 27.0919    | -34.9176  | -34.8547 |
| 65    | 27.0919    | -34.9176  | -34.8547 | -51.4400   | -34.9093  | -34.8683 |
| 66    | -51.4400   | -34.9093  | -34.8683 | -129.9632  | -34.9005  | -34.9226 |
| 67    | -129.9632  | -34.9005  | -34.9226 | -208.4778  | -34.9025  | -34.9613 |
| 68    | -208.4778  | -34.9025  | -34.9613 | -287.0142  | -34.9079  | -34.9950 |
| 69    | -287.0142  | -34.9079  | -34.9950 | -365.5089  | -34.9004  | -35.0965 |
| 70    | -365.5089  | -34.9004  | -35.0965 | 1399.7139  | -51.6738  | 113.3425 |
| 71    | 1399.7139  | -51.6738  | 113.3425 | 1305.6061  | -79.4952  | 180.2081 |
| 72    | 1305.6061  | -79.4952  | 180.2081 | 1146.3958  | -112.6086 | 254.2636 |
| 73    | 1146.3958  | -112.6086 | 254.2636 | 884.2774   | -146.2162 | 335.4380 |
| 74    | 884.2774   | -146.2162 | 335.4380 | 552.0165   | -171.4073 | 391.8618 |
| 75    | 552.0165   | -171.4073 | 391.8618 | 156.5560   | -195.5460 | 444.6225 |
| 76    | 156.5560   | -195.5460 | 444.6225 | -281.4146  | -222.0742 | 496.5039 |
| 77    | -281.4146  | -222.0742 | 496.5039 | -777.2496  | -250.6508 | 562.6604 |
| 78    | -777.2496  | -250.6508 | 562.6604 | -1308.8140 | -270.3690 | 606.5148 |
| 79    | -1308.8140 | -270.3690 | 606.5148 | -1866.6338 | -288.6540 | 649.5183 |
| 80    | -1866.6338 | -288.6540 | 649.5183 | -1263.5643 | -124.9884 | 445.1108 |
| 81    | -1263.5643 | -124.9884 | 445.1108 | 262.7196   | -34.9021  | -34.9923 |
| 82    | 262.7196   | -34.9021  | -34.9923 | 184.1781   | -34.9051  | -34.9211 |
| 83    | 184.1781   | -34.9051  | -34.9211 | 105.6575   | -34.9073  | -34.8612 |
| 84    | 105.6575   | -34.9073  | -34.8612 | 27.1371    | -34.9021  | -34.8321 |
| 85    | 27.1371    | -34.9021  | -34.8321 | -51.3914   | -34.9019  | -34.8588 |
| 86    | -51.3914   | -34.9019  | -34.8588 | -129.8897  | -34.9086  | -34.8637 |
| 87    | -129.8897  | -34.9086  | -34.8637 | -208.4333  | -34.9135  | -34.9154 |
| 88    | -208.4333  | -34.9135  | -34.9154 | -286.9523  | -34.9074  | -35.0750 |
| 89    | -286.9523  | -34.9074  | -35.0750 | -365.4489  | -34.8870  | -35.1710 |
| 90    | -365.4489  | -34.8870  | -35.1710 | 1399.7317  | -51.6826  | 113.1385 |
| 91    | 1399.7317  | -51.6826  | 113.1385 | 1305.4072  | -79.5218  | 180.1825 |
| 92    | 1305.4072  | -79.5218  | 180.1825 | 1146.1119  | -112.6216 | 254.5330 |
| 93    | 1146.1119  | -112.6216 | 254.5330 | 884.2351   | -146.2001 | 335.3099 |
| 94    | 884.2351   | -146.2001 | 335.3099 | 552.0551   | -171.3868 | 391.8287 |
| 95    | 552.0551   | -171.3868 | 391.8287 | 156.3712   | -195.5146 | 444.7003 |
| 96    | 156.3712   | -195.5146 | 444.7003 | -281.1190  | -222.0526 | 496.5871 |
| 97    | -281.1190  | -222.0526 | 496.5871 | -777.1304  | -250.6255 | 562.5128 |
| 98    | -777.1304  | -250.6255 | 562.5128 | -1308.7296 | -270.3455 | 606.5839 |
| 99    | -1308.7296 | -270.3455 | 606.5839 | -1866.1868 | -288.6317 | 649.6901 |
| 100   | -1866.1868 | -288.6317 | 649.6901 | -1263.6050 | -124.9792 | 445.0380 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1263.6050 | -124.9792 | 445.0380 | 262.0499   | -34.8161  | -34.8602 |
| 102   | 262.0499   | -34.8161  | -34.8602 | 183.7227   | -34.8209  | -34.8032 |
| 103   | 183.7227   | -34.8209  | -34.8032 | 105.3905   | -34.8196  | -34.7277 |
| 104   | 105.3905   | -34.8196  | -34.7277 | 27.0529    | -34.8156  | -34.7130 |
| 105   | 27.0529    | -34.8156  | -34.7130 | -51.2917   | -34.8236  | -34.7257 |
| 106   | -51.2917   | -34.8236  | -34.7257 | -129.6415  | -34.8176  | -34.7610 |
| 107   | -129.6415  | -34.8176  | -34.7610 | -207.9270  | -34.8050  | -34.8143 |
| 108   | -207.9270  | -34.8050  | -34.8143 | -286.2360  | -34.8017  | -34.8432 |
| 109   | -286.2360  | -34.8017  | -34.8432 | -364.5380  | -34.8056  | -34.9547 |
| 110   | -364.5380  | -34.8056  | -34.9547 | 1399.5211  | -51.6666  | 113.2043 |
| 111   | 1399.5211  | -51.6666  | 113.2043 | 1305.5540  | -79.5145  | 180.0486 |
| 112   | 1305.5540  | -79.5145  | 180.0486 | 1146.6925  | -112.6348 | 254.3824 |
| 113   | 1146.6925  | -112.6348 | 254.3824 | 885.0795   | -146.2274 | 335.3740 |
| 114   | 885.0795   | -146.2274 | 335.3740 | 553.3212   | -171.4256 | 391.9057 |
| 115   | 553.3212   | -171.4256 | 391.9057 | 158.1507   | -195.5242 | 444.7791 |
| 116   | 158.1507   | -195.5242 | 444.7791 | -278.1879  | -221.9928 | 496.7318 |
| 117   | -278.1879  | -221.9928 | 496.7318 | -773.0385  | -250.5359 | 562.7178 |
| 118   | -773.0385  | -250.5359 | 562.7178 | -1303.5803 | -270.2203 | 606.3444 |
| 119   | -1303.5803 | -270.2203 | 606.3444 | -1859.8748 | -288.4692 | 649.9489 |
| 120   | -1859.8748 | -288.4692 | 649.9489 | -1266.9817 | -124.8734 | 445.1888 |
| 121   | -1266.9817 | -124.8734 | 445.1888 | 329.2137   | -10.0622  | 1.0241   |
| 122   | 329.2137   | -10.0622  | 1.0241   | 306.5753   | -10.0618  | 1.1217   |
| 123   | 306.5753   | -10.0618  | 1.1217   | 283.9337   | -10.0636  | 1.2172   |
| 124   | 283.9337   | -10.0636  | 1.2172   | 261.2880   | -10.0632  | 1.2627   |
| 125   | 261.2880   | -10.0632  | 1.2627   | 238.6422   | -10.0608  | 1.3821   |
| 126   | 238.6422   | -10.0608  | 1.3821   | 216.0016   | -10.0555  | 1.4491   |
| 127   | 216.0016   | -10.0555  | 1.4491   | 193.3861   | -10.0528  | 1.5053   |
| 128   | 193.3861   | -10.0528  | 1.5053   | 170.7589   | -10.0555  | 1.5743   |
| 129   | 170.7589   | -10.0555  | 1.5743   | 467.3586   | -27.0931  | 242.0601 |
| 130   | 467.3586   | -27.0931  | 242.0601 | 1391.7393  | -52.2427  | 114.2115 |
| 131   | 1391.7393  | -52.2427  | 114.2115 | 1300.1113  | -79.8360  | 181.2789 |
| 132   | 1300.1113  | -79.8360  | 181.2789 | 1149.0201  | -112.4709 | 255.7101 |
| 133   | 1149.0201  | -112.4709 | 255.7101 | 895.7383   | -145.6574 | 337.0468 |
| 134   | 895.7383   | -145.6574 | 337.0468 | 575.6733   | -170.3332 | 393.7740 |
| 135   | 575.6733   | -170.3332 | 393.7740 | 196.2366   | -193.8961 | 447.0044 |
| 136   | 196.2366   | -193.8961 | 447.0044 | -210.9290  | -219.4011 | 499.6022 |
| 137   | -210.9290  | -219.4011 | 499.6022 | -678.5142  | -247.2035 | 566.0594 |
| 138   | -678.5142  | -247.2035 | 566.0594 | -1175.5831 | -266.0373 | 610.4127 |
| 139   | -1175.5831 | -266.0373 | 610.4127 | -1691.5626 | -283.3516 | 654.4310 |
| 140   | -1691.5626 | -283.3516 | 654.4310 | -1305.6256 | -125.3963 | 449.0396 |
| 141   | -1305.6256 | -125.3963 | 449.0396 | 344.5298   | -10.0728  | 1.4152   |
| 142   | 344.5298   | -10.0728  | 1.4152   | 326.3969   | -10.0733  | 1.4181   |
| 143   | 326.3969   | -10.0733  | 1.4181   | 308.2665   | -10.0731  | 1.4812   |
| 144   | 308.2665   | -10.0731  | 1.4812   | 290.1215   | -10.0751  | 1.6019   |
| 145   | 290.1215   | -10.0751  | 1.6019   | 271.9898   | -10.0759  | 1.6497   |
| 146   | 271.9898   | -10.0759  | 1.6497   | 253.8545   | -10.0716  | 1.7051   |
| 147   | 253.8545   | -10.0716  | 1.7051   | 235.7376   | -10.0633  | 1.7457   |
| 148   | 235.7376   | -10.0633  | 1.7457   | 217.6290   | -10.0632  | 1.8370   |
| 149   | 217.6290   | -10.0632  | 1.8370   | 199.5062   | -10.0649  | 1.8809   |
| 150   | 199.5062   | -10.0649  | 1.8809   | 181.3970   | -10.0656  | 1.9222   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 181.3970 | -10.0656  | 1.9222   | 365.2617 | -22.5023  | 272.4390 |
| 152   | 365.2617 | -22.5023  | 272.4390 | 532.4333 | -36.9142  | 318.2445 |
| 153   | 532.4333 | -36.9142  | 318.2445 | 670.8391 | -53.1428  | 368.0567 |
| 154   | 670.8391 | -53.1428  | 368.0567 | 770.7112 | -71.2957  | 422.2581 |
| 155   | 770.7112 | -71.2957  | 422.2581 | 730.0852 | -81.0602  | 451.2716 |
| 156   | 730.0852 | -81.0602  | 451.2716 | 735.1427 | -102.0421 | 508.7866 |
| 157   | 735.1427 | -102.0421 | 508.7866 | 675.1476 | -124.9208 | 566.5486 |
| 158   | 675.1476 | -124.9208 | 566.5486 | 539.3349 | -149.7000 | 624.6319 |
| 159   | 539.3349 | -149.7000 | 624.6319 | 317.7086 | -176.3690 | 683.5242 |
| 160   | 317.7086 | -176.3690 | 683.5242 | 0.0651   | -190.3872 | 714.3076 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | 0.0030     | -0.0030   | 2.1845   | 14.0567    | -0.5266   | 5.4201   |
| 2     | 14.0567    | -0.5266   | 5.4201   | 78.7211    | -3.1330   | 15.0630  |
| 3     | 78.7211    | -3.1330   | 15.0630  | 182.8398   | -7.8132   | 28.9939  |
| 4     | 182.8398   | -7.8132   | 28.9939  | 315.3517   | -14.5463  | 47.1831  |
| 5     | 315.3517   | -14.5463  | 47.1831  | 372.0216   | -18.6745  | 57.9376  |
| 6     | 372.0216   | -18.6745  | 57.9376  | 518.0056   | -28.4321  | 82.6153  |
| 7     | 518.0056   | -28.4321  | 82.6153  | 663.9352   | -40.1879  | 111.7153 |
| 8     | 663.9352   | -40.1879  | 111.7153 | 799.7650   | -53.8807  | 145.0699 |
| 9     | 799.7650   | -53.8807  | 145.0699 | 915.8669   | -69.4540  | 182.7182 |
| 10    | 915.8669   | -69.4540  | 182.7182 | 1003.0230  | -79.3690  | 203.7676 |
| 11    | 1003.0230  | -79.3690  | 203.7676 | 946.6805   | -96.1673  | 247.6376 |
| 12    | 946.6805   | -96.1673  | 247.6376 | 957.1383   | -116.1703 | 296.1667 |
| 13    | 957.1383   | -116.1703 | 296.1667 | 917.4403   | -137.8243 | 348.9521 |
| 14    | 917.4403   | -137.8243 | 348.9521 | 820.7108   | -161.0018 | 406.1907 |
| 15    | 820.7108   | -161.0018 | 406.1907 | 661.0026   | -177.5685 | 440.7761 |
| 16    | 661.0026   | -177.5685 | 440.7761 | 378.6436   | -196.8410 | 489.8854 |
| 17    | 378.6436   | -196.8410 | 489.8854 | 102.4313   | -219.7668 | 545.8021 |
| 18    | 102.4313   | -219.7668 | 545.8021 | -227.5775  | -241.8121 | 601.3409 |
| 19    | -227.5775  | -241.8121 | 601.3409 | -606.3376  | -263.4008 | 661.9091 |
| 20    | -606.3376  | -263.4008 | 661.9091 | -1063.0342 | -122.1999 | 362.3627 |
| 21    | -1063.0342 | -122.1999 | 362.3627 | -909.3138  | 27.5693   | 37.3918  |
| 22    | -909.3138  | 27.5693   | 37.3918  | -762.2572  | 24.8017   | 45.2012  |
| 23    | -762.2572  | 24.8017   | 45.2012  | -601.2445  | 21.1227   | 56.5396  |
| 24    | -601.2445  | 21.1227   | 56.5396  | -430.0212  | 16.4426   | 71.6163  |
| 25    | -430.0212  | 16.4426   | 71.6163  | -172.4442  | 7.4128    | 100.7310 |
| 26    | -172.4442  | 7.4128    | 100.7310 | -11.4147   | -0.0237   | 124.5972 |
| 27    | -11.4147   | -0.0237   | 124.5972 | 188.2509   | -8.6378   | 152.1313 |
| 28    | 188.2509   | -8.6378   | 152.1313 | 351.6384   | -18.4550  | 183.2266 |
| 29    | 351.6384   | -18.4550  | 183.2266 | 596.7153   | -35.4477  | 236.6888 |
| 30    | 596.7153   | -35.4477  | 236.6888 | 713.0695   | -48.4056  | 276.5148 |
| 31    | 713.0695   | -48.4056  | 276.5148 | 797.8104   | -62.9969  | 319.8022 |
| 32    | 797.8104   | -62.9969  | 319.8022 | 944.2899   | -80.3395  | 369.3641 |
| 33    | 944.2899   | -80.3395  | 369.3641 | 931.1324   | -106.2883 | 438.3796 |
| 34    | 931.1324   | -106.2883 | 438.3796 | 856.9600   | -126.2088 | 486.7505 |
| 35    | 856.9600   | -126.2088 | 486.7505 | 713.7255   | -147.5811 | 535.4574 |
| 36    | 713.7255   | -147.5811 | 535.4574 | 559.0233   | -174.5510 | 591.2736 |
| 37    | 559.0233   | -174.5510 | 591.2736 | 240.9009   | -206.5129 | 667.4133 |
| 38    | 240.9009   | -206.5129 | 667.4133 | -165.9443  | -231.9684 | 725.8163 |
| 39    | -165.9443  | -231.9684 | 725.8163 | -665.1895  | -258.3276 | 787.0153 |
| 40    | -665.1895  | -258.3276 | 787.0153 | -1259.3214 | -124.8381 | 444.6406 |
| 41    | -1259.3214 | -124.8381 | 444.6406 | -1146.7935 | 34.7693   | 44.4781  |
| 42    | -1146.7935 | 34.7693   | 44.4781  | -1012.6078 | 32.9459   | 52.3766  |
| 43    | -1012.6078 | 32.9459   | 52.3766  | -856.2213  | 30.0686   | 63.6796  |
| 44    | -856.2213  | 30.0686   | 63.6796  | -681.5464  | 26.0326   | 78.6697  |
| 45    | -681.5464  | 26.0326   | 78.6697  | -416.0308  | 17.5667   | 107.7292 |
| 46    | -416.0308  | 17.5667   | 107.7292 | -211.0518  | 10.2200   | 131.4484 |
| 47    | -211.0518  | 10.2200   | 131.4484 | -7.4229    | 1.4181    | 158.7167 |
| 48    | -7.4229    | 1.4181    | 158.7167 | 186.9926   | -8.8736   | 189.4736 |
| 49    | 186.9926   | -8.8736   | 189.4736 | 473.5765   | -27.1847  | 241.9967 |
| 50    | 473.5765   | -27.1847  | 241.9967 | 623.4937   | -41.3175  | 281.3696 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 623.4937   | -41.3175  | 281.3696 | 735.6140   | -56.9800  | 324.2613 |
| 52    | 735.6140   | -56.9800  | 324.2613 | 907.8162   | -75.7878  | 372.9589 |
| 53    | 907.8162   | -75.7878  | 372.9589 | 909.9037   | -102.6640 | 442.0431 |
| 54    | 909.9037   | -102.6640 | 442.0431 | 846.7712   | -123.4166 | 490.1049 |
| 55    | 846.7712   | -123.4166 | 490.1049 | 711.1550   | -145.5037 | 538.0583 |
| 56    | 711.1550   | -145.5037 | 538.0583 | 560.2673   | -173.3878 | 593.2645 |
| 57    | 560.2673   | -173.3878 | 593.2645 | 243.2072   | -205.8284 | 669.2823 |
| 58    | 243.2072   | -205.8284 | 669.2823 | -164.3125  | -231.7407 | 727.1885 |
| 59    | -164.3125  | -231.7407 | 727.1885 | -665.9975  | -258.4626 | 788.0697 |
| 60    | -665.9975  | -258.4626 | 788.0697 | -1263.2246 | -125.0145 | 445.1729 |
| 61    | -1263.2246 | -125.0145 | 445.1729 | -1153.5153 | 34.9440   | 44.5599  |
| 62    | -1153.5153 | 34.9440   | 44.5599  | -1020.3046 | 33.1625   | 52.3008  |
| 63    | -1020.3046 | 33.1625   | 52.3008  | -864.2879  | 30.3282   | 63.6028  |
| 64    | -864.2879  | 30.3282   | 63.6028  | -689.4846  | 26.3177   | 78.6012  |
| 65    | -689.4846  | 26.3177   | 78.6012  | -423.5113  | 17.8818   | 107.7350 |
| 66    | -423.5113  | 17.8818   | 107.7350 | -217.7520  | 10.5375   | 131.4435 |
| 67    | -217.7520  | 10.5375   | 131.4435 | -13.2390   | 1.7231    | 158.7112 |
| 68    | -13.2390   | 1.7231    | 158.7112 | 182.0965   | -8.5911   | 189.4352 |
| 69    | 182.0965   | -8.5911   | 189.4352 | 469.6490   | -26.9377  | 241.9659 |
| 70    | 469.6490   | -26.9377  | 241.9659 | 620.3293   | -41.0989  | 281.4657 |
| 71    | 620.3293   | -41.0989  | 281.4657 | 733.1907   | -56.7895  | 324.3954 |
| 72    | 733.1907   | -56.7895  | 324.3954 | 906.1766   | -75.6294  | 373.0029 |
| 73    | 906.1766   | -75.6294  | 373.0029 | 908.6802   | -102.5228 | 442.0552 |
| 74    | 908.6802   | -102.5228 | 442.0552 | 845.9731   | -123.2900 | 490.1380 |
| 75    | 845.9731   | -123.2900 | 490.1380 | 710.7721   | -145.3929 | 538.0714 |
| 76    | 710.7721   | -145.3929 | 538.0714 | 559.8128   | -173.3051 | 593.4405 |
| 77    | 559.8128   | -173.3051 | 593.4405 | 243.1997   | -205.7809 | 669.4186 |
| 78    | 243.1997   | -205.7809 | 669.4186 | -164.5000  | -231.6974 | 727.2633 |
| 79    | -164.5000  | -231.6974 | 727.2633 | -666.3389  | -258.4346 | 788.1360 |
| 80    | -666.3389  | -258.4346 | 788.1360 | -1263.5643 | -124.9884 | 445.1108 |
| 81    | -1263.5643 | -124.9884 | 445.1108 | -1153.8279 | 34.9875   | 44.5247  |
| 82    | -1153.8279 | 34.9875   | 44.5247  | -1020.5790 | 33.2022   | 52.4576  |
| 83    | -1020.5790 | 33.2022   | 52.4576  | -864.6062  | 30.3604   | 63.6286  |
| 84    | -864.6062  | 30.3604   | 63.6286  | -689.7798  | 26.3443   | 78.5912  |
| 85    | -689.7798  | 26.3443   | 78.5912  | -423.8464  | 17.9080   | 107.6727 |
| 86    | -423.8464  | 17.9080   | 107.6727 | -218.0358  | 10.5481   | 131.4379 |
| 87    | -218.0358  | 10.5481   | 131.4379 | -13.5089   | 1.7336    | 158.7021 |
| 88    | -13.5089   | 1.7336    | 158.7021 | 181.7907   | -8.5761   | 189.4785 |
| 89    | 181.7907   | -8.5761   | 189.4785 | 469.4186   | -26.9259  | 242.1190 |
| 90    | 469.4186   | -26.9259  | 242.1190 | 620.2437   | -41.1115  | 281.3703 |
| 91    | 620.2437   | -41.1115  | 281.3703 | 732.9856   | -56.7969  | 324.3430 |
| 92    | 732.9856   | -56.7969  | 324.3430 | 905.8535   | -75.6331  | 373.1479 |
| 93    | 905.8535   | -75.6331  | 373.1479 | 908.5712   | -102.4935 | 441.8400 |
| 94    | 908.5712   | -102.4935 | 441.8400 | 845.8709   | -123.2789 | 490.0587 |
| 95    | 845.8709   | -123.2789 | 490.0587 | 710.4285   | -145.3738 | 538.1516 |
| 96    | 710.4285   | -145.3738 | 538.1516 | 559.8293   | -173.2903 | 593.4163 |
| 97    | 559.8293   | -173.2903 | 593.4163 | 242.9781   | -205.7530 | 669.3777 |
| 98    | 242.9781   | -205.7530 | 669.3777 | -164.7398  | -231.6750 | 727.3926 |
| 99    | -164.7398  | -231.6750 | 727.3926 | -666.2672  | -258.4210 | 788.1938 |
| 100   | -666.2672  | -258.4210 | 788.1938 | -1263.6050 | -124.9792 | 445.0380 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1263.6050 | -124.9792 | 445.0380 | -1153.8369 | 34.9963   | 44.6351  |
| 102   | -1153.8369 | 34.9963   | 44.6351  | -1020.6295 | 33.2114   | 52.5729  |
| 103   | -1020.6295 | 33.2114   | 52.5729  | -864.6302  | 30.3657   | 63.6964  |
| 104   | -864.6302  | 30.3657   | 63.6964  | -689.7899  | 26.3483   | 78.6577  |
| 105   | -689.7899  | 26.3483   | 78.6577  | -423.8190  | 17.9021   | 107.7193 |
| 106   | -423.8190  | 17.9021   | 107.7193 | -218.0367  | 10.5488   | 131.4435 |
| 107   | -218.0367  | 10.5488   | 131.4435 | -13.5100   | 1.7371    | 158.7206 |
| 108   | -13.5100   | 1.7371    | 158.7206 | 181.8494   | -8.5801   | 189.4585 |
| 109   | 181.8494   | -8.5801   | 189.4585 | 469.3741   | -26.9327  | 242.0020 |
| 110   | 469.3741   | -26.9327  | 242.0020 | 620.0936   | -41.0945  | 281.4130 |
| 111   | 620.0936   | -41.0945  | 281.4130 | 732.8695   | -56.7920  | 324.2783 |
| 112   | 732.8695   | -56.7920  | 324.2783 | 905.6144   | -75.6633  | 373.0422 |
| 113   | 905.6144   | -75.6633  | 373.0422 | 908.0450   | -102.5790 | 441.9108 |
| 114   | 908.0450   | -102.5790 | 441.9108 | 844.9857   | -123.3762 | 490.1357 |
| 115   | 844.9857   | -123.3762 | 490.1357 | 709.0952   | -145.5060 | 538.2335 |
| 116   | 709.0952   | -145.5060 | 538.2335 | 558.0167   | -173.4362 | 593.4250 |
| 117   | 558.0167   | -173.4362 | 593.4250 | 240.9272   | -205.8938 | 669.2664 |
| 118   | 240.9272   | -205.8938 | 669.2664 | -167.3822  | -231.8257 | 727.2003 |
| 119   | -167.3822  | -231.8257 | 727.2003 | -669.3615  | -258.5552 | 788.2885 |
| 120   | -669.3615  | -258.5552 | 788.2885 | -1266.9817 | -124.8734 | 445.1888 |
| 121   | -1266.9817 | -124.8734 | 445.1888 | -1156.6670 | 35.3335   | 44.5238  |
| 122   | -1156.6670 | 35.3335   | 44.5238  | -1022.5904 | 33.5356   | 52.4621  |
| 123   | -1022.5904 | 33.5356   | 52.4621  | -865.7441  | 30.6686   | 63.7475  |
| 124   | -865.7441  | 30.6686   | 63.7475  | -690.2339  | 26.6138   | 78.7171  |
| 125   | -690.2339  | 26.6138   | 78.7171  | -423.8238  | 18.0844   | 107.6980 |
| 126   | -423.8238  | 18.0844   | 107.6980 | -217.8484  | 10.6588   | 131.4935 |
| 127   | -217.8484  | 10.6588   | 131.4935 | -13.5348   | 1.7810    | 158.7686 |
| 128   | -13.5348   | 1.7810    | 158.7686 | 181.2343   | -8.6112   | 189.5380 |
| 129   | 181.2343   | -8.6112   | 189.5380 | 467.3586   | -27.0931  | 242.0601 |
| 130   | 467.3586   | -27.0931  | 242.0601 | 616.4697   | -41.3526  | 281.5619 |
| 131   | 616.4697   | -41.3526  | 281.5619 | 727.1168   | -57.1488  | 324.5073 |
| 132   | 727.1168   | -57.1488  | 324.5073 | 896.5345   | -76.1732  | 373.1119 |
| 133   | 896.5345   | -76.1732  | 373.1119 | 895.8484   | -103.1755 | 442.0533 |
| 134   | 895.8484   | -103.1755 | 442.0533 | 829.3542   | -124.0667 | 490.1038 |
| 135   | 829.3542   | -124.0667 | 490.1038 | 689.7185   | -146.2613 | 538.2579 |
| 136   | 689.7185   | -146.2613 | 538.2579 | 533.5443   | -174.3354 | 593.5981 |
| 137   | 533.5443   | -174.3354 | 593.5981 | 212.3931   | -206.8861 | 669.4843 |
| 138   | 212.3931   | -206.8861 | 669.4843 | -199.7068  | -232.8578 | 727.4518 |
| 139   | -199.7068  | -232.8578 | 727.4518 | -705.0517  | -259.6260 | 788.4568 |
| 140   | -705.0517  | -259.6260 | 788.4568 | -1305.6256 | -125.3963 | 449.0396 |
| 141   | -1305.6256 | -125.3963 | 449.0396 | -1227.9135 | 35.9152   | 49.6953  |
| 142   | -1227.9135 | 35.9152   | 49.6953  | -1121.4642 | 34.6154   | 57.8223  |
| 143   | -1121.4642 | 34.6154   | 57.8223  | -987.9587  | 32.2939   | 69.7442  |
| 144   | -987.9587  | 32.2939   | 69.7442  | -829.3591  | 28.8127   | 85.7433  |
| 145   | -829.3591  | 28.8127   | 85.7433  | -717.6447  | 26.5980   | 95.4110  |
| 146   | -717.6447  | 26.5980   | 95.4110  | -532.4884  | 21.1395   | 118.0512 |
| 147   | -532.4884  | 21.1395   | 118.0512 | -333.2534  | 14.2493   | 145.0170 |
| 148   | -333.2534  | 14.2493   | 145.0170 | -125.5554  | 5.8274    | 176.1401 |
| 149   | -125.5554  | 5.8274    | 176.1401 | 84.0863    | -4.2167   | 211.4908 |
| 150   | 84.0863    | -4.2167   | 211.4908 | 178.4037   | -9.8757   | 230.7477 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 178.4037 | -9.8757   | 230.7477 | 365.2617 | -22.5023  | 272.4390 |
| 152   | 365.2617 | -22.5023  | 272.4390 | 532.4333 | -36.9142  | 318.2445 |
| 153   | 532.4333 | -36.9142  | 318.2445 | 670.8391 | -53.1428  | 368.0567 |
| 154   | 670.8391 | -53.1428  | 368.0567 | 770.7112 | -71.2957  | 422.2581 |
| 155   | 770.7112 | -71.2957  | 422.2581 | 730.0852 | -81.0602  | 451.2716 |
| 156   | 730.0852 | -81.0602  | 451.2716 | 735.1427 | -102.0421 | 508.7866 |
| 157   | 735.1427 | -102.0421 | 508.7866 | 675.1476 | -124.9208 | 566.5486 |
| 158   | 675.1476 | -124.9208 | 566.5486 | 539.3349 | -149.7000 | 624.6319 |
| 159   | 539.3349 | -149.7000 | 624.6319 | 317.7086 | -176.3690 | 683.5242 |
| 160   | 317.7086 | -176.3690 | 683.5242 | 0.0651   | -190.3872 | 714.3076 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0488     | 186.0199  | -699.4655 | 309.9424   | 172.1848  | -668.9353 |
| 2     | 309.9424   | 172.1848  | -668.9353 | 525.3846   | 145.9100  | -610.5319 |
| 3     | 525.3846   | 145.9100  | -610.5319 | 656.5803   | 121.5128  | -555.6500 |
| 4     | 656.5803   | 121.5128  | -555.6500 | 713.3723   | 99.0220   | -501.7816 |
| 5     | 713.3723   | 99.0220   | -501.7816 | 796.8984   | 80.9870   | -453.5132 |
| 6     | 796.8984   | 80.9870   | -453.5132 | 744.3805   | 68.8764   | -421.0094 |
| 7     | 744.3805   | 68.8764   | -421.0094 | 645.1371   | 51.1444   | -367.6409 |
| 8     | 645.1371   | 51.1444   | -367.6409 | 508.7629   | 35.2705   | -317.7255 |
| 9     | 508.7629   | 35.2705   | -317.7255 | 344.6796   | 21.2326   | -271.8990 |
| 10    | 344.6796   | 21.2326   | -271.8990 | 161.8663   | 8.9601    | -230.2419 |
| 11    | 161.8663   | 8.9601    | -230.2419 | 69.1451    | 3.4656    | -210.9941 |
| 12    | 69.1451    | 3.4656    | -210.9941 | -135.1750  | -6.2756   | -175.6512 |
| 13    | -135.1750  | -6.2756   | -175.6512 | -337.1378  | -14.4060  | -144.4805 |
| 14    | -337.1378  | -14.4060  | -144.4805 | -530.2660  | -21.0267  | -117.6084 |
| 15    | -530.2660  | -21.0267  | -117.6084 | -709.1533  | -26.2407  | -94.8116  |
| 16    | -709.1533  | -26.2407  | -94.8116  | -817.2566  | -28.3522  | -85.3414  |
| 17    | -817.2566  | -28.3522  | -85.3414  | -969.3235  | -31.6621  | -69.2975  |
| 18    | -969.3235  | -31.6621  | -69.2975  | -1096.6771 | -33.8268  | -57.1871  |
| 19    | -1096.6771 | -33.8268  | -57.1871  | -1197.2722 | -34.9948  | -49.4870  |
| 20    | -1197.2722 | -34.9948  | -49.4870  | -1269.5919 | -42.6690  | -44.2669  |
| 21    | -1269.5919 | -42.6690  | -44.2669  | -678.2235  | -181.8361 | -714.9459 |
| 22    | -678.2235  | -181.8361 | -714.9459 | 221.1494   | 202.1031  | -657.0339 |
| 23    | -181.8361  | 221.1494  | 202.1031  | 533.6993   | 169.8540  | -581.2389 |
| 24    | 533.6993   | 169.8540  | -581.2389 | 683.1018   | 142.2830  | -526.3895 |
| 25    | 683.1018   | 142.2830  | -526.3895 | 816.2009   | 120.4627  | -479.2099 |
| 26    | 816.2009   | 120.4627  | -479.2099 | 877.2024   | 99.9507   | -434.5798 |
| 27    | 877.2024   | 99.9507   | -434.5798 | 73.3202    | 54.9127   | -323.7755 |
| 28    | 73.3202    | 54.9127   | -323.7755 | 593.4766   | 39.5147   | -281.0190 |
| 29    | 593.4766   | 39.5147   | -281.0190 | 445.8835   | 25.6364   | -241.5672 |
| 30    | 445.8835   | 25.6364   | -241.5672 | 165.7947   | 7.6965    | -188.9713 |
| 31    | 165.7947   | 7.6965    | -188.9713 | -24.8226   | -2.3794   | -158.2473 |
| 32    | -24.8226   | -2.3794   | -158.2473 | -224.1445  | -10.9756  | -130.9643 |
| 33    | -224.1445  | -10.9756  | -130.9643 | -424.4001  | -18.1359  | -107.2901 |
| 34    | -424.4001  | -18.1359  | -107.2901 | -681.8557  | -26.3098  | -78.1414  |
| 35    | -681.8557  | -26.3098  | -78.1414  | -851.1122  | -30.1640  | -63.2949  |
| 36    | -851.1122  | -30.1640  | -63.2949  | -1001.6032 | -32.8626  | -51.9694  |
| 37    | -1001.6032 | -32.8626  | -51.9694  | -1129.5442 | -34.5146  | -43.8888  |
| 38    | -1129.5442 | -34.5146  | -43.8888  | -1232.5122 | -64.4139  | -775.7837 |
| 39    | -1232.5122 | -64.4139  | -775.7837 | -151.2433  | 248.1881  | -656.8387 |
| 40    | -151.2433  | 248.1881  | -656.8387 | 556.9711   | 169.0108  | -581.0271 |
| 41    | 556.9711   | 169.0108  | -581.0271 | 701.5414   | 141.5757  | -526.2010 |
| 42    | 701.5414   | 141.5757  | -526.2010 | 830.9906   | 119.8468  | -479.1713 |
| 43    | 830.9906   | 119.8468  | -479.1713 | 888.7953   | 99.4290   | -434.5125 |
| 44    | 888.7953   | 99.4290   | -434.5125 | 882.5815   | 72.9070   | -368.7059 |
| 45    | 882.5815   | 72.9070   | -368.7059 | 709.6563   | 54.5944   | -323.8710 |
| 46    | 709.6563   | 54.5944   | -323.8710 | 596.8323   | 39.2715   | -280.9427 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 596.8323   | 39.2715   | -280.9427 | 447.6957   | 25.4898   | -241.5319 |
| 52    | 447.6957   | 25.4898   | -241.5319 | 166.0329   | 7.6607    | -188.9420 |
| 53    | 166.0329   | 7.6607    | -188.9420 | -25.1062   | -2.3365   | -158.1954 |
| 54    | -25.1062   | -2.3365   | -158.1954 | -224.6212  | -10.8542  | -130.9597 |
| 55    | -224.6212  | -10.8542  | -130.9597 | -424.7628  | -17.9384  | -107.1357 |
| 56    | -424.7628  | -17.9384  | -107.1357 | -681.7621  | -26.0567  | -78.0742  |
| 57    | -681.7621  | -26.0567  | -78.0742  | -850.3536  | -29.8695  | -63.1997  |
| 58    | -850.3536  | -29.8695  | -63.1997  | -1000.1045 | -32.5481  | -51.7333  |
| 59    | -1000.1045 | -32.5481  | -51.7333  | -1127.1821 | -34.1811  | -43.9701  |
| 60    | -1127.1821 | -34.1811  | -43.9701  | -1229.3376 | -43.9701  | -43.9701  |
| 61    | -1229.3376 | -43.9701  | -43.9701  | 122.8550   | 122.8550  | -438.6571 |
| 62    | -122.8550  | 122.8550  | -438.6571 | 253.3548   | 253.3548  | -775.6383 |
| 63    | 253.3548   | 253.3548  | -775.6383 | -148.1703  | 226.8254  | -714.7380 |
| 64    | -148.1703  | 226.8254  | -714.7380 | 250.9477   | 201.1370  | -656.7985 |
| 65    | 250.9477   | 201.1370  | -656.7985 | 559.3717   | 168.9300  | -581.0123 |
| 66    | 559.3717   | 168.9300  | -581.0123 | 703.3493   | 141.4810  | -526.2920 |
| 67    | 703.3493   | 141.4810  | -526.2920 | 832.4333   | 119.7202  | -479.1988 |
| 68    | 832.4333   | 119.7202  | -479.1988 | 889.7949   | 99.3023   | -434.5644 |
| 69    | 889.7949   | 99.3023   | -434.5644 | 883.1700   | 72.7852   | -368.8842 |
| 70    | 883.1700   | 72.7852   | -368.8842 | 709.9393   | 54.5494   | -323.9033 |
| 71    | 709.9393   | 54.5494   | -323.9033 | 597.0056   | 39.2388   | -280.8912 |
| 72    | 597.0056   | 39.2388   | -280.8912 | 447.7902   | 25.4719   | -241.5058 |
| 73    | 447.7902   | 25.4719   | -241.5058 | 166.0585   | 7.6580    | -188.9933 |
| 74    | 166.0585   | 7.6580    | -188.9933 | -25.0763   | -2.3354   | -158.2474 |
| 75    | -25.0763   | -2.3354   | -158.2474 | -224.5598  | -10.8514  | -131.0057 |
| 76    | -224.5598  | -10.8514  | -131.0057 | -424.6725  | -17.9477  | -107.2002 |
| 77    | -424.6725  | -17.9477  | -107.2002 | -681.6469  | -26.0382  | -78.2327  |
| 78    | -681.6469  | -26.0382  | -78.2327  | -850.1500  | -29.8746  | -63.2304  |
| 79    | -850.1500  | -29.8746  | -63.2304  | -999.9221  | -32.5495  | -51.8080  |
| 80    | -999.9221  | -32.5495  | -51.8080  | -1126.9719 | -34.1779  | -44.1985  |
| 81    | -1126.9719 | -34.1779  | -44.1985  | -1228.9856 | -44.1985  | -438.8641 |
| 82    | -1228.9856 | -44.1985  | -438.8641 | 122.8242   | 122.8242  | -775.7217 |
| 83    | 122.8242   | 122.8242  | -775.7217 | -148.0976  | 226.7753  | -714.7217 |
| 84    | -148.0976  | 226.7753  | -714.7217 | 250.8642   | 201.0942  | -656.7053 |
| 85    | 250.8642   | 201.0942  | -656.7053 | 559.2338   | 168.9109  | -580.9651 |
| 86    | 559.2338   | 168.9109  | -580.9651 | 703.4185   | 141.4840  | -526.1165 |
| 87    | 703.4185   | 141.4840  | -526.1165 | 832.3445   | 119.7374  | -479.2657 |
| 88    | 832.3445   | 119.7374  | -479.2657 | 889.7432   | 99.3371   | -434.6446 |
| 89    | 889.7432   | 99.3371   | -434.6446 | 883.3809   | 72.8249   | -368.5547 |
| 90    | 883.3809   | 72.8249   | -368.5547 | 710.2098   | 54.5471   | -323.6768 |
| 91    | 710.2098   | 54.5471   | -323.6768 | 597.1340   | 39.2423   | -281.0024 |
| 92    | 597.1340   | 39.2423   | -281.0024 | 447.9557   | 25.4710   | -241.4762 |
| 93    | 447.9557   | 25.4710   | -241.4762 | 166.3804   | 7.6739    | -188.9540 |
| 94    | 166.3804   | 7.6739    | -188.9540 | -24.7451   | -2.3203   | -158.2218 |
| 95    | -24.7451   | -2.3203   | -158.2218 | -224.1375  | -10.8366  | -130.9865 |
| 96    | -224.1375  | -10.8366  | -130.9865 | -424.2158  | -17.9314  | -107.2237 |
| 97    | -424.2158  | -17.9314  | -107.2237 | -681.1681  | -26.0458  | -78.1616  |
| 98    | -681.1681  | -26.0458  | -78.1616  | -849.7458  | -29.8645  | -63.3317  |
| 99    | -849.7458  | -29.8645  | -63.3317  | -999.5768  | -32.5427  | -51.8545  |
| 100   | -999.5768  | -32.5427  | -51.8545  | -1126.7329 | -34.1761  | -44.0818  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1228.9392 | 122.8232  | -439.0002 | -640.9297  | 253.3152  | -775.8094 |
| 102   | -640.9297  | 253.3152  | -775.8094 | -148.5130  | 226.8096  | -714.7089 |
| 103   | -148.5130  | 226.8096  | -714.7089 | 250.5067   | 201.1575  | -656.7599 |
| 104   | 250.5067   | 201.1575  | -656.7599 | 559.1472   | 168.9964  | -580.9387 |
| 105   | 559.1472   | 168.9964  | -580.9387 | 703.5664   | 141.6055  | -526.1063 |
| 106   | 703.5664   | 141.6055  | -526.1063 | 833.0513   | 119.9128  | -479.1034 |
| 107   | 833.0513   | 119.9128  | -479.1034 | 890.8925   | 99.5042   | -434.4373 |
| 108   | 890.8925   | 99.5042   | -434.4373 | 884.9229   | 73.0123   | -368.7749 |
| 109   | 884.9229   | 73.0123   | -368.7749 | 712.5605   | 54.7846   | -323.7803 |
| 110   | 712.5605   | 54.7846   | -323.7803 | 600.4382   | 39.5177   | -280.8862 |
| 111   | 600.4382   | 39.5177   | -280.8862 | 452.1173   | 25.7584   | -241.4558 |
| 112   | 452.1173   | 25.7584   | -241.4558 | 171.4906   | 7.9707    | -188.8900 |
| 113   | 171.4906   | 7.9707    | -188.8900 | -18.7537   | -2.0038   | -158.1411 |
| 114   | -18.7537   | -2.0038   | -158.1411 | -217.3383  | -10.5119  | -130.9150 |
| 115   | -217.3383  | -10.5119  | -130.9150 | -416.6587  | -17.5885  | -107.1652 |
| 116   | -416.6587  | -17.5885  | -107.1652 | -673.2023  | -25.7020  | -77.9991  |
| 117   | -673.2023  | -25.7020  | -77.9991  | -841.6260  | -29.5491  | -63.0275  |
| 118   | -841.6260  | -29.5491  | -63.0275  | -991.7461  | -32.2639  | -51.8669  |
| 119   | -991.7461  | -32.2639  | -51.8669  | -1119.8447 | -33.9504  | -43.9072  |
| 120   | -1119.8447 | -33.9504  | -43.9072  | -1225.0764 | -438.0918 | -438.0918 |
| 121   | -1225.0764 | -438.0918 | -438.0918 | -640.2689  | 253.2263  | -774.4922 |
| 122   | -640.2689  | 253.2263  | -774.4922 | -150.0374  | 227.0973  | -713.1403 |
| 123   | -150.0374  | 227.0973  | -713.1403 | 248.1472   | 201.8907  | -654.9498 |
| 124   | 248.1472   | 201.8907  | -654.9498 | 557.8815   | 170.2577  | -578.7482 |
| 125   | 557.8815   | 170.2577  | -578.7482 | 706.6326   | 143.8016  | -523.3279 |
| 126   | 706.6326   | 143.8016  | -523.3279 | 843.6714   | 122.8060  | -476.0849 |
| 127   | 843.6714   | 122.8060  | -476.0849 | 912.8327   | 103.2439  | -430.9610 |
| 128   | 912.8327   | 103.2439  | -430.9610 | 922.6874   | 77.6667   | -364.7396 |
| 129   | 922.6874   | 77.6667   | -364.7396 | 776.4760   | 60.9247   | -319.2687 |
| 130   | 776.4760   | 60.9247   | -319.2687 | 692.2352   | 46.7498   | -275.7958 |
| 131   | 692.2352   | 46.7498   | -275.7958 | 672.4529   | 25.2654   | -212.9651 |
| 132   | 672.4529   | 25.2654   | -212.9651 | 684.2961   | -12.2371  | -106.9339 |
| 133   | 684.2961   | -12.2371  | -106.9339 | 617.3843   | -49.7438  | -0.7763   |
| 134   | 617.3843   | -49.7438  | -0.7763   | -0.7515    | 0.2167    | -0.0044   |
| 135   | -0.7515    | 0.2167    | -0.0044   | -2.8907    | 2.3719    | -0.0049   |
| 136   | -2.8907    | 2.3719    | -0.0049   | 2.4446     | 2.3716    | -0.0054   |
| 137   | 2.4446     | 2.3716    | -0.0054   | 0.7092     | 0.2162    | -0.0045   |
| 138   | 0.7092     | 0.2162    | -0.0045   | 1.1956     | 0.2162    | -0.0043   |
| 139   | 1.1956     | 0.2162    | -0.0043   | 1.6819     | 0.2162    | -0.0038   |
| 140   | 1.6819     | 0.2162    | -0.0038   | -2309.0090 | 33.2586   | -47.4559  |
| 141   | -2309.0090 | 33.2586   | -47.4559  | -1830.9781 | 298.7355  | -623.3651 |
| 142   | -1830.9781 | 298.7355  | -623.3651 | -1362.9756 | 276.8162  | -566.0367 |
| 143   | -1362.9756 | 276.8162  | -566.0367 | -915.2933  | 252.9794  | -508.4362 |
| 144   | -915.2933  | 252.9794  | -508.4362 | -498.4524  | 227.2398  | -451.0975 |
| 145   | -498.4524  | 227.2398  | -451.0975 | -113.1550  | 213.6781  | -421.3289 |
| 146   | -113.1550  | 213.6781  | -421.3289 | 223.0829   | 184.6498  | -348.2690 |
| 147   | 223.0829   | 184.6498  | -348.2690 | 522.5751   | 154.6744  | -263.4242 |
| 148   | 522.5751   | 154.6744  | -263.4242 | 773.9940   | 124.6673  | -178.4177 |
| 149   | 773.9940   | 124.6673  | -178.4177 | 977.4160   | 94.6720   | -93.5071  |
| 150   | 977.4160   | 94.6720   | -93.5071  | 1132.8589  | 79.6833   | -50.8855  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|----------|-----------|---------|
| 151   | 1132.8589 | 79.6833   | -50.8855 | -3.5118  | 0.2166    | -0.0027 |
| 152   | -3.5118   | 0.2166    | -0.0027  | -3.0949  | 0.2147    | -0.0033 |
| 153   | -3.0949   | 0.2147    | -0.0033  | -2.7119  | 0.2152    | -0.0034 |
| 154   | -2.7119   | 0.2152    | -0.0034  | -2.3218  | 0.2149    | -0.0042 |
| 155   | -2.3218   | 0.2149    | -0.0042  | -1.9349  | 0.2149    | -0.0055 |
| 156   | -1.9349   | 0.2149    | -0.0055  | -16.3881 | 2.2768    | -0.0058 |
| 157   | -16.3881  | 2.2768    | -0.0058  | -1.1709  | 0.2169    | -0.0055 |
| 158   | -1.1709   | 0.2169    | -0.0055  | -8.8779  | 2.4664    | -0.0094 |
| 159   | -8.8779   | 2.4664    | -0.0094  | -4.4395  | 2.4661    | -0.0118 |
| 160   | -4.4395   | 2.4661    | -0.0118  | 0.0000   | 2.4659    | -0.0127 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 1     | 0.0055   | 16.1783   | -65.4591 | 33.3260  | 17.8195   | -57.8241 |
| 2     | 33.3260  | 17.8195   | -57.8241 | 62.6576  | 15.3198   | -50.7476 |
| 3     | 62.6576  | 15.3198   | -50.7476 | 88.0070  | 12.8177   | -43.6559 |
| 4     | 88.0070  | 12.8177   | -43.6559 | 109.3291 | 10.3154   | -36.5784 |
| 5     | 109.3291 | 10.3154   | -36.5784 | 126.6541 | 8.4425    | -31.2534 |
| 6     | 126.6541 | 8.4425    | -31.2534 | 139.7395 | 6.5682    | -25.9288 |
| 7     | 139.7395 | 6.5682    | -25.9288 | 148.8242 | 4.0623    | -18.8086 |
| 8     | 148.8242 | 4.0623    | -18.8086 | 153.8889 | 1.5575    | -11.7214 |
| 9     | 153.8889 | 1.5575    | -11.7214 | 154.9428 | -0.9463   | -4.6262  |
| 10    | 154.9428 | -0.9463   | -4.6262  | 151.9934 | -2.8222   | 0.7314   |
| 11    | 151.9934 | -2.8222   | 0.7314   | 144.7943 | -4.6929   | 6.0561   |
| 12    | 144.7943 | -4.6929   | 6.0561   | 133.5983 | -7.1926   | 13.1501  |
| 13    | 133.5983 | -7.1926   | 13.1501  | 118.3985 | -9.6953   | 20.2397  |
| 14    | 118.3985 | -9.6953   | 20.2397  | 99.1776  | -12.1959  | 27.3451  |
| 15    | 99.1776  | -12.1959  | 27.3451  | 75.9807  | -14.0700  | 32.6447  |
| 16    | 75.9807  | -14.0700  | 32.6447  | 48.5032  | -15.9462  | 37.9553  |
| 17    | 48.5032  | -15.9462  | 37.9553  | 17.0441  | -18.4455  | 45.0427  |
| 18    | 17.0441  | -18.4455  | 45.0427  | -0.0088  | -0.0003   | 0.1820   |
| 19    | -0.0088  | -0.0003   | 0.1820   | -0.0093  | -0.0003   | 0.0949   |
| 20    | -0.0093  | -0.0003   | 0.0949   | -0.0098  | 0.0000    | 0.0077   |
| 21    | -0.0098  | 0.0000    | 0.0077   | -0.0091  | 0.0003    | 0.0077   |
| 22    | -0.0091  | 0.0003    | 0.0077   | -0.0085  | 0.0003    | 0.0077   |
| 23    | -0.0085  | 0.0003    | 0.0077   | -0.0079  | 0.0003    | 0.0077   |
| 24    | -0.0079  | 0.0003    | 0.0077   | -0.0073  | 0.0003    | 0.0077   |
| 25    | -0.0073  | 0.0003    | 0.0077   | 27.0743  | 16.7560   | -36.2507 |
| 26    | 27.0743  | 16.7560   | -36.2507 | 62.2923  | 14.2550   | -29.1601 |
| 27    | 62.2923  | 14.2550   | -29.1601 | 91.2439  | 11.7542   | -22.0784 |
| 28    | 91.2439  | 11.7542   | -22.0784 | 113.9437 | 8.6313    | -13.3752 |
| 29    | 113.9437 | 8.6313    | -13.3752 | 130.0882 | 5.5057    | -4.4862  |
| 30    | 130.0882 | 5.5057    | -4.4862  | 139.9772 | 3.0054    | 2.5932   |
| 31    | 139.9772 | 3.0054    | 2.5932   | 143.6107 | 0.5060    | 9.7022   |
| 32    | 143.6107 | 0.5060    | 9.7022   | 140.9924 | -2.6170   | 18.6003  |
| 33    | 140.9924 | -2.6170   | 18.6003  | 131.8219 | -5.7380   | 27.4292  |
| 34    | 131.8219 | -5.7380   | 27.4292  | 116.4038 | -8.2371   | 34.5296  |
| 35    | 116.4038 | -8.2371   | 34.5296  | 94.7210  | -10.7369  | 41.6594  |
| 36    | 94.7210  | -10.7369  | 41.6594  | 66.8128  | -13.8619  | 50.5078  |
| 37    | 66.8128  | -13.8619  | 50.5078  | 32.3114  | -16.9884  | 59.3414  |
| 38    | 32.3114  | -16.9884  | 59.3414  | 15.1730  | 2.8759    | 2.5925   |
| 39    | 15.1730  | 2.8759    | 2.5925   | 21.6443  | 2.8759    | 2.5973   |
| 40    | 21.6443  | 2.8759    | 2.5973   | 28.1157  | 1.0387    | 1.3358   |
| 41    | 28.1157  | 1.0387    | 1.3358   | 26.3198  | -0.7984   | 0.0720   |
| 42    | 26.3198  | -0.7984   | 0.0720   | 24.5232  | -0.7984   | 0.0808   |
| 43    | 24.5232  | -0.7984   | 0.0808   | 22.7261  | -0.7984   | 0.0882   |
| 44    | 22.7261  | -0.7984   | 0.0882   | 20.9296  | -0.7984   | 0.0913   |
| 45    | 20.9296  | -0.7984   | 0.0913   | 24.9109  | 16.8522   | -35.4603 |
| 46    | 24.9109  | 16.8522   | -35.4603 | 60.3390  | 14.3531   | -28.3799 |
| 47    | 60.3390  | 14.3531   | -28.3799 | 89.5195  | 11.8561   | -21.2969 |
| 48    | 89.5195  | 11.8561   | -21.2969 | 112.4460 | 8.7311    | -12.4368 |
| 49    | 112.4460 | 8.7311    | -12.4368 | 128.8070 | 5.6018    | -3.7330  |
| 50    | 128.8070 | 5.6018    | -3.7330  | 138.9085 | 3.0996    | 3.3726   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 138.9085 | 3.0996    | 3.3726   | 142.7539 | 0.5964    | 10.4782  |
| 52    | 142.7539 | 0.5964    | 10.4782  | 140.3401 | -2.5299   | 19.3498  |
| 53    | 140.3401 | -2.5299   | 19.3498  | 131.3549 | -5.6554   | 28.2446  |
| 54    | 131.3549 | -5.6554   | 28.2446  | 116.1198 | -8.1553   | 35.3465  |
| 55    | 116.1198 | -8.1553   | 35.3465  | 94.6433  | -10.6550  | 42.4240  |
| 56    | 94.6433  | -10.6550  | 42.4240  | 66.9028  | -13.7796  | 51.2753  |
| 57    | 66.9028  | -13.7796  | 51.2753  | 32.5865  | -16.9045  | 60.1256  |
| 58    | 32.5865  | -16.9045  | 60.1256  | 16.2956  | 3.0891    | 3.3550   |
| 59    | 16.2956  | 3.0891    | 3.3550   | 23.2456  | 3.0895    | 3.3651   |
| 60    | 23.2456  | 3.0895    | 3.3651   | 30.1956  | 1.1165    | 1.7321   |
| 61    | 30.1956  | 1.1165    | 1.7321   | 28.2677  | -0.8568   | 0.1006   |
| 62    | 28.2677  | -0.8568   | 0.1006   | 26.3399  | -0.8568   | 0.1139   |
| 63    | 26.3399  | -0.8568   | 0.1139   | 24.4122  | -0.8571   | 0.1220   |
| 64    | 24.4122  | -0.8571   | 0.1220   | 22.4832  | -0.8576   | 0.1254   |
| 65    | 22.4832  | -0.8576   | 0.1254   | 25.7486  | 16.8141   | -35.4324 |
| 66    | 25.7486  | 16.8141   | -35.4324 | 61.0986  | 14.3130   | -28.3449 |
| 67    | 61.0986  | 14.3130   | -28.3449 | 90.1857  | 11.8117   | -21.2627 |
| 68    | 90.1857  | 11.8117   | -21.2627 | 113.0166 | 8.6877    | -12.4209 |
| 69    | 113.0166 | 8.6877    | -12.4209 | 129.2842 | 5.5638    | -3.6986  |
| 70    | 129.2842 | 5.5638    | -3.6986  | 139.2971 | 3.0628    | 3.4305   |
| 71    | 139.2971 | 3.0628    | 3.4305   | 143.0680 | 0.5608    | 10.5378  |
| 72    | 143.0680 | 0.5608    | 10.5378  | 140.5732 | -2.5658   | 19.3905  |
| 73    | 140.5732 | -2.5658   | 19.3905  | 131.5083 | -5.6878   | 28.2825  |
| 74    | 131.5083 | -5.6878   | 28.2825  | 116.2013 | -8.1870   | 35.3827  |
| 75    | 116.2013 | -8.1870   | 35.3827  | 94.6568  | -10.6864  | 42.4612  |
| 76    | 94.6568  | -10.6864  | 42.4612  | 66.8287  | -13.8114  | 51.3266  |
| 77    | 66.8287  | -13.8114  | 51.3266  | 32.4727  | -16.9369  | 60.1694  |
| 78    | 32.4727  | -16.9369  | 60.1694  | 16.1729  | 3.0645    | 3.3850   |
| 79    | 16.1729  | 3.0645    | 3.3850   | 23.0656  | 3.0642    | 3.3974   |
| 80    | 23.0656  | 3.0642    | 3.3974   | 29.9590  | 1.1064    | 1.7514   |
| 81    | 29.9590  | 1.1064    | 1.7514   | 28.0449  | -0.8509   | 0.1031   |
| 82    | 28.0449  | -0.8509   | 0.1031   | 26.1299  | -0.8506   | 0.1116   |
| 83    | 26.1299  | -0.8506   | 0.1116   | 24.2164  | -0.8508   | 0.1230   |
| 84    | 24.2164  | -0.8508   | 0.1230   | 22.3019  | -0.8511   | 0.1274   |
| 85    | 22.3019  | -0.8511   | 0.1274   | 25.5544  | 16.8215   | -35.4209 |
| 86    | 25.5544  | 16.8215   | -35.4209 | 60.9056  | 14.3207   | -28.3541 |
| 87    | 60.9056  | 14.3207   | -28.3541 | 90.0101  | 11.8225   | -21.4164 |
| 88    | 90.0101  | 11.8225   | -21.4164 | 112.8756 | 8.6976    | -12.3809 |
| 89    | 112.8756 | 8.6976    | -12.3809 | 129.1624 | 5.5693    | -3.5157  |
| 90    | 129.1624 | 5.5693    | -3.5157  | 139.1903 | 3.0658    | 3.4021   |
| 91    | 139.1903 | 3.0658    | 3.4021   | 142.9498 | 0.5650    | 10.5354  |
| 92    | 142.9498 | 0.5650    | 10.5354  | 140.4743 | -2.5544   | 19.4072  |
| 93    | 140.4743 | -2.5544   | 19.4072  | 131.4432 | -5.6750   | 28.2518  |
| 94    | 131.4432 | -5.6750   | 28.2518  | 116.1524 | -8.1755   | 35.3762  |
| 95    | 116.1524 | -8.1755   | 35.3762  | 94.6134  | -10.6764  | 42.4731  |
| 96    | 94.6134  | -10.6764  | 42.4731  | 66.8329  | -13.8011  | 51.3257  |
| 97    | 66.8329  | -13.8011  | 51.3257  | 32.4779  | -16.9261  | 60.1692  |
| 98    | 32.4779  | -16.9261  | 60.1692  | 16.2201  | 3.0721    | 3.3819   |
| 99    | 16.2201  | 3.0721    | 3.3819   | 23.1290  | 3.0721    | 3.3928   |
| 100   | 23.1290  | 3.0721    | 3.3928   | 30.0397  | 1.1093    | 1.7522   |



ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| ===== |          |           |          |          |           |          |
| 101   | 30.0397  | 1.1093    | 1.7522   | 28.1199  | -0.8535   | 0.1002   |
| 102   | 28.1199  | -0.8535   | 0.1002   | 26.1999  | -0.8532   | 0.1083   |
| 103   | 26.1999  | -0.8532   | 0.1083   | 24.2810  | -0.8530   | 0.1207   |
| 104   | 24.2810  | -0.8530   | 0.1207   | 22.3608  | -0.8533   | 0.1249   |
| 105   | 22.3608  | -0.8533   | 0.1249   | 25.6038  | 16.8166   | -35.4244 |
| 106   | 25.6038  | 16.8166   | -35.4244 | 60.9602  | 14.3163   | -28.3449 |
| 107   | 60.9602  | 14.3163   | -28.3449 | 90.0444  | 11.8138   | -21.2589 |
| 108   | 90.0444  | 11.8138   | -21.2589 | 112.8788 | 8.6864    | -12.5593 |
| 109   | 112.8788 | 8.6864    | -12.5593 | 129.1432 | 5.5599    | -3.5454  |
| 110   | 129.1432 | 5.5599    | -3.5454  | 139.1693 | 3.0666    | 3.4121   |
| 111   | 139.1693 | 3.0666    | 3.4121   | 142.9356 | 0.5636    | 10.5189  |
| 112   | 142.9356 | 0.5636    | 10.5189  | 140.4364 | -2.5680   | 19.3923  |
| 113   | 140.4364 | -2.5680   | 19.3923  | 131.3680 | -5.6946   | 28.2640  |
| 114   | 131.3680 | -5.6946   | 28.2640  | 116.0459 | -8.1942   | 35.3867  |
| 115   | 116.0459 | -8.1942   | 35.3867  | 94.4654  | -10.6938  | 42.4825  |
| 116   | 94.4654  | -10.6938  | 42.4825  | 66.6514  | -13.8174  | 51.3244  |
| 117   | 66.6514  | -13.8174  | 51.3244  | 32.2781  | -16.9416  | 60.1581  |
| 118   | 32.2781  | -16.9416  | 60.1581  | 16.2749  | 3.0736    | 3.3895   |
| 119   | 16.2749  | 3.0736    | 3.3895   | 23.1895  | 3.0735    | 3.3948   |
| 120   | 23.1895  | 3.0735    | 3.3948   | 30.1049  | 1.1063    | 1.7490   |
| 121   | 30.1049  | 1.1063    | 1.7490   | 28.1671  | -0.8610   | 0.1031   |
| 122   | 28.1671  | -0.8610   | 0.1031   | 26.2299  | -0.8611   | 0.1115   |
| 123   | 26.2299  | -0.8611   | 0.1115   | 24.2929  | -0.8611   | 0.1198   |
| 124   | 24.2929  | -0.8611   | 0.1198   | 22.3554  | -0.8612   | 0.1235   |
| 125   | 22.3554  | -0.8612   | 0.1235   | 25.4123  | 16.7178   | -35.3855 |
| 126   | 25.4123  | 16.7178   | -35.3855 | 60.5475  | 14.2204   | -28.3173 |
| 127   | 60.5475  | 14.2204   | -28.3173 | 89.4175  | 11.7224   | -21.2269 |
| 128   | 89.4175  | 11.7224   | -21.2269 | 112.0513 | 8.5972    | -12.3678 |
| 129   | 112.0513 | 8.5972    | -12.3678 | 128.1168 | 5.4705    | -3.5215  |
| 130   | 128.1168 | 5.4705    | -3.5215  | 137.9212 | 2.9697    | 3.4613   |
| 131   | 137.9212 | 2.9697    | 3.4613   | 141.4772 | 0.4685    | 10.5670  |
| 132   | 141.4772 | 0.4685    | 10.5670  | 138.7767 | -2.6586   | 19.4147  |
| 133   | 138.7767 | -2.6586   | 19.4147  | 129.5038 | -5.7836   | 28.2899  |
| 134   | 129.5038 | -5.7836   | 28.2899  | 113.9792 | -8.2847   | 35.3927  |
| 135   | 113.9792 | -8.2847   | 35.3927  | 92.1961  | -10.7849  | 42.4984  |
| 136   | 92.1961  | -10.7849  | 42.4984  | 64.1744  | -13.9088  | 51.3537  |
| 137   | 64.1744  | -13.9088  | 51.3537  | 29.5890  | -17.0347  | 60.1877  |
| 138   | 29.5890  | -17.0347  | 60.1877  | 17.0854  | 3.1007    | 3.3924   |
| 139   | 17.0854  | 3.1007    | 3.3924   | 24.0594  | 3.1006    | 3.3990   |
| 140   | 24.0594  | 3.1006    | 3.3990   | 31.0361  | 1.1193    | 1.7684   |
| 141   | 31.0361  | 1.1193    | 1.7684   | 29.4841  | -0.8621   | 0.1398   |
| 142   | 29.4841  | -0.8621   | 0.1398   | 27.9324  | -0.8621   | 0.1402   |
| 143   | 27.9324  | -0.8621   | 0.1402   | 26.3806  | -0.8622   | 0.1455   |
| 144   | 26.3806  | -0.8622   | 0.1455   | 24.8279  | -0.8622   | 0.1558   |
| 145   | 24.8279  | -0.8622   | 0.1558   | 23.2761  | -0.8622   | 0.1600   |
| 146   | 23.2761  | -0.8622   | 0.1600   | 21.7244  | -0.8615   | 0.1644   |
| 147   | 21.7244  | -0.8615   | 0.1644   | 45.7618  | 12.7938   | -15.8558 |
| 148   | 45.7618  | 12.7938   | -15.8558 | 66.5390  | 10.2934   | -8.7710  |
| 149   | 66.5390  | 10.2934   | -8.7710  | 83.3247  | 7.7963    | -1.6935  |
| 150   | 83.3247  | 7.7963    | -1.6935  | 96.1077  | 6.5459    | 1.8576   |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 151   | 96.1077  | 6.5459    | 1.8576  | 104.6383 | 4.0441    | 8.9594  |
| 152   | 104.6383 | 4.0441    | 8.9594  | 109.1632 | 1.5452    | 16.0418 |
| 153   | 109.1632 | 1.5452    | 16.0418 | 109.6947 | -0.9543   | 23.1025 |
| 154   | 109.6947 | -0.9543   | 23.1025 | 106.2095 | -3.4574   | 30.2052 |
| 155   | 106.2095 | -3.4574   | 30.2052 | 98.7122  | -4.7107   | 33.7992 |
| 156   | 98.7122  | -4.7107   | 33.7992 | 86.9802  | -7.2121   | 40.8636 |
| 157   | 86.9802  | -7.2121   | 40.8636 | 71.2507  | -9.7121   | 47.9237 |
| 158   | 71.2507  | -9.7121   | 47.9237 | 51.4976  | -12.2114  | 55.0109 |
| 159   | 51.4976  | -12.2114  | 55.0109 | 27.7507  | -14.7104  | 62.0883 |
| 160   | 27.7507  | -14.7104  | 62.0883 | 0.0053   | -13.5904  | 59.1891 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | 0.0002    | -0.0003   | 0.1820   | -0.0002   | -0.0003   | 0.1820   |
| 2     | -0.0002   | -0.0003   | 0.1820   | -0.0007   | -0.0003   | 0.1820   |
| 3     | -0.0007   | -0.0003   | 0.1820   | -0.0012   | -0.0003   | 0.1820   |
| 4     | -0.0012   | -0.0003   | 0.1820   | -0.0017   | -0.0003   | 0.1820   |
| 5     | -0.0017   | -0.0003   | 0.1820   | -0.0022   | -0.0003   | 0.1820   |
| 6     | -0.0022   | -0.0003   | 0.1820   | -0.0027   | -0.0003   | 0.1820   |
| 7     | -0.0027   | -0.0003   | 0.1820   | -0.0033   | -0.0003   | 0.1820   |
| 8     | -0.0033   | -0.0003   | 0.1820   | -0.0038   | -0.0003   | 0.1820   |
| 9     | -0.0038   | -0.0003   | 0.1820   | -0.0042   | -0.0003   | 0.1820   |
| 10    | -0.0042   | -0.0003   | 0.1820   | -0.0048   | -0.0003   | 0.1820   |
| 11    | -0.0048   | -0.0003   | 0.1820   | -0.0052   | -0.0003   | 0.1820   |
| 12    | -0.0052   | -0.0003   | 0.1820   | -0.0058   | -0.0003   | 0.1820   |
| 13    | -0.0058   | -0.0003   | 0.1820   | -0.0063   | -0.0003   | 0.1820   |
| 14    | -0.0063   | -0.0003   | 0.1820   | -0.7541   | -16.1576  | 23.2530  |
| 15    | -0.7541   | -16.1576  | 23.2530  | -31.0813  | -18.0321  | 28.5552  |
| 16    | -31.0813  | -18.0321  | 28.5552  | -65.6886  | -19.9072  | 33.8200  |
| 17    | -65.6886  | -19.9072  | 33.8200  | -104.2737 | -22.4074  | 40.8636  |
| 18    | -104.2737 | -22.4074  | 40.8636  | -146.8660 | -24.9072  | 47.9190  |
| 19    | -146.8660 | -24.9072  | 47.9190  | -193.4574 | -27.4071  | 54.9140  |
| 20    | -193.4574 | -27.4071  | 54.9140  | -244.0329 | 0.9244    | -8.3546  |
| 21    | -244.0329 | 0.9244    | -8.3546  | -177.2436 | 28.0060   | -68.0807 |
| 22    | -177.2436 | 28.0060   | -68.0807 | -116.6915 | 25.5056   | -61.0856 |
| 23    | -116.6915 | 25.5056   | -61.0856 | -81.9203  | 2.8785    | 2.7409   |
| 24    | -81.9203  | 2.8785    | 2.7409   | -75.4433  | 2.8786    | 2.7407   |
| 25    | -75.4433  | 2.8786    | 2.7407   | -68.9682  | 2.8786    | 2.7191   |
| 26    | -68.9682  | 2.8786    | 2.7191   | -62.4937  | 2.8784    | 2.6786   |
| 27    | -62.4937  | 2.8784    | 2.6786   | -56.0194  | 2.8779    | 2.6596   |
| 28    | -56.0194  | 2.8779    | 2.6596   | -49.5456  | 2.8776    | 2.6508   |
| 29    | -49.5456  | 2.8776    | 2.6508   | -43.0703  | 2.8780    | 2.6285   |
| 30    | -43.0703  | 2.8780    | 2.6285   | -36.5936  | 2.8784    | 2.6212   |
| 31    | -36.5936  | 2.8784    | 2.6212   | -30.1212  | 2.8781    | 2.6123   |
| 32    | -30.1212  | 2.8781    | 2.6123   | -23.6455  | 2.8774    | 2.7406   |
| 33    | -23.6455  | 2.8774    | 2.7406   | -17.1735  | 2.8756    | 2.7397   |
| 34    | -17.1735  | 2.8756    | 2.7397   | -10.7053  | 2.8747    | 2.7361   |
| 35    | -10.7053  | 2.8747    | 2.7361   | -4.2392   | 2.8746    | 2.7312   |
| 36    | -4.2392   | 2.8746    | 2.7312   | -36.0761  | -17.8253  | 47.0993  |
| 37    | -36.0761  | -17.8253  | 47.0993  | -79.4933  | -20.9507  | 55.8968  |
| 38    | -79.4933  | -20.9507  | 55.8968  | -129.1400 | -23.4508  | 62.9414  |
| 39    | -129.1400 | -23.4508  | 62.9414  | -185.0508 | -25.9508  | 69.9639  |
| 40    | -185.0508 | -25.9508  | 69.9639  | -247.2282 | 1.0756    | 1.3179   |
| 41    | -247.2282 | 1.0756    | 1.3179   | -180.2665 | 28.1021   | -67.3022 |
| 42    | -180.2665 | 28.1021   | -67.3022 | -119.5141 | 25.6020   | -60.2923 |
| 43    | -119.5141 | 25.6020   | -60.2923 | -87.8833  | 3.0861    | 3.5152   |
| 44    | -87.8833  | 3.0861    | 3.5152   | -80.9398  | 3.0865    | 3.5032   |
| 45    | -80.9398  | 3.0865    | 3.5032   | -73.9965  | 3.0866    | 3.4805   |
| 46    | -73.9965  | 3.0866    | 3.4805   | -67.0560  | 3.0859    | 3.4457   |
| 47    | -67.0560  | 3.0859    | 3.4457   | -60.1141  | 3.0847    | 3.4268   |
| 48    | -60.1141  | 3.0847    | 3.4268   | -53.1791  | 3.0848    | 3.4093   |
| 49    | -53.1791  | 3.0848    | 3.4093   | -46.2374  | 3.0860    | 3.4007   |
| 50    | -46.2374  | 3.0860    | 3.4007   | -39.2928  | 3.0865    | 3.3885   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | -39.2928  | 3.0865    | 3.3885   | -32.3478  | 3.0869    | 3.3770   |
| 52    | -32.3478  | 3.0869    | 3.3770   | -25.4015  | 3.0881    | 3.3685   |
| 53    | -25.4015  | 3.0881    | 3.3685   | -18.4547  | 3.0880    | 3.5011   |
| 54    | -18.4547  | 3.0880    | 3.5011   | -11.5055  | 3.0883    | 3.4963   |
| 55    | -11.5055  | 3.0883    | 3.4963   | -4.5585   | 3.0887    | 3.4949   |
| 56    | -4.5585   | 3.0887    | 3.4949   | -35.9670  | -17.7050  | 47.8741  |
| 57    | -35.9670  | -17.7050  | 47.8741  | -79.1167  | -20.8300  | 56.6924  |
| 58    | -79.1167  | -20.8300  | 56.6924  | -128.4832 | -23.3301  | 63.7355  |
| 59    | -128.4832 | -23.3301  | 63.7355  | -184.1378 | -25.8301  | 70.7183  |
| 60    | -184.1378 | -25.8301  | 70.7183  | -246.0283 | 1.1192    | 1.7341   |
| 61    | -246.0283 | 1.1192    | 1.7341   | -179.1045 | 28.0683   | -67.2477 |
| 62    | -179.1045 | 28.0683   | -67.2477 | -118.4235 | 25.5684   | -60.2616 |
| 63    | -118.4235 | 25.5684   | -60.2616 | -87.2169  | 3.0602    | 3.5370   |
| 64    | -87.2169  | 3.0602    | 3.5370   | -80.3315  | 3.0618    | 3.5248   |
| 65    | -80.3315  | 3.0618    | 3.5248   | -73.4414  | 3.0631    | 3.5124   |
| 66    | -73.4414  | 3.0631    | 3.5124   | -66.5501  | 3.0640    | 3.4781   |
| 67    | -66.5501  | 3.0640    | 3.4781   | -59.6561  | 3.0642    | 3.4571   |
| 68    | -59.6561  | 3.0642    | 3.4571   | -52.7610  | 3.0643    | 3.4501   |
| 69    | -52.7610  | 3.0643    | 3.4501   | -45.8697  | 3.0639    | 3.4355   |
| 70    | -45.8697  | 3.0639    | 3.4355   | -38.9779  | 3.0631    | 3.4150   |
| 71    | -38.9779  | 3.0631    | 3.4150   | -32.0856  | 3.0638    | 3.4024   |
| 72    | -32.0856  | 3.0638    | 3.4024   | -25.1919  | 3.0654    | 3.3977   |
| 73    | -25.1919  | 3.0654    | 3.3977   | -18.2975  | 3.0638    | 3.5322   |
| 74    | -18.2975  | 3.0638    | 3.5322   | -11.4015  | 3.0635    | 3.5266   |
| 75    | -11.4015  | 3.0635    | 3.5266   | -4.5147   | 3.0634    | 3.5261   |
| 76    | -4.5147   | 3.0634    | 3.5261   | -36.0205  | -17.7353  | 47.9037  |
| 77    | -36.0205  | -17.7353  | 47.9037  | -79.2004  | -20.8604  | 56.7331  |
| 78    | -79.2004  | -20.8604  | 56.7331  | -128.6534 | -23.3605  | 63.7663  |
| 79    | -128.6534 | -23.3605  | 63.7663  | -184.3825 | -25.8605  | 70.7309  |
| 80    | -184.3825 | -25.8605  | 70.7309  | -246.3141 | 1.1061    | 1.7233   |
| 81    | -246.3141 | 1.1061    | 1.7233   | -179.3678 | 28.0732   | -67.2575 |
| 82    | -179.3678 | 28.0732   | -67.2575 | -118.6691 | 25.5735   | -60.2429 |
| 83    | -118.6691 | 25.5735   | -60.2429 | -87.4537  | 3.0707    | 3.5413   |
| 84    | -87.4537  | 3.0707    | 3.5413   | -80.5457  | 3.0701    | 3.5259   |
| 85    | -80.5457  | 3.0701    | 3.5259   | -73.6376  | 3.0712    | 3.5031   |
| 86    | -73.6376  | 3.0712    | 3.5031   | -66.7267  | 3.0721    | 3.4794   |
| 87    | -66.7267  | 3.0721    | 3.4794   | -59.8177  | 3.0711    | 3.4690   |
| 88    | -59.8177  | 3.0711    | 3.4690   | -52.9097  | 3.0717    | 3.4335   |
| 89    | -52.9097  | 3.0717    | 3.4335   | -45.9970  | 3.0725    | 3.4172   |
| 90    | -45.9970  | 3.0725    | 3.4172   | -39.0825  | 3.0743    | 3.4169   |
| 91    | -39.0825  | 3.0743    | 3.4169   | -32.1636  | 3.0753    | 3.4016   |
| 92    | -32.1636  | 3.0753    | 3.4016   | -25.2472  | 3.0724    | 3.5347   |
| 93    | -25.2472  | 3.0724    | 3.5347   | -18.3367  | 3.0718    | 3.5331   |
| 94    | -18.3367  | 3.0718    | 3.5331   | -11.4272  | 3.0718    | 3.5252   |
| 95    | -11.4272  | 3.0718    | 3.5252   | -4.5163   | 3.0709    | 3.5224   |
| 96    | -4.5163   | 3.0709    | 3.5224   | -35.9613  | -17.7249  | 47.9117  |
| 97    | -35.9613  | -17.7249  | 47.9117  | -79.1443  | -20.8497  | 56.7196  |
| 98    | -79.1443  | -20.8497  | 56.7196  | -128.5814 | -23.3497  | 63.7720  |
| 99    | -128.5814 | -23.3497  | 63.7720  | -184.2614 | -25.8498  | 70.7496  |
| 100   | -184.2614 | -25.8498  | 70.7496  | -246.1819 | 1.1082    | 1.6990   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -246.1819 | 1.1082    | 1.6990   | -179.2634 | 28.0667   | -67.2623 |
| 102   | -179.2634 | 28.0667   | -67.2623 | -118.5962 | 25.5672   | -60.2364 |
| 103   | -118.5962 | 25.5672   | -60.2364 | -87.3904  | 3.0695    | 3.5482   |
| 104   | -87.3904  | 3.0695    | 3.5482   | -80.4822  | 3.0703    | 3.5329   |
| 105   | -80.4822  | 3.0703    | 3.5329   | -73.5757  | 3.0697    | 3.5097   |
| 106   | -73.5757  | 3.0697    | 3.5097   | -66.6713  | 3.0699    | 3.4767   |
| 107   | -66.6713  | 3.0699    | 3.4767   | -59.7654  | 3.0713    | 3.4576   |
| 108   | -59.7654  | 3.0713    | 3.4576   | -52.8561  | 3.0726    | 3.4474   |
| 109   | -52.8561  | 3.0726    | 3.4474   | -45.9451  | 3.0722    | 3.4336   |
| 110   | -45.9451  | 3.0722    | 3.4336   | -39.0363  | 3.0715    | 3.4188   |
| 111   | -39.0363  | 3.0715    | 3.4188   | -32.1283  | 3.0726    | 3.4088   |
| 112   | -32.1283  | 3.0726    | 3.4088   | -25.2158  | 3.0739    | 3.3984   |
| 113   | -25.2158  | 3.0739    | 3.3984   | -18.3016  | 3.0732    | 3.5363   |
| 114   | -18.3016  | 3.0732    | 3.5363   | -11.3890  | 3.0735    | 3.5283   |
| 115   | -11.3890  | 3.0735    | 3.5283   | -4.4734   | 3.0735    | 3.5259   |
| 116   | -4.4734   | 3.0735    | 3.5259   | -35.2378  | -17.7023  | 47.9303  |
| 117   | -35.2378  | -17.7023  | 47.9303  | -78.3513  | -20.8272  | 56.7453  |
| 118   | -78.3513  | -20.8272  | 56.7453  | -127.7479 | -23.3272  | 63.7542  |
| 119   | -127.7479 | -23.3272  | 63.7542  | -183.3825 | -25.8272  | 70.7765  |
| 120   | -183.3825 | -25.8272  | 70.7765  | -245.2508 | 1.0712    | 1.7694   |
| 121   | -245.2508 | 1.0712    | 1.7694   | -178.5726 | 27.9697   | -67.2381 |
| 122   | -178.5726 | 27.9697   | -67.2381 | -118.1216 | 25.4695   | -60.2132 |
| 123   | -118.1216 | 25.4695   | -60.2132 | -87.5177  | 3.0990    | 3.5528   |
| 124   | -87.5177  | 3.0990    | 3.5528   | -80.5434  | 3.0996    | 3.5392   |
| 125   | -80.5434  | 3.0996    | 3.5392   | -73.5668  | 3.0987    | 3.5030   |
| 126   | -73.5668  | 3.0987    | 3.5030   | -66.5954  | 3.0970    | 3.4820   |
| 127   | -66.5954  | 3.0970    | 3.4820   | -59.6290  | 3.0975    | 3.4640   |
| 128   | -59.6290  | 3.0975    | 3.4640   | -52.6604  | 3.0979    | 3.4433   |
| 129   | -52.6604  | 3.0979    | 3.4433   | -45.6869  | 3.0976    | 3.4375   |
| 130   | -45.6869  | 3.0976    | 3.4375   | -38.7199  | 3.0980    | 3.4179   |
| 131   | -38.7199  | 3.0980    | 3.4179   | -31.7433  | 3.0992    | 3.4057   |
| 132   | -31.7433  | 3.0992    | 3.4057   | -24.7705  | 3.0993    | 3.5463   |
| 133   | -24.7705  | 3.0993    | 3.5463   | -17.7951  | 3.0992    | 3.5385   |
| 134   | -17.7951  | 3.0992    | 3.5385   | -10.8207  | 3.0997    | 3.5338   |
| 135   | -10.8207  | 3.0997    | 3.5338   | -3.8471   | 3.1003    | 3.5314   |
| 136   | -3.8471   | 3.1003    | 3.5314   | -11.2622  | -16.7847  | 48.6214  |
| 137   | -11.2622  | -16.7847  | 48.6214  | -52.3156  | -19.9097  | 57.4406  |
| 138   | -52.3156  | -19.9097  | 57.4406  | -99.6393  | -22.4093  | 64.4799  |
| 139   | -99.6393  | -22.4093  | 64.4799  | -153.1979 | -24.9092  | 71.5016  |
| 140   | -153.1979 | -24.9092  | 71.5016  | -213.0029 | 0.1923    | 10.1926  |
| 141   | -213.0029 | 0.1923    | 10.1926  | -163.9633 | 26.5439   | -54.6565 |
| 142   | -163.9633 | 26.5439   | -54.6565 | -118.9263 | 24.0437   | -47.6036 |
| 143   | -118.9263 | 24.0437   | -47.6036 | -94.9632  | 3.1040    | 4.2995   |
| 144   | -94.9632  | 3.1040    | 4.2995   | -89.3746  | 3.1049    | 4.2626   |
| 145   | -89.3746  | 3.1049    | 4.2626   | -83.7879  | 3.1042    | 4.2484   |
| 146   | -83.7879  | 3.1042    | 4.2484   | -78.2020  | 3.1023    | 4.2307   |
| 147   | -78.2020  | 3.1023    | 4.2307   | -72.6203  | 3.1014    | 4.2176   |
| 148   | -72.6203  | 3.1014    | 4.2176   | -67.0415  | 3.1019    | 4.1898   |
| 149   | -67.0415  | 3.1019    | 4.1898   | -61.4594  | 3.1021    | 4.1757   |
| 150   | -61.4594  | 3.1021    | 4.1757   | -55.8796  | 3.1023    | 4.1631   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | -55.8796 | 3.1023    | 4.1631  | -50.2931 | 3.1026    | 4.1425  |
| 152   | -50.2931 | 3.1026    | 4.1425  | -44.7092 | 3.1012    | 4.1335  |
| 153   | -44.7092 | 3.1012    | 4.1335  | -39.1276 | 3.1035    | 4.1334  |
| 154   | -39.1276 | 3.1035    | 4.1334  | -33.5385 | 3.1065    | 4.1210  |
| 155   | -33.5385 | 3.1065    | 4.1210  | -27.9520 | 3.1070    | 4.1022  |
| 156   | -27.9520 | 3.1070    | 4.1022  | -22.3578 | 3.1071    | 4.1010  |
| 157   | -22.3578 | 3.1071    | 4.1010  | -16.7682 | 3.1063    | 4.1027  |
| 158   | -16.7682 | 3.1063    | 4.1027  | -11.1777 | 3.1061    | 4.0965  |
| 159   | -11.1777 | 3.1061    | 4.0965  | -5.5899  | 3.1055    | 4.0936  |
| 160   | -5.5899  | 3.1055    | 4.0936  | -0.0003  | 1.8147    | 2.0661  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | 0.0048    | 19.0700   | -61.3555 | 33.3260   | 17.8195   | -57.8241 |
| 2     | 33.3260   | 17.8195   | -57.8241 | 62.6576   | 15.3198   | -50.7476 |
| 3     | 62.6576   | 15.3198   | -50.7476 | 88.0040   | 12.8180   | -43.4829 |
| 4     | 88.0040   | 12.8180   | -43.4829 | 109.3263  | 10.3162   | -36.4042 |
| 5     | 109.3263  | 10.3162   | -36.4042 | 126.6494  | 8.4432    | -31.0788 |
| 6     | 126.6494  | 8.4432    | -31.0788 | 139.7325  | 6.5696    | -25.7530 |
| 7     | 139.7325  | 6.5696    | -25.7530 | 148.8174  | 4.0659    | -18.6349 |
| 8     | 148.8174  | 4.0659    | -18.6349 | 153.8857  | 1.5588    | -11.5484 |
| 9     | 153.8857  | 1.5588    | -11.5484 | -0.0042   | -0.0003   | 0.1820   |
| 10    | -0.0042   | -0.0003   | 0.1820   | -0.0048   | -0.0003   | 0.1820   |
| 11    | -0.0048   | -0.0003   | 0.1820   | -0.0052   | -0.0003   | 0.1820   |
| 12    | -0.0052   | -0.0003   | 0.1820   | -0.0058   | -0.0003   | 0.1820   |
| 13    | -0.0058   | -0.0003   | 0.1820   | -0.0063   | -0.0003   | 0.1820   |
| 14    | -0.0063   | -0.0003   | 0.1820   | -0.0068   | -0.0003   | 0.1820   |
| 15    | -0.0068   | -0.0003   | 0.1820   | -0.0072   | -0.0003   | 0.1820   |
| 16    | -0.0072   | -0.0003   | 0.1820   | -0.0078   | -0.0003   | 0.1820   |
| 17    | -0.0078   | -0.0003   | 0.1820   | -0.0083   | -0.0003   | 0.1820   |
| 18    | -0.0083   | -0.0003   | 0.1820   | -0.0088   | -0.0003   | 0.1820   |
| 19    | -0.0088   | -0.0003   | 0.1820   | -0.0093   | -0.0003   | 0.1820   |
| 20    | -0.0093   | -0.0003   | 0.1820   | -244.0329 | 0.9244    | -8.3546  |
| 21    | -244.0329 | 0.9244    | -8.3546  | -177.2436 | 28.0060   | -68.0807 |
| 22    | -177.2436 | 28.0060   | -68.0807 | -116.6915 | 25.5056   | -61.0856 |
| 23    | -116.6915 | 25.5056   | -61.0856 | -62.4071  | 23.0053   | -54.0585 |
| 24    | -62.4071  | 23.0053   | -54.0585 | -14.3874  | 19.8807   | -45.0873 |
| 25    | -14.3874  | 19.8807   | -45.0873 | 27.0743   | 16.7560   | -36.2507 |
| 26    | 27.0743   | 16.7560   | -36.2507 | 62.2881   | 14.2552   | -29.3043 |
| 27    | 62.2881   | 14.2552   | -29.3043 | 91.2430   | 11.7556   | -22.2233 |
| 28    | 91.2430   | 11.7556   | -22.2233 | 113.9437  | 8.6313    | -13.3752 |
| 29    | 113.9437  | 8.6313    | -13.3752 | 130.0852  | 5.5063    | -4.3419  |
| 30    | 130.0852  | 5.5063    | -4.3419  | 139.9756  | 3.0055    | 2.7361   |
| 31    | 139.9756  | 3.0055    | 2.7361   | -30.1212  | 2.8781    | 2.6123   |
| 32    | -30.1212  | 2.8781    | 2.6123   | -23.6454  | 2.8777    | 2.5975   |
| 33    | -23.6454  | 2.8777    | 2.5975   | -17.1719  | 2.8765    | 2.5975   |
| 34    | -17.1719  | 2.8765    | 2.5975   | -10.7025  | 2.8760    | 2.5935   |
| 35    | -10.7025  | 2.8760    | 2.5935   | -4.2343   | 2.8758    | 2.5886   |
| 36    | -4.2343   | 2.8758    | 2.5886   | 2.2336    | 2.8756    | 2.5869   |
| 37    | 2.2336    | 2.8756    | 2.5869   | 8.7043    | 2.8760    | 2.5907   |
| 38    | 8.7043    | 2.8760    | 2.5907   | 15.1730   | 2.8759    | 2.5925   |
| 39    | 15.1730   | 2.8759    | 2.5925   | 21.6443   | 2.8759    | 2.5973   |
| 40    | 21.6443   | 2.8759    | 2.5973   | -247.2282 | 1.0756    | 1.3179   |
| 41    | -247.2282 | 1.0756    | 1.3179   | -180.2665 | 28.1021   | -67.3022 |
| 42    | -180.2665 | 28.1021   | -67.3022 | -119.5141 | 25.6020   | -60.2923 |
| 43    | -119.5141 | 25.6020   | -60.2923 | -65.0022  | 23.1023   | -53.2597 |
| 44    | -65.0022  | 23.1023   | -53.2597 | -16.7672  | 19.9775   | -44.4404 |
| 45    | -16.7672  | 19.9775   | -44.4404 | 24.9060   | 16.8523   | -35.6042 |
| 46    | 24.9060   | 16.8523   | -35.6042 | 60.3365   | 14.3537   | -28.5246 |
| 47    | 60.3365   | 14.3537   | -28.5246 | 89.5178   | 11.8561   | -21.4401 |
| 48    | 89.5178   | 11.8561   | -21.4401 | 112.4460  | 8.7311    | -12.4368 |
| 49    | 112.4460  | 8.7311    | -12.4368 | 128.8047  | 5.6025    | -3.5893  |
| 50    | 128.8047  | 5.6025    | -3.5893  | 138.9029  | 3.1010    | 3.5163   |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | 138.9029  | 3.1010    | 3.5163   | -32.3478  | 3.0869    | 3.3770   |
| 52    | -32.3478  | 3.0869    | 3.3770   | -25.4015  | 3.0881    | 3.3685   |
| 53    | -25.4015  | 3.0881    | 3.3685   | -18.4524  | 3.0888    | 3.3572   |
| 54    | -18.4524  | 3.0888    | 3.3572   | -11.5021  | 3.0887    | 3.3523   |
| 55    | -11.5021  | 3.0887    | 3.3523   | -4.5542   | 3.0889    | 3.3510   |
| 56    | -4.5542   | 3.0889    | 3.3510   | 2.3948    | 3.0890    | 3.3518   |
| 57    | 2.3948    | 3.0890    | 3.3518   | 9.3466    | 3.0890    | 3.3526   |
| 58    | 9.3466    | 3.0890    | 3.3526   | 16.2956   | 3.0891    | 3.3550   |
| 59    | 16.2956   | 3.0891    | 3.3550   | 23.2456   | 3.0895    | 3.3651   |
| 60    | 23.2456   | 3.0895    | 3.3651   | -246.0283 | 1.1192    | 1.7341   |
| 61    | -246.0283 | 1.1192    | 1.7341   | -179.1045 | 28.0683   | -67.2477 |
| 62    | -179.1045 | 28.0683   | -67.2477 | -118.4235 | 25.5684   | -60.2616 |
| 63    | -118.4235 | 25.5684   | -60.2616 | -63.9901  | 23.0676   | -53.2286 |
| 64    | -63.9901  | 23.0676   | -53.2286 | -15.8386  | 19.9404   | -44.4090 |
| 65    | -15.8386  | 19.9404   | -44.4090 | 25.7486   | 16.8141   | -35.4324 |
| 66    | 25.7486   | 16.8141   | -35.4324 | 61.0986   | 14.3130   | -28.3449 |
| 67    | 61.0986   | 14.3130   | -28.3449 | 90.1857   | 11.8117   | -21.2627 |
| 68    | 90.1857   | 11.8117   | -21.2627 | 113.0164  | 8.6888    | -12.5646 |
| 69    | 113.0164  | 8.6888    | -12.5646 | 129.2842  | 5.5638    | -3.6986  |
| 70    | 129.2842  | 5.5638    | -3.6986  | -38.9779  | 3.0631    | 3.4150   |
| 71    | -38.9779  | 3.0631    | 3.4150   | -32.0856  | 3.0638    | 3.4024   |
| 72    | -32.0856  | 3.0638    | 3.4024   | -25.1919  | 3.0654    | 3.3977   |
| 73    | -25.1919  | 3.0654    | 3.3977   | -18.2939  | 3.0649    | 3.3882   |
| 74    | -18.2939  | 3.0649    | 3.3882   | -11.3996  | 3.0642    | 3.3832   |
| 75    | -11.3996  | 3.0642    | 3.3832   | -4.5093   | 3.0642    | 3.3819   |
| 76    | -4.5093   | 3.0642    | 3.3819   | 2.3859    | 3.0640    | 3.3819   |
| 77    | 2.3859    | 3.0640    | 3.3819   | 9.2782    | 3.0641    | 3.3812   |
| 78    | 9.2782    | 3.0641    | 3.3812   | 16.1729   | 3.0645    | 3.3850   |
| 79    | 16.1729   | 3.0645    | 3.3850   | 23.0656   | 3.0642    | 3.3974   |
| 80    | 23.0656   | 3.0642    | 3.3974   | 29.9590   | 1.1064    | 1.7514   |
| 81    | 29.9590   | 1.1064    | 1.7514   | -179.3678 | 28.0732   | -67.2575 |
| 82    | -179.3678 | 28.0732   | -67.2575 | -118.6691 | 25.5735   | -60.2429 |
| 83    | -118.6691 | 25.5735   | -60.2429 | -64.2346  | 23.0735   | -53.2169 |
| 84    | -64.2346  | 23.0735   | -53.2169 | -16.0672  | 19.9477   | -44.4062 |
| 85    | -16.0672  | 19.9477   | -44.4062 | 25.5544   | 16.8215   | -35.4209 |
| 86    | 25.5544   | 16.8215   | -35.4209 | 60.9016   | 14.3213   | -28.4988 |
| 87    | 60.9016   | 14.3213   | -28.4988 | 90.0101   | 11.8225   | -21.4164 |
| 88    | 90.0101   | 11.8225   | -21.4164 | 112.8756  | 8.6976    | -12.3809 |
| 89    | 112.8756  | 8.6976    | -12.3809 | 129.1624  | 5.5693    | -3.5157  |
| 90    | 129.1624  | 5.5693    | -3.5157  | -39.0825  | 3.0743    | 3.4169   |
| 91    | -39.0825  | 3.0743    | 3.4169   | -32.1636  | 3.0753    | 3.4016   |
| 92    | -32.1636  | 3.0753    | 3.4016   | -25.2470  | 3.0736    | 3.3902   |
| 93    | -25.2470  | 3.0736    | 3.3902   | -18.3351  | 3.0724    | 3.3889   |
| 94    | -18.3351  | 3.0724    | 3.3889   | -11.4240  | 3.0720    | 3.3814   |
| 95    | -11.4240  | 3.0720    | 3.3814   | -4.5120   | 3.0714    | 3.3787   |
| 96    | -4.5120   | 3.0714    | 3.3787   | 2.3963    | 3.0712    | 3.3784   |
| 97    | 2.3963    | 3.0712    | 3.3784   | 9.3068    | 3.0715    | 3.3810   |
| 98    | 9.3068    | 3.0715    | 3.3810   | 16.2201   | 3.0721    | 3.3819   |
| 99    | 16.2201   | 3.0721    | 3.3819   | 23.1290   | 3.0721    | 3.3928   |
| 100   | 23.1290   | 3.0721    | 3.3928   | 30.0397   | 1.1093    | 1.7522   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | 30.0397   | 1.1093    | 1.7522   | -179.2634 | 28.0667   | -67.2623 |
| 102   | -179.2634 | 28.0667   | -67.2623 | -118.5962 | 25.5672   | -60.2364 |
| 103   | -118.5962 | 25.5672   | -60.2364 | -64.1720  | 23.0668   | -53.2223 |
| 104   | -64.1720  | 23.0668   | -53.2223 | -16.0047  | 19.9407   | -44.4045 |
| 105   | -16.0047  | 19.9407   | -44.4045 | 25.6038   | 16.8166   | -35.4244 |
| 106   | 25.6038   | 16.8166   | -35.4244 | 60.9602   | 14.3163   | -28.3449 |
| 107   | 60.9602   | 14.3163   | -28.3449 | 90.0423   | 11.8142   | -21.4034 |
| 108   | 90.0423   | 11.8142   | -21.4034 | 112.8788  | 8.6864    | -12.5593 |
| 109   | 112.8788  | 8.6864    | -12.5593 | 129.1424  | 5.5626    | -3.6918  |
| 110   | 129.1424  | 5.5626    | -3.6918  | -39.0363  | 3.0715    | 3.4188   |
| 111   | -39.0363  | 3.0715    | 3.4188   | -32.1283  | 3.0726    | 3.4088   |
| 112   | -32.1283  | 3.0726    | 3.4088   | -25.2158  | 3.0739    | 3.3984   |
| 113   | -25.2158  | 3.0739    | 3.3984   | -18.3004  | 3.0745    | 3.3923   |
| 114   | -18.3004  | 3.0745    | 3.3923   | -11.3861  | 3.0743    | 3.3843   |
| 115   | -11.3861  | 3.0743    | 3.3843   | -4.4689   | 3.0743    | 3.3814   |
| 116   | -4.4689   | 3.0743    | 3.3814   | 2.4471    | 3.0738    | 3.3814   |
| 117   | 2.4471    | 3.0738    | 3.3814   | 9.3601    | 3.0735    | 3.3828   |
| 118   | 9.3601    | 3.0735    | 3.3828   | 16.2749   | 3.0736    | 3.3895   |
| 119   | 16.2749   | 3.0736    | 3.3895   | 23.1895   | 3.0735    | 3.3948   |
| 120   | 23.1895   | 3.0735    | 3.3948   | 30.1049   | 1.1063    | 1.7490   |
| 121   | 30.1049   | 1.1063    | 1.7490   | -178.5726 | 27.9697   | -67.2381 |
| 122   | -178.5726 | 27.9697   | -67.2381 | -118.1216 | 25.4695   | -60.2132 |
| 123   | -118.1216 | 25.4695   | -60.2132 | -63.9260  | 22.9696   | -53.1875 |
| 124   | -63.9260  | 22.9696   | -53.1875 | -15.9889  | 19.8438   | -44.3619 |
| 125   | -15.9889  | 19.8438   | -44.3619 | 25.4077   | 16.7193   | -35.5283 |
| 126   | 25.4077   | 16.7193   | -35.5283 | 60.5447   | 14.2220   | -28.4598 |
| 127   | 60.5447   | 14.2220   | -28.4598 | 89.4175   | 11.7224   | -21.2269 |
| 128   | 89.4175   | 11.7224   | -21.2269 | 112.0513  | 8.5972    | -12.3678 |
| 129   | 112.0513  | 8.5972    | -12.3678 | 128.1168  | 5.4705    | -3.5215  |
| 130   | 128.1168  | 5.4705    | -3.5215  | -38.7161  | 3.0981    | 3.5620   |
| 131   | -38.7161  | 3.0981    | 3.5620   | -31.7433  | 3.0992    | 3.4057   |
| 132   | -31.7433  | 3.0992    | 3.4057   | -24.7697  | 3.0999    | 3.4024   |
| 133   | -24.7697  | 3.0999    | 3.4024   | -17.7940  | 3.1000    | 3.3951   |
| 134   | -17.7940  | 3.1000    | 3.3951   | -10.8173  | 3.1002    | 3.3899   |
| 135   | -10.8173  | 3.1002    | 3.3899   | -3.8421   | 3.1006    | 3.3874   |
| 136   | -3.8421   | 3.1006    | 3.3874   | 3.1323    | 3.1008    | 3.3870   |
| 137   | 3.1323    | 3.1008    | 3.3870   | 10.1081   | 3.1009    | 3.3883   |
| 138   | 10.1081   | 3.1009    | 3.3883   | 17.0854   | 3.1007    | 3.3924   |
| 139   | 17.0854   | 3.1007    | 3.3924   | 24.0594   | 3.1006    | 3.3990   |
| 140   | 24.0594   | 3.1006    | 3.3990   | 31.0361   | 1.1193    | 1.7684   |
| 141   | 31.0361   | 1.1193    | 1.7684   | -163.9633 | 26.5439   | -54.6565 |
| 142   | -163.9633 | 26.5439   | -54.6565 | -118.9263 | 24.0437   | -47.6036 |
| 143   | -118.9263 | 24.0437   | -47.6036 | -77.9007  | 21.5433   | -40.5491 |
| 144   | -77.9007  | 21.5433   | -40.5491 | -40.8374  | 19.0442   | -33.5190 |
| 145   | -40.8374  | 19.0442   | -33.5190 | -7.8138   | 17.7957   | -29.9884 |
| 146   | -7.8138   | 17.7957   | -29.9884 | 20.9743   | 15.2962   | -22.9272 |
| 147   | 20.9743   | 15.2962   | -22.9272 | 45.7618   | 12.7938   | -15.8558 |
| 148   | 45.7618   | 12.7938   | -15.8558 | 66.5390   | 10.2934   | -8.7710  |
| 149   | 66.5390   | 10.2934   | -8.7710  | 83.3247   | 7.7963    | -1.6935  |
| 150   | 83.3247   | 7.7963    | -1.6935  | 96.1077   | 6.5459    | 1.8576   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 96.1077  | 6.5459    | 1.8576  | 104.6383 | 4.0441    | 8.9594  |
| 152   | 104.6383 | 4.0441    | 8.9594  | -44.7009 | 3.1026    | 4.3074  |
| 153   | -44.7009 | 3.1026    | 4.3074  | -39.1276 | 3.1035    | 4.1334  |
| 154   | -39.1276 | 3.1035    | 4.1334  | -33.5385 | 3.1065    | 4.1210  |
| 155   | -33.5385 | 3.1065    | 4.1210  | -27.9472 | 3.1072    | 4.2761  |
| 156   | -27.9472 | 3.1072    | 4.2761  | -22.3578 | 3.1071    | 4.1010  |
| 157   | -22.3578 | 3.1071    | 4.1010  | -16.7682 | 3.1063    | 4.1027  |
| 158   | -16.7682 | 3.1063    | 4.1027  | -11.1777 | 3.1061    | 4.0965  |
| 159   | -11.1777 | 3.1061    | 4.0965  | -5.5887  | 3.1057    | 4.2676  |
| 160   | -5.5887  | 3.1057    | 4.2676  | 0.0008   | 3.1055    | 4.2666  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 1     | 0.0002    | -0.0003   | 0.1820  | 1.1714    | -0.0439   | 0.4517  |
| 2     | 1.1714    | -0.0439   | 0.4517  | 6.5601    | -0.2611   | 1.2552  |
| 3     | 6.5601    | -0.2611   | 1.2552  | 15.2366   | -0.6511   | 2.4162  |
| 4     | 15.2366   | -0.6511   | 2.4162  | 26.2791   | -1.2121   | 3.9321  |
| 5     | 26.2791   | -1.2121   | 3.9321  | 31.0019   | -1.5561   | 4.8280  |
| 6     | 31.0019   | -1.5561   | 4.8280  | 43.1678   | -2.3687   | 6.8847  |
| 7     | 43.1678   | -2.3687   | 6.8847  | 55.3276   | -3.3493   | 9.3101  |
| 8     | 55.3276   | -3.3493   | 9.3101  | 66.6468   | -4.4923   | 12.0903 |
| 9     | 66.6468   | -4.4923   | 12.0903 | 76.3213   | -5.7870   | 15.2267 |
| 10    | 76.3213   | -5.7870   | 15.2267 | 80.5901   | -6.7832   | -3.2608 |
| 11    | 80.5901   | -6.7832   | -3.2608 | 66.2648   | -8.6562   | 2.0469  |
| 12    | 66.2648   | -8.6562   | 2.0469  | 47.9357   | -11.1562  | 9.1241  |
| 13    | 47.9357   | -11.1562  | 9.1241  | 25.5944   | -13.6573  | 16.1847 |
| 14    | 25.5944   | -13.6573  | 16.1847 | -0.7541   | -16.1576  | 23.2530 |
| 15    | -0.7541   | -16.1576  | 23.2530 | -31.0813  | -18.0321  | 28.5552 |
| 16    | -31.0813  | -18.0321  | 28.5552 | -65.6886  | -19.9072  | 33.8200 |
| 17    | -65.6886  | -19.9072  | 33.8200 | -104.2737 | -22.4074  | 40.8636 |
| 18    | -104.2737 | -22.4074  | 40.8636 | -146.8660 | -24.9072  | 47.9190 |
| 19    | -146.8660 | -24.9072  | 47.9190 | -193.4574 | -27.4071  | 54.9140 |
| 20    | -193.4574 | -27.4071  | 54.9140 | -101.3504 | -10.9092  | 32.8347 |
| 21    | -101.3504 | -10.9092  | 32.8347 | -0.0091   | 0.0003    | 0.0077  |
| 22    | -0.0091   | 0.0003    | 0.0077  | -0.0085   | 0.0003    | 0.0077  |
| 23    | -0.0085   | 0.0003    | 0.0077  | -0.0079   | 0.0003    | 0.0077  |
| 24    | -0.0079   | 0.0003    | 0.0077  | -0.0073   | 0.0003    | 0.0077  |
| 25    | -0.0073   | 0.0003    | 0.0077  | -0.0066   | 0.0003    | 0.0077  |
| 26    | -0.0066   | 0.0003    | 0.0077  | -0.0060   | 0.0003    | 0.0077  |
| 27    | -0.0060   | 0.0003    | 0.0077  | -0.0054   | 0.0003    | 0.0077  |
| 28    | -0.0054   | 0.0003    | 0.0077  | 15.2678   | -0.7225   | 15.9557 |
| 29    | 15.2678   | -0.7225   | 15.9557 | 39.0001   | -2.2381   | 20.4860 |
| 30    | 39.0001   | -2.2381   | 20.4860 | 51.5148   | -3.4132   | 23.8759 |
| 31    | 51.5148   | -3.4132   | 23.8759 | 60.9436   | -4.7212   | 27.5698 |
| 32    | 60.9436   | -4.7212   | 27.5698 | 73.7652   | -6.5791   | 15.2926 |
| 33    | 73.7652   | -6.5791   | 15.2926 | 55.6839   | -9.7021   | 24.1209 |
| 34    | 55.6839   | -9.7021   | 24.1209 | 31.3537   | -12.2006  | 31.1996 |
| 35    | 31.3537   | -12.2006  | 31.1996 | 0.7505    | -14.7003  | 38.2661 |
| 36    | 0.7505    | -14.7003  | 38.2661 | -36.0761  | -17.8253  | 47.0993 |
| 37    | -36.0761  | -17.8253  | 47.0993 | -79.4933  | -20.9507  | 55.8968 |
| 38    | -79.4933  | -20.9507  | 55.8968 | -129.1400 | -23.4508  | 62.9414 |
| 39    | -129.1400 | -23.4508  | 62.9414 | -185.0508 | -25.9508  | 69.9639 |
| 40    | -185.0508 | -25.9508  | 69.9639 | -108.7002 | -10.7017  | 42.1248 |
| 41    | -108.7002 | -10.7017  | 42.1248 | 26.3198   | -0.7984   | 0.0720  |
| 42    | 26.3198   | -0.7984   | 0.0720  | 24.5232   | -0.7984   | 0.0808  |
| 43    | 24.5232   | -0.7984   | 0.0808  | 22.7261   | -0.7984   | 0.0882  |
| 44    | 22.7261   | -0.7984   | 0.0882  | 20.9296   | -0.7984   | 0.0913  |
| 45    | 20.9296   | -0.7984   | 0.0913  | 19.1328   | -0.7984   | 0.0973  |
| 46    | 19.1328   | -0.7984   | 0.0973  | 17.3365   | -0.7982   | 0.1062  |
| 47    | 17.3365   | -0.7982   | 0.1062  | 15.5334   | -0.7980   | 0.1171  |
| 48    | 15.5334   | -0.7980   | 0.1171  | 13.7454   | -0.7980   | 0.1155  |
| 49    | 13.7454   | -0.7980   | 0.1155  | 36.8391   | -2.0911   | 21.2568 |
| 50    | 36.8391   | -2.0911   | 21.2568 | 49.7909   | -3.2747   | 24.6504 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 51    | 49.7909   | -3.2747   | 24.6504 | 59.6214   | -4.5906   | 28.3480 |
| 52    | 59.6214   | -4.5906   | 28.3480 | 72.7900   | -6.4543   | 16.0617 |
| 53    | 72.7900   | -6.4543   | 16.0617 | 54.9717   | -9.5798   | 24.9162 |
| 54    | 54.9717   | -9.5798   | 24.9162 | 30.9033   | -12.0796  | 31.9921 |
| 55    | 30.9033   | -12.0796  | 31.9921 | 0.6076    | -14.5798  | 39.0649 |
| 56    | 0.6076    | -14.5798  | 39.0649 | -35.9670  | -17.7050  | 47.8741 |
| 57    | -35.9670  | -17.7050  | 47.8741 | -79.1167  | -20.8300  | 56.6924 |
| 58    | -79.1167  | -20.8300  | 56.6924 | -128.4832 | -23.3301  | 63.7355 |
| 59    | -128.4832 | -23.3301  | 63.7355 | -184.1378 | -25.8301  | 70.7183 |
| 60    | -184.1378 | -25.8301  | 70.7183 | -107.8466 | -10.6742  | 42.5318 |
| 61    | -107.8466 | -10.6742  | 42.5318 | 28.2677   | -0.8568   | 0.1006  |
| 62    | 28.2677   | -0.8568   | 0.1006  | 26.3399   | -0.8568   | 0.1139  |
| 63    | 26.3399   | -0.8568   | 0.1139  | 24.4122   | -0.8571   | 0.1220  |
| 64    | 24.4122   | -0.8571   | 0.1220  | 22.4832   | -0.8576   | 0.1254  |
| 65    | 22.4832   | -0.8576   | 0.1254  | 20.5538   | -0.8577   | 0.1289  |
| 66    | 20.5538   | -0.8577   | 0.1289  | 18.6231   | -0.8578   | 0.1384  |
| 67    | 18.6231   | -0.8578   | 0.1384  | 16.6928   | -0.8579   | 0.1443  |
| 68    | 16.6928   | -0.8579   | 0.1443  | 14.7610   | -0.8579   | 0.1464  |
| 69    | 14.7610   | -0.8579   | 0.1464  | 37.2772   | -2.1220   | 21.2880 |
| 70    | 37.2772   | -2.1220   | 21.2880 | 50.1619   | -3.3054   | 24.6913 |
| 71    | 50.1619   | -3.3054   | 24.6913 | 59.9279   | -4.6221   | 28.3916 |
| 72    | 59.9279   | -4.6221   | 28.3916 | 73.0300   | -6.4863   | 16.0877 |
| 73    | 73.0300   | -6.4863   | 16.0877 | 55.1467   | -9.6112   | 24.9513 |
| 74    | 55.1467   | -9.6112   | 24.9513 | 31.0054   | -12.1105  | 32.0241 |
| 75    | 31.0054   | -12.1105  | 32.0241 | 0.6395    | -14.6105  | 39.0854 |
| 76    | 0.6395    | -14.6105  | 39.0854 | -36.0205  | -17.7353  | 47.9037 |
| 77    | -36.0205  | -17.7353  | 47.9037 | -79.2004  | -20.8604  | 56.7331 |
| 78    | -79.2004  | -20.8604  | 56.7331 | -128.6534 | -23.3605  | 63.7663 |
| 79    | -128.6534 | -23.3605  | 63.7663 | -184.3825 | -25.8605  | 70.7309 |
| 80    | -184.3825 | -25.8605  | 70.7309 | -108.1753 | -10.6830  | 42.5438 |
| 81    | -108.1753 | -10.6830  | 42.5438 | 28.0449   | -0.8509   | 0.1031  |
| 82    | 28.0449   | -0.8509   | 0.1031  | 26.1299   | -0.8506   | 0.1116  |
| 83    | 26.1299   | -0.8506   | 0.1116  | 24.2164   | -0.8508   | 0.1230  |
| 84    | 24.2164   | -0.8508   | 0.1230  | 22.3019   | -0.8511   | 0.1274  |
| 85    | 22.3019   | -0.8511   | 0.1274  | 20.3872   | -0.8511   | 0.1335  |
| 86    | 20.3872   | -0.8511   | 0.1335  | 18.4729   | -0.8510   | 0.1400  |
| 87    | 18.4729   | -0.8510   | 0.1400  | 16.5584   | -0.8507   | 0.1426  |
| 88    | 16.5584   | -0.8507   | 0.1426  | 14.6441   | -0.8509   | 0.1526  |
| 89    | 14.6441   | -0.8509   | 0.1526  | 37.1490   | -2.1138   | 21.3012 |
| 90    | 37.1490   | -2.1138   | 21.3012 | 50.0622   | -3.2991   | 24.6850 |
| 91    | 50.0622   | -3.2991   | 24.6850 | 59.8325   | -4.6165   | 28.3894 |
| 92    | 59.8325   | -4.6165   | 28.3894 | 72.9763   | -6.4769   | 16.1037 |
| 93    | 72.9763   | -6.4769   | 16.1037 | 55.1275   | -9.6010   | 24.9424 |
| 94    | 55.1275   | -9.6010   | 24.9424 | 31.0092   | -12.1007  | 32.0215 |
| 95    | 31.0092   | -12.1007  | 32.0215 | 0.6442    | -14.6003  | 39.0894 |
| 96    | 0.6442    | -14.6003  | 39.0894 | -35.9613  | -17.7249  | 47.9117 |
| 97    | -35.9613  | -17.7249  | 47.9117 | -79.1443  | -20.8497  | 56.7196 |
| 98    | -79.1443  | -20.8497  | 56.7196 | -128.5814 | -23.3497  | 63.7720 |
| 99    | -128.5814 | -23.3497  | 63.7720 | -184.2614 | -25.8498  | 70.7496 |
| 100   | -184.2614 | -25.8498  | 70.7496 | -108.0972 | -10.6793  | 42.5377 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | -108.0972 | -10.6793  | 42.5377 | 28.1199   | -0.8535   | 0.1002  |
| 102   | 28.1199   | -0.8535   | 0.1002  | 26.1999   | -0.8532   | 0.1083  |
| 103   | 26.1999   | -0.8532   | 0.1083  | 24.2810   | -0.8530   | 0.1207  |
| 104   | 24.2810   | -0.8530   | 0.1207  | 22.3608   | -0.8533   | 0.1249  |
| 105   | 22.3608   | -0.8533   | 0.1249  | 20.4402   | -0.8532   | 0.1314  |
| 106   | 20.4402   | -0.8532   | 0.1314  | 18.5200   | -0.8532   | 0.1404  |
| 107   | 18.5200   | -0.8532   | 0.1404  | 16.6002   | -0.8534   | 0.1459  |
| 108   | 16.6002   | -0.8534   | 0.1459  | 14.6792   | -0.8537   | 0.1485  |
| 109   | 14.6792   | -0.8537   | 0.1485  | 37.1801   | -2.1157   | 21.2920 |
| 110   | 37.1801   | -2.1157   | 21.2920 | 50.0790   | -3.3001   | 24.6887 |
| 111   | 50.0790   | -3.3001   | 24.6887 | 59.8479   | -4.6184   | 28.3841 |
| 112   | 59.8479   | -4.6184   | 28.3841 | 73.4935   | -6.4535   | 16.1033 |
| 113   | 73.4935   | -6.4535   | 16.1033 | 55.6890   | -9.5786   | 24.9486 |
| 114   | 55.6890   | -9.5786   | 24.9486 | 31.6274   | -12.0779  | 32.0340 |
| 115   | 31.6274   | -12.0779  | 32.0340 | 1.3196    | -14.5777  | 39.1085 |
| 116   | 1.3196    | -14.5777  | 39.1085 | -35.2378  | -17.7023  | 47.9303 |
| 117   | -35.2378  | -17.7023  | 47.9303 | -78.3513  | -20.8272  | 56.7453 |
| 118   | -78.3513  | -20.8272  | 56.7453 | -127.7479 | -23.3272  | 63.7542 |
| 119   | -127.7479 | -23.3272  | 63.7542 | -183.3825 | -25.8272  | 70.7765 |
| 120   | -183.3825 | -25.8272  | 70.7765 | -108.4078 | -10.6712  | 42.5508 |
| 121   | -108.4078 | -10.6712  | 42.5508 | 28.1671   | -0.8610   | 0.1031  |
| 122   | 28.1671   | -0.8610   | 0.1031  | 26.2299   | -0.8611   | 0.1115  |
| 123   | 26.2299   | -0.8611   | 0.1115  | 24.2929   | -0.8611   | 0.1198  |
| 124   | 24.2929   | -0.8611   | 0.1198  | 22.3554   | -0.8612   | 0.1235  |
| 125   | 22.3554   | -0.8612   | 0.1235  | 20.4175   | -0.8608   | 0.1336  |
| 126   | 20.4175   | -0.8608   | 0.1336  | 18.4811   | -0.8606   | 0.1394  |
| 127   | 18.4811   | -0.8606   | 0.1394  | 16.5456   | -0.8605   | 0.1447  |
| 128   | 16.5456   | -0.8605   | 0.1447  | 14.6098   | -0.8603   | 0.1501  |
| 129   | 14.6098   | -0.8603   | 0.1501  | 37.0131   | -2.1279   | 21.2972 |
| 130   | 37.0131   | -2.1279   | 21.2972 | 49.7805   | -3.3203   | 24.7011 |
| 131   | 49.7805   | -3.3203   | 24.7011 | 59.3754   | -4.6459   | 28.4028 |
| 132   | 59.3754   | -4.6459   | 28.4028 | 73.9536   | -6.2565   | 32.7237 |
| 133   | 73.9536   | -6.2565   | 32.7237 | 73.4771   | -8.6590   | 25.6260 |
| 134   | 73.4771   | -8.6590   | 25.6260 | 51.4800   | -11.1591  | 32.7087 |
| 135   | 51.4800   | -11.1591  | 32.7087 | 23.2295   | -13.6597  | 39.7861 |
| 136   | 23.2295   | -13.6597  | 39.7861 | -11.2622  | -16.7847  | 48.6214 |
| 137   | -11.2622  | -16.7847  | 48.6214 | -52.3156  | -19.9097  | 57.4406 |
| 138   | -52.3156  | -19.9097  | 57.4406 | -99.6393  | -22.4093  | 64.4799 |
| 139   | -99.6393  | -22.4093  | 64.4799 | -153.1979 | -24.9092  | 71.5016 |
| 140   | -153.1979 | -24.9092  | 71.5016 | -111.7189 | -10.7151  | 42.9202 |
| 141   | -111.7189 | -10.7151  | 42.9202 | 29.4841   | -0.8621   | 0.1398  |
| 142   | 29.4841   | -0.8621   | 0.1398  | 27.9324   | -0.8621   | 0.1402  |
| 143   | 27.9324   | -0.8621   | 0.1402  | 26.3806   | -0.8622   | 0.1455  |
| 144   | 26.3806   | -0.8622   | 0.1455  | 24.8279   | -0.8622   | 0.1558  |
| 145   | 24.8279   | -0.8622   | 0.1558  | 23.2761   | -0.8622   | 0.1600  |
| 146   | 23.2761   | -0.8622   | 0.1600  | 21.7244   | -0.8615   | 0.1644  |
| 147   | 21.7244   | -0.8615   | 0.1644  | 20.1744   | -0.8614   | 0.1682  |
| 148   | 20.1744   | -0.8614   | 0.1682  | 18.6240   | -0.8620   | 0.1761  |
| 149   | 18.6240   | -0.8620   | 0.1761  | 17.0730   | -0.8618   | 0.1801  |
| 150   | 17.0730   | -0.8618   | 0.1801  | 15.5229   | -0.8614   | 0.1831  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 15.5229  | -0.8614   | 0.1831  | 28.3186  | -1.7442   | 24.0030 |
| 152   | 28.3186  | -1.7442   | 24.0030 | 42.5177  | -2.9482   | 27.9487 |
| 153   | 42.5177  | -2.9482   | 27.9487 | 54.3650  | -4.3076   | 32.2428 |
| 154   | 54.3650  | -4.3076   | 32.2428 | 63.0373  | -5.8292   | 36.9153 |
| 155   | 63.0373  | -5.8292   | 36.9153 | 59.9239  | -6.6536   | 39.4165 |
| 156   | 59.9239  | -6.6536   | 39.4165 | 60.6936  | -8.4245   | 44.6156 |
| 157   | 60.6936  | -8.4245   | 44.6156 | 56.0089  | -10.3613  | 50.1604 |
| 158   | 56.0089  | -10.3613  | 50.1604 | 44.9347  | -12.4724  | 56.0854 |
| 159   | 44.9347  | -12.4724  | 56.0854 | 26.5790  | -14.7543  | 62.3581 |
| 160   | 26.5790  | -14.7543  | 62.3581 | 0.0052   | -15.9600  | 65.6252 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 1     | 0.0002    | -0.0003   | 0.1820  | 1.1714    | -0.0439   | 0.4517  |
| 2     | 1.1714    | -0.0439   | 0.4517  | 6.5601    | -0.2611   | 1.2552  |
| 3     | 6.5601    | -0.2611   | 1.2552  | 15.2366   | -0.6511   | 2.4162  |
| 4     | 15.2366   | -0.6511   | 2.4162  | 26.2791   | -1.2121   | 3.9321  |
| 5     | 26.2791   | -1.2121   | 3.9321  | 31.0019   | -1.5561   | 4.8280  |
| 6     | 31.0019   | -1.5561   | 4.8280  | 43.1678   | -2.3687   | 6.8847  |
| 7     | 43.1678   | -2.3687   | 6.8847  | 55.3276   | -3.3493   | 9.3101  |
| 8     | 55.3276   | -3.3493   | 9.3101  | 66.6468   | -4.4923   | 12.0903 |
| 9     | 66.6468   | -4.4923   | 12.0903 | 76.3213   | -5.7870   | 15.2267 |
| 10    | 76.3213   | -5.7870   | 15.2267 | 83.5860   | -6.6125   | 16.9805 |
| 11    | 83.5860   | -6.6125   | 16.9805 | 78.8888   | -8.0149   | 20.6352 |
| 12    | 78.8888   | -8.0149   | 20.6352 | 79.7632   | -9.6812   | 24.6810 |
| 13    | 79.7632   | -9.6812   | 24.6810 | 76.4529   | -11.4848  | 29.0789 |
| 14    | 76.4529   | -11.4848  | 29.0789 | 68.3934   | -13.4154  | 33.8493 |
| 15    | 68.3934   | -13.4154  | 33.8493 | 55.1457   | -14.8421  | 37.1854 |
| 16    | 55.1457   | -14.8421  | 37.1854 | 31.5302   | -16.5335  | 41.6388 |
| 17    | 31.5302   | -16.5335  | 41.6388 | 7.7236    | -18.7484  | 47.2909 |
| 18    | 7.7236    | -18.7484  | 47.2909 | -22.2362  | -21.0616  | 53.2719 |
| 19    | -22.2362  | -21.0616  | 53.2719 | -58.5431  | -23.4641  | 59.5739 |
| 20    | -58.5431  | -23.4641  | 59.5739 | -101.3504 | -10.9092  | 32.8347 |
| 21    | -101.3504 | -10.9092  | 32.8347 | -93.0183  | 2.8205    | 3.4362  |
| 22    | -93.0183  | 2.8205    | 3.4362  | -82.4886  | 2.6845    | 4.1351  |
| 23    | -82.4886  | 2.6845    | 4.1351  | -70.0051  | 2.4598    | 5.1294  |
| 24    | -70.0051  | 2.4598    | 5.1294  | -55.9056  | 2.1357    | 6.4410  |
| 25    | -55.9056  | 2.1357    | 6.4410  | -34.3064  | 1.4504    | 8.9421  |
| 26    | -34.3064  | 1.4504    | 8.9421  | -17.5152  | 0.8487    | 10.9722 |
| 27    | -17.5152  | 0.8487    | 10.9722 | -0.7724   | 0.1258    | 13.3140 |
| 28    | -0.7724   | 0.1258    | 13.3140 | 15.2678   | -0.7225   | 15.9557 |
| 29    | 15.2678   | -0.7225   | 15.9557 | 39.0001   | -2.2381   | 20.4860 |
| 30    | 39.0001   | -2.2381   | 20.4860 | 51.5148   | -3.4132   | 23.8759 |
| 31    | 51.5148   | -3.4132   | 23.8759 | 60.9436   | -4.7212   | 27.5698 |
| 32    | 60.9436   | -4.7212   | 27.5698 | 75.4743   | -6.3053   | 31.9177 |
| 33    | 75.4743   | -6.3053   | 31.9177 | 75.8136   | -8.5635   | 38.1051 |
| 34    | 75.8136   | -8.5635   | 38.1051 | 70.6741   | -10.3240  | 42.8402 |
| 35    | 70.6741   | -10.3240  | 42.8402 | 59.3831   | -12.2078  | 47.8952 |
| 36    | 59.3831   | -12.2078  | 47.8952 | 46.8201   | -14.6278  | 54.2208 |
| 37    | 46.8201   | -14.6278  | 54.2208 | 20.0861   | -17.4218  | 61.7350 |
| 38    | 20.0861   | -17.4218  | 61.7350 | -14.5007  | -19.6884  | 67.7907 |
| 39    | -14.5007  | -19.6884  | 67.7907 | -57.3257  | -22.0486  | 74.0926 |
| 40    | -57.3257  | -22.0486  | 74.0926 | -108.6819 | -10.7017  | 42.1249 |
| 41    | -108.6819 | -10.7017  | 42.1249 | -99.8727  | 3.0281    | 4.2048  |
| 42    | -99.8727  | 3.0281    | 4.2048  | -88.7760  | 2.8891    | 4.9153  |
| 43    | -88.7760  | 2.8891    | 4.9153  | -75.6984  | 2.6583    | 5.9104  |
| 44    | -75.6984  | 2.6583    | 5.9104  | -60.9942  | 2.3292    | 7.2137  |
| 45    | -60.9942  | 2.3292    | 7.2137  | -38.7012  | 1.6325    | 9.7172  |
| 46    | -38.7012  | 1.6325    | 9.7172  | -21.3239  | 1.0232    | 11.7507 |
| 47    | -21.3239  | 1.0232    | 11.7507 | -4.0232   | 0.2924    | 14.0921 |
| 48    | -4.0232   | 0.2924    | 14.0921 | 12.5417   | -0.5637   | 16.7355 |
| 49    | 12.5417   | -0.5637   | 16.7355 | 36.8391   | -2.0911   | 21.2568 |
| 50    | 36.8391   | -2.0911   | 21.2568 | 49.7909   | -3.2747   | 24.6504 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 51    | 49.7909   | -3.2747   | 24.6504 | 59.6214   | -4.5906   | 28.3480 |
| 52    | 59.6214   | -4.5906   | 28.3480 | 74.5511   | -6.1860   | 32.6758 |
| 53    | 74.5511   | -6.1860   | 32.6758 | 75.1860   | -8.4548   | 38.9004 |
| 54    | 75.1860   | -8.4548   | 38.9004 | 70.3097   | -10.2227  | 43.6427 |
| 55    | 70.3097   | -10.2227  | 43.6427 | 59.2817   | -12.1131  | 48.6687 |
| 56    | 59.2817   | -12.1131  | 48.6687 | 46.9156   | -14.5393  | 54.9889 |
| 57    | 46.9156   | -14.5393  | 54.9889 | 20.3715   | -17.3350  | 62.5204 |
| 58    | 20.3715   | -17.3350  | 62.5204 | -14.0203  | -19.6040  | 68.5581 |
| 59    | -14.0203  | -19.6040  | 68.5581 | -56.6850  | -21.9651  | 74.8565 |
| 60    | -56.6850  | -21.9651  | 74.8565 | -107.8466 | -10.6742  | 42.5318 |
| 61    | -107.8466 | -10.6742  | 42.5318 | -99.0805  | 3.0016    | 4.2404  |
| 62    | -99.0805  | 3.0016    | 4.2404  | -88.0349  | 2.8610    | 4.9384  |
| 63    | -88.0349  | 2.8610    | 4.9384  | -75.0040  | 2.6315    | 5.9338  |
| 64    | -75.0040  | 2.6315    | 5.9338  | -60.3423  | 2.3032    | 7.2385  |
| 65    | -60.3423  | 2.3032    | 7.2385  | -38.0798  | 1.6064    | 9.7496  |
| 66    | -38.0798  | 1.6064    | 9.7496  | -20.7414  | 0.9970    | 11.7825 |
| 67    | -20.7414  | 0.9970    | 11.7825 | -3.4838   | 0.2652    | 14.1243 |
| 68    | -3.4838   | 0.2652    | 14.1243 | 13.0343   | -0.5923   | 16.7656 |
| 69    | 13.0343   | -0.5923   | 16.7656 | 37.2772   | -2.1220   | 21.2880 |
| 70    | 37.2772   | -2.1220   | 21.2880 | 50.1619   | -3.3054   | 24.6913 |
| 71    | 50.1619   | -3.3054   | 24.6913 | 59.9279   | -4.6221   | 28.3916 |
| 72    | 59.9279   | -4.6221   | 28.3916 | 74.7933   | -6.2192   | 32.7131 |
| 73    | 74.7933   | -6.2192   | 32.7131 | 75.3472   | -8.4862   | 38.9355 |
| 74    | 75.3472   | -8.4862   | 38.9355 | 70.4008   | -10.2527  | 43.6796 |
| 75    | 70.4008   | -10.2527  | 43.6796 | 59.3091   | -12.1434  | 48.7034 |
| 76    | 59.3091   | -12.1434  | 48.7034 | 46.8485   | -14.5698  | 55.0368 |
| 77    | 46.8485   | -14.5698  | 55.0368 | 20.2622   | -17.3659  | 62.5642 |
| 78    | 20.2622   | -17.3659  | 62.5642 | -14.2153  | -19.6352  | 68.5977 |
| 79    | -14.2153  | -19.6352  | 68.5977 | -56.9582  | -21.9958  | 74.8948 |
| 80    | -56.9582  | -21.9958  | 74.8948 | -108.1753 | -10.6830  | 42.5438 |
| 81    | -108.1753 | -10.6830  | 42.5438 | -99.3676  | 3.0129    | 4.2397  |
| 82    | -99.3676  | 3.0129    | 4.2397  | -88.2924  | 2.8724    | 4.9539  |
| 83    | -88.2924  | 2.8724    | 4.9539  | -75.2404  | 2.6424    | 5.9382  |
| 84    | -75.2404  | 2.6424    | 5.9382  | -60.5573  | 2.3123    | 7.2393  |
| 85    | -60.5573  | 2.3123    | 7.2393  | -38.2763  | 1.6150    | 9.7456  |
| 86    | -38.2763  | 1.6150    | 9.7456  | -20.9176  | 1.0053    | 11.7836 |
| 87    | -20.9176  | 1.0053    | 11.7836 | -3.6428   | 0.2734    | 14.1255 |
| 88    | -3.6428   | 0.2734    | 14.1255 | 12.8865   | -0.5840   | 16.7700 |
| 89    | 12.8865   | -0.5840   | 16.7700 | 37.1490   | -2.1138   | 21.3012 |
| 90    | 37.1490   | -2.1138   | 21.3012 | 50.0622   | -3.2991   | 24.6850 |
| 91    | 50.0622   | -3.2991   | 24.6850 | 59.8325   | -4.6165   | 28.3894 |
| 92    | 59.8325   | -4.6165   | 28.3894 | 74.7033   | -6.2106   | 32.7273 |
| 93    | 74.7033   | -6.2106   | 32.7273 | 75.2932   | -8.4767   | 38.9203 |
| 94    | 75.2932   | -8.4767   | 38.9203 | 70.3617   | -10.2455  | 43.6751 |
| 95    | 70.3617   | -10.2455  | 43.6751 | 59.2672   | -12.1339  | 48.7111 |
| 96    | 59.2672   | -12.1339  | 48.7111 | 46.8545   | -14.5604  | 55.0364 |
| 97    | 46.8545   | -14.5604  | 55.0364 | 20.2701   | -17.3538  | 62.5619 |
| 98    | 20.2701   | -17.3538  | 62.5619 | -14.1923  | -19.6246  | 68.6089 |
| 99    | -14.1923  | -19.6246  | 68.6089 | -56.8863  | -21.9857  | 74.8999 |
| 100   | -56.8863  | -21.9857  | 74.8999 | -108.0972 | -10.6793  | 42.5377 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | -108.0972 | -10.6793  | 42.5377 | -99.2921  | 3.0115    | 4.2487  |
| 102   | -99.2921  | 3.0115    | 4.2487  | -88.2249  | 2.8712    | 4.9637  |
| 103   | -88.2249  | 2.8712    | 4.9637  | -75.1787  | 2.6403    | 5.9436  |
| 104   | -75.1787  | 2.6403    | 5.9436  | -60.4972  | 2.3104    | 7.2446  |
| 105   | -60.4972  | 2.3104    | 7.2446  | -38.2197  | 1.6125    | 9.7495  |
| 106   | -38.2197  | 1.6125    | 9.7495  | -20.8680  | 1.0024    | 11.7841 |
| 107   | -20.8680  | 1.0024    | 11.7841 | -3.5989   | 0.2715    | 14.1262 |
| 108   | -3.5989   | 0.2715    | 14.1262 | 12.9309   | -0.5864   | 16.7687 |
| 109   | 12.9309   | -0.5864   | 16.7687 | 37.1801   | -2.1157   | 21.2920 |
| 110   | 37.1801   | -2.1157   | 21.2920 | 50.0790   | -3.3001   | 24.6887 |
| 111   | 50.0790   | -3.3001   | 24.6887 | 59.8479   | -4.6184   | 28.3841 |
| 112   | 59.8479   | -4.6184   | 28.3841 | 74.7032   | -6.2181   | 32.7175 |
| 113   | 74.7032   | -6.2181   | 32.7175 | 75.2617   | -8.4863   | 38.9252 |
| 114   | 75.2617   | -8.4863   | 38.9252 | 70.2981   | -10.2571  | 43.6813 |
| 115   | 70.2981   | -10.2571  | 43.6813 | 59.1597   | -12.1486  | 48.7192 |
| 116   | 59.1597   | -12.1486  | 48.7192 | 46.6997   | -14.5757  | 55.0371 |
| 117   | 46.6997   | -14.5757  | 55.0371 | 20.0892   | -17.3701  | 62.5546 |
| 118   | 20.0892   | -17.3701  | 62.5546 | -14.4310  | -19.6393  | 68.5944 |
| 119   | -14.4310  | -19.6393  | 68.5944 | -57.1684  | -22.0000  | 74.9093 |
| 120   | -57.1684  | -22.0000  | 74.9093 | -108.4259 | -10.6712  | 42.5508 |
| 121   | -108.4259 | -10.6712  | 42.5508 | -99.5588  | 3.0414    | 4.2393  |
| 122   | -99.5588  | 3.0414    | 4.2393  | -88.4160  | 2.8998    | 4.9543  |
| 123   | -88.4160  | 2.8998    | 4.9543  | -75.2939  | 2.6675    | 5.9479  |
| 124   | -75.2939  | 2.6675    | 5.9479  | -60.5524  | 2.3345    | 7.2502  |
| 125   | -60.5524  | 2.3345    | 7.2502  | -38.2348  | 1.6300    | 9.7474  |
| 126   | -38.2348  | 1.6300    | 9.7474  | -20.8628  | 1.0145    | 11.7885 |
| 127   | -20.8628  | 1.0145    | 11.7885 | -3.6063   | 0.2767    | 14.1306 |
| 128   | -3.6063   | 0.2767    | 14.1306 | 12.8780   | -0.5875   | 16.7753 |
| 129   | 12.8780   | -0.5875   | 16.7753 | 37.0131   | -2.1279   | 21.2972 |
| 130   | 37.0131   | -2.1279   | 21.2972 | 49.7805   | -3.3203   | 24.7011 |
| 131   | 49.7805   | -3.3203   | 24.7011 | 59.3754   | -4.6459   | 28.4028 |
| 132   | 59.3754   | -4.6459   | 28.4028 | 73.9536   | -6.2565   | 32.7237 |
| 133   | 73.9536   | -6.2565   | 32.7237 | 74.2531   | -8.5335   | 38.9363 |
| 134   | 74.2531   | -8.5335   | 38.9363 | 68.9965   | -10.3113  | 43.6788 |
| 135   | 68.9965   | -10.3113  | 43.6788 | 57.5394   | -12.2111  | 48.7220 |
| 136   | 57.5394   | -12.2111  | 48.7220 | 44.6414   | -14.6504  | 55.0541 |
| 137   | 44.6414   | -14.6504  | 55.0541 | 17.6789   | -17.4528  | 62.5734 |
| 138   | 17.6789   | -17.4528  | 62.5734 | -17.1676  | -19.7271  | 68.6181 |
| 139   | -17.1676  | -19.7271  | 68.6181 | -60.2012  | -22.0898  | 74.9267 |
| 140   | -60.2012  | -22.0898  | 74.9267 | -111.7009 | -10.7151  | 42.9366 |
| 141   | -111.7009 | -10.7151  | 42.9366 | -105.4657 | 3.0842    | 4.7478  |
| 142   | -105.4657 | 3.0842    | 4.7478  | -96.7218  | 2.9855    | 5.4905  |
| 143   | -96.7218  | 2.9855    | 5.4905  | -85.6391  | 2.7993    | 6.5487  |
| 144   | -85.6391  | 2.7993    | 6.5487  | -72.3949  | 2.5159    | 7.9471  |
| 145   | -72.3949  | 2.5159    | 7.9471  | -62.9493  | 2.3330    | 8.7855  |
| 146   | -62.9493  | 2.3330    | 8.7855  | -47.4160  | 1.8819    | 10.7389 |
| 147   | -47.4160  | 1.8819    | 10.7389 | -30.6763  | 1.3116    | 13.0534 |
| 148   | -30.6763  | 1.3116    | 13.0534 | -13.2078  | 0.6133    | 15.7234 |
| 149   | -13.2078  | 0.6133    | 15.7234 | 4.4433    | -0.2221   | 18.7607 |
| 150   | 4.4433    | -0.2221   | 18.7607 | 12.5208   | -0.6926   | 20.4160 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 12.5208  | -0.6926   | 20.4160 | 28.3186  | -1.7442   | 24.0030 |
| 152   | 28.3186  | -1.7442   | 24.0030 | 42.5177  | -2.9482   | 27.9487 |
| 153   | 42.5177  | -2.9482   | 27.9487 | 54.3650  | -4.3076   | 32.2428 |
| 154   | 54.3650  | -4.3076   | 32.2428 | 63.0373  | -5.8292   | 36.9153 |
| 155   | 63.0373  | -5.8292   | 36.9153 | 59.9239  | -6.6536   | 39.4165 |
| 156   | 59.9239  | -6.6536   | 39.4165 | 60.6936  | -8.4245   | 44.6156 |
| 157   | 60.6936  | -8.4245   | 44.6156 | 56.0089  | -10.3613  | 50.1604 |
| 158   | 56.0089  | -10.3613  | 50.1604 | 44.9347  | -12.4724  | 56.0854 |
| 159   | 44.9347  | -12.4724  | 56.0854 | 26.5790  | -14.7543  | 62.3581 |
| 160   | 26.5790  | -14.7543  | 62.3581 | 0.0052   | -15.9600  | 65.6252 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====    |
| 1     | 0.0050    | 15.9797   | -65.4603 | 27.7673   | 14.7310   | -61.9290 |
| 2     | 27.7673   | 14.7310   | -61.9290 | 51.5285   | 12.2276   | -54.8553 |
| 3     | 51.5285   | 12.2276   | -54.8553 | 71.3316   | 9.7300    | -47.7693 |
| 4     | 71.3316   | 9.7300    | -47.7693 | 87.0981   | 7.2296    | -40.6945 |
| 5     | 87.0981   | 7.2296    | -40.6945 | 98.7132   | 5.3376    | -35.3758 |
| 6     | 98.7132   | 5.3376    | -35.3758 | 106.3278  | 3.4736    | -30.0571 |
| 7     | 106.3278  | 3.4736    | -30.0571 | 109.8945  | 0.9780    | -22.9522 |
| 8     | 109.8945  | 0.9780    | -22.9522 | 109.3934  | -1.5273   | -15.8710 |
| 9     | 109.3934  | -1.5273   | -15.8710 | 104.6536  | -4.0448   | -8.7870  |
| 10    | 104.6536  | -4.0448   | -8.7870  | 96.0708   | -5.9225   | -3.4486  |
| 11    | 96.0708   | -5.9225   | -3.4486  | -0.0052   | -0.0003   | 0.1820   |
| 12    | -0.0052   | -0.0003   | 0.1820   | -0.0058   | -0.0003   | 0.1820   |
| 13    | -0.0058   | -0.0003   | 0.1820   | -0.0063   | -0.0003   | 0.1820   |
| 14    | -0.0063   | -0.0003   | 0.1820   | -0.0068   | -0.0003   | 0.1820   |
| 15    | -0.0068   | -0.0003   | 0.1820   | -0.0072   | -0.0003   | 0.1820   |
| 16    | -0.0072   | -0.0003   | 0.1820   | -0.0078   | -0.0003   | 0.1820   |
| 17    | -0.0078   | -0.0003   | 0.1820   | -0.0083   | -0.0003   | 0.1820   |
| 18    | -0.0083   | -0.0003   | 0.1820   | -0.0088   | -0.0003   | 0.1820   |
| 19    | -0.0088   | -0.0003   | 0.1820   | -0.0093   | -0.0003   | 0.1820   |
| 20    | -0.0093   | -0.0003   | 0.1820   | -0.0093   | -0.0003   | 0.1820   |
| 21    | -215.2471 | -0.1143   | -10.1194 | -215.2471 | -0.1143   | -10.1194 |
| 22    | -153.3432 | 24.9263   | -71.4823 | -153.3432 | 24.9263   | -71.4823 |
| 23    | -99.7199  | 22.4258   | -64.4776 | -99.7199  | 22.4258   | -64.4776 |
| 24    | -52.3643  | 19.9258   | -57.4459 | -52.3643  | 19.9258   | -57.4459 |
| 25    | -11.2788  | 16.8003   | -48.6180 | -11.2788  | 16.8003   | -48.6180 |
| 26    | 23.2445   | 13.6677   | -39.7830 | 23.2445   | 13.6677   | -39.7830 |
| 27    | 51.5452   | 11.1756   | -32.6971 | 51.5452   | 11.1756   | -32.6971 |
| 28    | 73.5762   | 8.6763    | -25.6192 | 73.5762   | 8.6763    | -25.6192 |
| 29    | 89.2804   | 5.5422    | -16.7759 | 89.2804   | 5.5422    | -16.7759 |
| 30    | 98.3417   | 2.4049    | -7.9012  | 98.3417   | 2.4049    | -7.9012  |
| 31    | 101.3382  | -0.0884   | -0.8252  | 101.3382  | -0.0884   | -0.8252  |
| 32    | -0.0029   | 0.0003    | 0.0077   | -0.0029   | 0.0003    | 0.0077   |
| 33    | -0.0023   | 0.0003    | 0.0077   | -0.0023   | 0.0003    | 0.0077   |
| 34    | -0.0017   | 0.0003    | 0.0077   | -0.0017   | 0.0003    | 0.0077   |
| 35    | -0.0010   | 0.0003    | 0.0077   | -0.0010   | 0.0003    | 0.0077   |
| 36    | -0.0004   | 0.0003    | 0.0077   | -0.0004   | 0.0003    | 0.0077   |
| 37    | 0.0002    | 0.0003    | 0.0077   | 0.0002    | 0.0003    | 0.0077   |
| 38    | 0.0008    | 0.0003    | 0.0077   | 0.0008    | 0.0003    | 0.0077   |
| 39    | 0.0015    | 0.0003    | 0.0077   | 0.0015    | 0.0003    | 0.0077   |
| 40    | 0.0021    | 0.0003    | 0.0077   | 0.0021    | 0.0003    | 0.0077   |
| 41    | -219.2687 | 0.0481    | -0.4320  | -219.2687 | 0.0481    | -0.4320  |
| 42    | -157.1774 | 25.0426   | -70.6994 | -157.1774 | 25.0426   | -70.6994 |
| 43    | -103.3078 | 22.5425   | -63.6826 | -103.3078 | 22.5425   | -63.6826 |
| 44    | -55.6785  | 20.0423   | -56.6458 | -55.6785  | 20.0423   | -56.6458 |
| 45    | -14.3311  | 16.9197   | -47.8253 | -14.3311  | 16.9197   | -47.8253 |
| 46    | 20.4631   | 13.7923   | -38.9906 | 20.4631   | 13.7923   | -38.9906 |
| 47    | 49.0207   | 11.2969   | -31.9142 | 49.0207   | 11.2969   | -31.9142 |
| 48    | 71.2773   | 8.7896    | -24.8339 | 71.2773   | 8.7896    | -24.8339 |
| 49    | 87.3065   | 5.6634    | -15.9812 | 87.3065   | 5.6634    | -15.9812 |
| 50    | 96.8407   | 2.5449    | -7.1378  | 96.8407   | 2.5449    | -7.1378  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====    |
| 51    | 100.0715  | 0.0425    | -0.0442  | 0.0008    | -0.0001   | 0.0003   |
| 52    | 0.0008    | -0.0001   | 0.0003   | 0.0006    | -0.0001   | 0.0003   |
| 53    | 0.0006    | -0.0001   | 0.0003   | 0.0005    | -0.0001   | 0.0003   |
| 54    | 0.0005    | -0.0001   | 0.0003   | 0.0003    | -0.0001   | 0.0003   |
| 55    | 0.0003    | -0.0001   | 0.0003   | 0.0001    | -0.0001   | 0.0003   |
| 56    | 0.0001    | -0.0001   | 0.0003   | -0.0001   | -0.0001   | 0.0003   |
| 57    | -0.0001   | -0.0001   | 0.0003   | -0.0002   | -0.0001   | 0.0003   |
| 58    | -0.0002   | -0.0001   | 0.0003   | -0.0004   | -0.0001   | 0.0003   |
| 59    | -0.0004   | -0.0001   | 0.0003   | -0.0006   | -0.0001   | 0.0003   |
| 60    | -0.0006   | -0.0001   | 0.0003   | -218.2007 | 0.0905    | -0.0197  |
| 61    | -218.2007 | 0.0905    | -0.0197  | -155.9700 | 24.9937   | -70.6525 |
| 62    | -155.9700 | 24.9937   | -70.6525 | -102.2047 | 22.4938   | -63.6563 |
| 63    | -102.2047 | 22.4938   | -63.6563 | -54.6898  | 19.9936   | -56.6191 |
| 64    | -54.6898  | 19.9936   | -56.6191 | -13.4520  | 16.8665   | -47.7986 |
| 65    | -13.4520  | 16.8665   | -47.7986 | 21.5180   | 13.9487   | -38.9668 |
| 66    | 21.5180   | 13.9487   | -38.9668 | 49.6484   | 11.2388   | -31.8844 |
| 67    | 49.6484   | 11.2388   | -31.8844 | 71.7836   | 8.7316    | -24.8060 |
| 68    | 71.7836   | 8.7316    | -24.8060 | 87.6178   | 5.5991    | -15.9662 |
| 69    | 87.6178   | 5.5991    | -15.9662 | 97.0947   | 2.4884    | -7.1095  |
| 70    | 97.0947   | 2.4884    | -7.1095  | -0.0003   | 0.0000    | 0.0000   |
| 71    | -0.0003   | 0.0000    | 0.0000   | -0.9773   | 0.0935    | -0.0003  |
| 72    | -0.9773   | 0.0935    | -0.0003  | -1.0774   | 0.1314    | -0.0005  |
| 73    | -1.0774   | 0.1314    | -0.0005  | -0.9484   | 0.1594    | -0.0010  |
| 74    | -0.9484   | 0.1594    | -0.0010  | -0.5898   | 0.1594    | -0.0013  |
| 75    | -0.5898   | 0.1594    | -0.0013  | -0.2314   | 0.1594    | -0.0014  |
| 76    | -0.2314   | 0.1594    | -0.0014  | 0.1274    | 0.1594    | -0.0014  |
| 77    | 0.1274    | 0.1594    | -0.0014  | 0.5129    | 0.1682    | -0.0014  |
| 78    | 0.5129    | 0.1682    | -0.0014  | 0.8915    | 0.1682    | -0.0012  |
| 79    | 0.8915    | 0.1682    | -0.0012  | 1.0632    | 0.1408    | -0.0005  |
| 80    | 1.0632    | 0.1408    | -0.0005  | -218.0920 | 0.0634    | -0.0248  |
| 81    | -218.0920 | 0.0634    | -0.0248  | -157.5756 | 25.1773   | -70.6581 |
| 82    | -157.5756 | 25.1773   | -70.6581 | -103.4379 | 22.6860   | -63.6373 |
| 83    | -103.4379 | 22.6860   | -63.6373 | -55.4719  | 20.1771   | -56.6068 |
| 84    | -55.4719  | 20.1771   | -56.6068 | -13.8193  | 17.0520   | -47.7939 |
| 85    | -13.8193  | 17.0520   | -47.7939 | 21.2567   | 13.9089   | -38.9541 |
| 86    | 21.2567   | 13.9089   | -38.9541 | 49.9528   | 11.3795   | -31.8889 |
| 87    | 49.9528   | 11.3795   | -31.8889 | 72.6090   | 8.9093    | -24.8110 |
| 88    | 72.6090   | 8.9093    | -24.8110 | 88.9194   | 5.7836    | -15.9316 |
| 89    | 88.9194   | 5.7836    | -15.9316 | 98.2574   | 2.6192    | -7.0751  |
| 90    | 98.2574   | 2.6192    | -7.0751  | 101.8893  | 0.1354    | -0.0122  |
| 91    | 101.8893  | 0.1354    | -0.0122  | 0.0001    | 0.0000    | 0.0000   |
| 92    | 0.0001    | 0.0000    | 0.0000   | 0.0000    | 0.0000    | 0.0000   |
| 93    | 0.0000    | 0.0000    | 0.0000   | -1.0217   | 0.1718    | 0.0000   |
| 94    | -1.0217   | 0.1718    | 0.0000   | -0.6709   | 0.1814    | -0.0005  |
| 95    | -0.6709   | 0.1814    | -0.0005  | -0.2887   | 0.1993    | -0.0007  |
| 96    | -0.2887   | 0.1993    | -0.0007  | 0.1525    | 0.1906    | -0.0007  |
| 97    | 0.1525    | 0.1906    | -0.0007  | 0.5813    | 0.1905    | -0.0005  |
| 98    | 0.5813    | 0.1905    | -0.0005  | 0.9614    | 0.1814    | -0.0004  |
| 99    | 0.9614    | 0.1814    | -0.0004  | 0.0000    | 0.0000    | 0.0000   |
| 100   | 0.0000    | 0.0000    | 0.0000   | -215.9738 | -0.0075   | -0.0219  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -215.9738 | -0.0075   | -0.0219  | -156.0063 | 24.9766   | -70.6198 |
| 102   | -156.0063 | 24.9766   | -70.6198 | -102.2915 | 22.4768   | -63.5889 |
| 103   | -102.2915 | 22.4768   | -63.5889 | -54.8179  | 19.9767   | -56.5683 |
| 104   | -54.8179  | 19.9767   | -56.5683 | -13.6041  | 16.8515   | -47.7491 |
| 105   | -13.6041  | 16.8515   | -47.7491 | 21.0480   | 13.7267   | -38.9144 |
| 106   | 21.0480   | 13.7267   | -38.9144 | 49.4538   | 11.2268   | -31.8386 |
| 107   | 49.4538   | 11.2268   | -31.8386 | 71.5914   | 8.7256    | -24.7572 |
| 108   | 71.5914   | 8.7256    | -24.7572 | 87.4756   | 5.5997    | -15.9173 |
| 109   | 87.4756   | 5.5997    | -15.9173 | 96.7972   | 2.4749    | -7.0584  |
| 110   | 96.7972   | 2.4749    | -7.0584  | -0.1819   | 0.0143    | -0.0002  |
| 111   | -0.1819   | 0.0143    | -0.0002  | -0.1497   | 0.0143    | -0.0003  |
| 112   | -0.1497   | 0.0143    | -0.0003  | -0.1174   | 0.0143    | -0.0003  |
| 113   | -0.1174   | 0.0143    | -0.0003  | -0.0972   | 0.0164    | -0.0003  |
| 114   | -0.0972   | 0.0164    | -0.0003  | -0.0603   | 0.0164    | -0.0004  |
| 115   | -0.0603   | 0.0164    | -0.0004  | -0.0222   | 0.0155    | -0.0004  |
| 116   | -0.0222   | 0.0155    | -0.0004  | 0.0126    | 0.0155    | -0.0004  |
| 117   | 0.0126    | 0.0155    | -0.0004  | 0.0489    | 0.0160    | -0.0004  |
| 118   | 0.0489    | 0.0160    | -0.0004  | 0.0848    | 0.0160    | -0.0003  |
| 119   | 0.0848    | 0.0160    | -0.0003  | 0.1038    | 0.0137    | -0.0003  |
| 120   | 0.1038    | 0.0137    | -0.0003  | 2.0173    | 0.0739    | -0.0011  |
| 121   | 2.0173    | 0.0739    | -0.0011  | -156.9208 | 25.0924   | -69.8405 |
| 122   | -156.9208 | 25.0924   | -69.8405 | -102.9429 | 22.5923   | -62.8107 |
| 123   | -102.9429 | 22.5923   | -62.8107 | -55.2188  | 20.0920   | -55.7802 |
| 124   | -55.2188  | 20.0920   | -55.7802 | -13.7558  | 16.9671   | -46.9543 |
| 125   | -13.7558  | 16.9671   | -46.9543 | 21.1674   | 13.8423   | -38.1218 |
| 126   | 21.1674   | 13.8423   | -38.1218 | 49.8294   | 11.3435   | -31.0545 |
| 127   | 49.8294   | 11.3435   | -31.0545 | 72.2273   | 8.8442    | -23.9691 |
| 128   | 72.2273   | 8.8442    | -23.9691 | 88.3860   | 5.7178    | -15.1161 |
| 129   | 88.3860   | 5.7178    | -15.1161 | 97.9741   | 2.5920    | -6.2744  |
| 130   | 97.9741   | 2.5920    | -6.2744  | -0.2023   | 0.0162    | -0.0002  |
| 131   | -0.2023   | 0.0162    | -0.0002  | -0.1658   | 0.0162    | -0.0003  |
| 132   | -0.1658   | 0.0162    | -0.0003  | -0.1293   | 0.0162    | -0.0003  |
| 133   | -0.1293   | 0.0162    | -0.0003  | -0.1016   | 0.0178    | -0.0003  |
| 134   | -0.1016   | 0.0178    | -0.0003  | -0.0616   | 0.0178    | -0.0004  |
| 135   | -0.0616   | 0.0178    | -0.0004  | -0.0205   | 0.0168    | -0.0004  |
| 136   | -0.0205   | 0.0168    | -0.0004  | 0.0167    | 0.0162    | -0.0004  |
| 137   | 0.0167    | 0.0162    | -0.0004  | 0.0568    | 0.0173    | -0.0004  |
| 138   | 0.0568    | 0.0173    | -0.0004  | 0.1034    | 0.0187    | -0.0004  |
| 139   | 0.1034    | 0.0187    | -0.0004  | 0.1455    | 0.0187    | -0.0003  |
| 140   | 0.1455    | 0.0187    | -0.0003  | 2.0857    | 0.0750    | -0.0008  |
| 141   | 2.0857    | 0.0750    | -0.0008  | -163.9633 | 26.5439   | -54.6565 |
| 142   | -163.9633 | 26.5439   | -54.6565 | -118.9263 | 24.0437   | -47.6036 |
| 143   | -118.9263 | 24.0437   | -47.6036 | -77.9007  | 21.5433   | -40.5491 |
| 144   | -77.9007  | 21.5433   | -40.5491 | -40.8374  | 19.0442   | -33.5190 |
| 145   | -40.8374  | 19.0442   | -33.5190 | -7.8138   | 17.7957   | -29.9884 |
| 146   | -7.8138   | 17.7957   | -29.9884 | 20.9743   | 15.2962   | -22.9272 |
| 147   | 20.9743   | 15.2962   | -22.9272 | 45.7618   | 12.7938   | -15.8558 |
| 148   | 45.7618   | 12.7938   | -15.8558 | 66.5390   | 10.2934   | -8.7710  |
| 149   | 66.5390   | 10.2934   | -8.7710  | 83.3247   | 7.7963    | -1.6935  |
| 150   | 83.3247   | 7.7963    | -1.6935  | -0.2895   | 0.0161    | -0.0001  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | -0.2895  | 0.0161    | -0.0001 | -0.2700  | 0.0167    | -0.0003 |
| 152   | -0.2700  | 0.0167    | -0.0003 | -0.2400  | 0.0166    | -0.0003 |
| 153   | -0.2400  | 0.0166    | -0.0003 | -0.2100  | 0.0166    | -0.0003 |
| 154   | -0.2100  | 0.0166    | -0.0003 | -0.1856  | 0.0172    | -0.0003 |
| 155   | -0.1856  | 0.0172    | -0.0003 | -0.1500  | 0.0167    | -0.0004 |
| 156   | -0.1500  | 0.0167    | -0.0004 | -0.1338  | 0.0186    | -0.0005 |
| 157   | -0.1338  | 0.0186    | -0.0005 | -0.1003  | 0.0186    | -0.0005 |
| 158   | -0.1003  | 0.0186    | -0.0005 | -0.0619  | 0.0172    | -0.0005 |
| 159   | -0.0619  | 0.0172    | -0.0005 | -0.3440  | 0.1911    | -0.0005 |
| 160   | -0.3440  | 0.1911    | -0.0005 | 0.0000   | 0.1817    | -0.0006 |

ENVOLVENTE MAXIMOS FLECTORES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0006   | -0.0006   | -0.4084   | -78.6624   | -42.0463  | -123.8163 |
| 2     | 334.7534  | 176.2563  | 503.4479  | -630.7616  | -154.0566 | -444.8786 |
| 3     | 630.6089  | 154.0569  | 445.0930  | -887.9554  | -131.8495 | -386.5456 |
| 4     | 887.8469  | 131.8270  | 386.7772  | -1106.6057 | -109.9458 | -329.9303 |
| 5     | 1106.6188 | 109.9468  | 329.9438  | -1286.8975 | -89.2543  | -275.3702 |
| 6     | 1286.8088 | 89.2688   | 275.8088  | -1427.8440 | -68.5771  | -221.2203 |
| 7     | 1427.8562 | 68.5875   | 221.2121  | -1530.3444 | -46.7108  | -164.3849 |
| 8     | 1530.2540 | 46.6438   | 165.3034  | -1594.2107 | -24.4307  | -106.7517 |
| 9     | 1594.2471 | 24.4082   | 106.2125  | -1619.3773 | -2.1998   | -47.6930  |
| 10    | 1619.3358 | 2.1538    | 48.7862   | -1605.9456 | 18.2004   | 4.1347    |
| 11    | 1605.9604 | -18.1839  | -4.2377   | -1553.5848 | 38.8784   | 58.8059   |
| 12    | 1553.6039 | -38.8547  | -58.2742  | -1462.5034 | 60.6826   | 115.2507  |
| 13    | 1462.4980 | -60.6911  | -115.2319 | -1333.2999 | 82.8901   | 173.7788  |
| 14    | 1333.3678 | -82.9273  | -173.3179 | -1165.2734 | 105.1372  | 231.8394  |
| 15    | 1165.3143 | -105.1137 | -231.5134 | -959.1702  | 125.4159  | 284.6374  |
| 16    | 959.0841  | -125.4252 | -284.9160 | -713.5818  | 146.1286  | 339.5442  |
| 17    | 714.0334  | -144.1038 | -330.6082 | -434.3073  | 165.8847  | 387.6889  |
| 18    | 485.6585  | -108.4236 | -255.1951 | -309.1638  | 81.8276   | 203.0846  |
| 19    | 351.2085  | -33.7179  | -93.6047  | -275.9624  | 49.9139   | 136.3622  |
| 20    | 310.3432  | -6.7011   | -33.6768  | -283.6996  | 22.9020   | 76.2533   |
| 21    | 308.9407  | -30.8372  | 23.0759   | -239.5684  | 30.8366   | -23.2714  |
| 22    | 262.9507  | -11.9908  | 67.9367   | -213.1827  | 32.2433   | -14.4703  |
| 23    | 269.5520  | 20.0951   | 143.4610  | -293.3561  | -41.6725  | -184.0808 |
| 24    | 341.7349  | 84.6166   | 290.1553  | -503.1581  | -59.7885  | -226.1258 |
| 25    | 568.7888  | 113.7974  | 370.6722  | -795.5481  | -87.7582  | -303.1075 |
| 26    | 869.1734  | 142.1932  | 336.1814  | -1161.2410 | -116.7348 | -269.7349 |
| 27    | 1161.1154 | 116.7356  | 270.3138  | -1395.3550 | -91.9722  | -206.3534 |
| 28    | 1395.3481 | 91.9761   | 206.3513  | -1571.1884 | -64.9229  | -135.6948 |
| 29    | 1571.1456 | 64.9247   | 136.1166  | -1687.5016 | -37.8399  | -65.5109  |
| 30    | 1687.4597 | 37.8391   | 66.3503   | -1744.8494 | -12.2378  | 0.4756    |
| 31    | 1744.8472 | 12.2468   | -0.9364   | -1743.2357 | 13.3722   | 67.7326   |
| 32    | 1743.2906 | -13.4015  | -66.3816  | -1682.4545 | 40.5343   | 137.1321  |
| 33    | 1682.4617 | -40.4937  | -137.1224 | -1561.7843 | 67.6205   | 208.0987  |
| 34    | 1561.7993 | -67.5743  | -208.0801 | -1382.0396 | 93.2190   | 275.0486  |
| 35    | 1382.1753 | -93.2056  | -274.3665 | -1143.2640 | 118.8531  | 341.2992  |
| 36    | 1143.4448 | -118.8346 | -340.7060 | -845.3923  | 145.9876  | 411.7512  |
| 37    | 866.2046  | -115.5143 | -391.0088 | -576.8008  | 142.0525  | 459.9210  |
| 38    | 632.8296  | -95.9232  | -330.0468 | -445.9486  | 69.1009   | 279.2661  |
| 39    | 511.8227  | -14.6650  | -143.0899 | -456.0318  | 34.9179   | 196.5473  |
| 40    | 511.3918  | 17.1677   | -67.5544  | -527.2419  | 7.3702    | 118.3327  |
| 41    | 567.5331  | -33.8793  | 19.1832   | -481.6855  | 38.1656   | -21.8640  |
| 42    | 506.2212  | -19.3558  | 66.5485   | -439.8892  | 39.6060   | -13.1085  |
| 43    | 500.8649  | 12.5830   | 142.0151  | -506.3928  | 7.6729    | -88.5570  |
| 44    | 561.4495  | 47.0222   | 225.0499  | -686.8118  | -65.8292  | -254.7595 |
| 45    | 733.8351  | 107.5753  | 368.8980  | -946.8083  | -81.5327  | -301.3374 |
| 46    | 1031.1758 | 135.4936  | 334.4822  | -1308.2369 | -110.0422 | -268.0146 |
| 47    | 1308.1438 | 110.0515  | 268.3642  | -1527.4438 | -85.2812  | -204.3953 |
| 48    | 1527.3840 | 85.3006   | 204.7263  | -1688.1895 | -58.2493  | -134.1221 |
| 49    | 1688.1643 | 58.2222   | 134.5899  | -1789.4100 | -31.1314  | -63.8839  |
| 50    | 1789.3829 | 31.1005   | 63.8791   | -1831.5793 | -5.4930   | 2.8675    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 51    | 1831.5869 | 5.4661    | -1.9686   | -1814.6567 | 20.1544   | 68.7673   |
| 52    | 1814.6558 | -20.1819  | -68.7554  | -1738.5157 | 47.3149   | 139.5690  |
| 53    | 1738.5624 | -47.3276  | -138.7148 | -1602.4607 | 74.4673   | 209.5202  |
| 54    | 1602.4923 | -74.4694  | -209.0798 | -1407.1317 | 100.1237  | 276.0507  |
| 55    | 1407.1959 | -100.1354 | -275.7450 | -1152.6875 | 125.7776  | 342.7937  |
| 56    | 1152.6976 | -125.7927 | -342.7841 | -839.0233  | 152.9358  | 413.8133  |
| 57    | 870.5982  | -104.3264 | -380.6970 | -606.3517  | 130.8503  | 449.5757  |
| 58    | 652.3435  | -89.1610  | -335.4585 | -486.9292  | 61.1506   | 284.6879  |
| 59    | 554.0567  | -6.4974   | -148.1532 | -516.6538  | 26.7485   | 201.5917  |
| 60    | 572.5828  | 25.4222   | -72.5062  | -607.0050  | -0.1700   | 122.9986  |
| 61    | 647.4021  | -35.3205  | 18.4028   | -556.6750  | 40.3231   | -21.3730  |
| 62    | 581.3205  | -21.5161  | 66.2124   | -510.1340  | 41.7650   | -12.7895  |
| 63    | 571.5323  | 10.4151   | 141.7360  | -572.1805  | 9.8397    | -88.2853  |
| 64    | 627.9747  | 44.8344   | 224.8210  | -741.2896  | -63.9139  | -254.5478 |
| 65    | 789.0455  | 105.6205  | 368.6936  | -997.6320  | -79.5691  | -301.1158 |
| 66    | 1082.6750 | 133.1187  | 334.1216  | -1354.4303 | -107.6542 | -267.6442 |
| 67    | 1354.3248 | 107.6368  | 268.3711  | -1568.2009 | -82.8606  | -204.4024 |
| 68    | 1568.2021 | 82.8593   | 204.4009  | -1723.5452 | -55.8045  | -133.7221 |
| 69    | 1723.5173 | 55.8166   | 134.0998  | -1819.3313 | -28.7401  | -63.4520  |
| 70    | 1819.2986 | 28.7334   | 63.9573   | -1856.1793 | -3.1388   | 2.7312    |
| 71    | 1856.1989 | 3.1424    | -1.7812   | -1834.0544 | 22.4817   | 68.5732   |
| 72    | 1834.0576 | -22.5055  | -68.5685  | -1752.7095 | 49.6321   | 139.4349  |
| 73    | 1752.7465 | -49.6472  | -138.9596 | -1611.4075 | 76.7868   | 209.7897  |
| 74    | 1611.4900 | -76.7556  | -208.9996 | -1410.9773 | 102.4022  | 275.9676  |
| 75    | 1410.9742 | -102.3936 | -276.0330 | -1151.5033 | 128.0275  | 343.0612  |
| 76    | 1151.6123 | -128.0217 | -342.6709 | -832.7559  | 155.1721  | 413.6979  |
| 77    | 867.5596  | -102.6985 | -380.6791 | -607.1425  | 129.2119  | 449.5384  |
| 78    | 653.1848  | -87.5057  | -335.5911 | -491.7773  | 59.4504   | 284.8753  |
| 79    | 559.0712  | -4.7926   | -148.2231 | -525.5106  | 25.0433   | 201.6529  |
| 80    | 581.4637  | 27.1318   | -72.5651  | -619.7281  | -1.8641   | 123.0357  |
| 81    | 660.1009  | -35.2469  | 18.4385   | -569.5093  | 40.2648   | -21.4192  |
| 82    | 594.1565  | -21.4540  | 66.1377   | -523.0830  | 41.7086   | -12.6876  |
| 83    | 584.5223  | 10.4631   | 141.5767  | -585.2861  | 9.7845    | -88.1510  |
| 84    | 640.9973  | 44.8789   | 224.8880  | -754.0311  | -63.9700  | -254.6230 |
| 85    | 801.7992  | 105.6830  | 368.5857  | -1010.5806 | -79.6273  | -301.0291 |
| 86    | 1093.8658 | 132.0849  | 334.5762  | -1363.2412 | -106.6294 | -268.0571 |
| 87    | 1363.3169 | 106.6435  | 267.7377  | -1574.9825 | -81.8742  | -203.7570 |
| 88    | 1574.9222 | 81.8743   | 204.5764  | -1728.0463 | -54.8162  | -134.0571 |
| 89    | 1727.9871 | 54.7892   | 134.9396  | -1821.5115 | -27.7008  | -64.2835  |
| 90    | 1821.5189 | 27.6729   | 64.2869   | -1855.9915 | -2.0586   | 2.5720    |
| 91    | 1855.9729 | 2.0054    | -2.5684   | -1831.2556 | 23.6063   | 69.3012   |
| 92    | 1831.3225 | -23.5564  | -67.8894  | -1747.5947 | 50.6687   | 138.7174  |
| 93    | 1747.5541 | -50.6297  | -139.1981 | -1604.0265 | 77.7719   | 210.1368  |
| 94    | 1604.1226 | -77.7767  | -209.3403 | -1401.4119 | 103.4093  | 276.2387  |
| 95    | 1401.4998 | -103.3761 | -275.8500 | -1139.6289 | 129.0232  | 342.8693  |
| 96    | 1139.7085 | -129.0177 | -342.6050 | -818.8057  | 156.1533  | 413.6331  |
| 97    | 854.4828  | -102.5995 | -380.8940 | -594.2181  | 129.1217  | 449.7690  |
| 98    | 640.4692  | -87.4139  | -335.4612 | -479.2475  | 59.3725   | 284.7610  |
| 99    | 546.4336  | -4.7228   | -148.4540 | -513.0430  | 24.9671   | 201.8735  |
| 100   | 569.0527  | 27.2050   | -72.6315  | -607.4866  | -1.9329   | 123.0860  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 647.8439  | -33.5725  | 18.4902   | -561.0051  | 38.5957   | -21.4655  |
| 102   | 585.6678  | -19.7914  | 65.9847   | -518.3613  | 40.0400   | -12.5479  |
| 103   | 579.7802  | 12.1368   | 141.6123  | -584.3106  | 8.1110    | -88.1894  |
| 104   | 640.0625  | 46.5428   | 224.7614  | -756.8775  | -65.6163  | -254.4797 |
| 105   | 804.6150  | 107.3102  | 368.6143  | -1017.0662 | -81.2632  | -301.0444 |
| 106   | 1094.8333 | 129.8851  | 334.1815  | -1359.3256 | -104.4178 | -267.6906 |
| 107   | 1359.2616 | 104.4066  | 268.0092  | -1565.7935 | -79.6436  | -204.0613 |
| 108   | 1565.7307 | 79.6156   | 204.4790  | -1713.7506 | -52.5488  | -133.8076 |
| 109   | 1713.7339 | 52.5409   | 133.8012  | -1802.1808 | -25.4587  | -63.1416  |
| 110   | 1802.1575 | 25.4700   | 64.0620   | -1831.7026 | 0.1342    | 2.6838    |
| 111   | 1831.7251 | -0.1404   | -2.6814   | -1802.2096 | 25.7569   | 69.4760   |
| 112   | 1802.2555 | -25.8264  | -68.5683  | -1713.3950 | 52.9617   | 139.3835  |
| 113   | 1713.3785 | -52.9682  | -139.3715 | -1564.5991 | 80.1137   | 210.2386  |
| 114   | 1564.6974 | -80.1400  | -209.4633 | -1356.6710 | 105.7787  | 276.3566  |
| 115   | 1356.7548 | -105.7699 | -275.9731 | -1089.4813 | 131.4205  | 342.9982  |
| 116   | 1089.5426 | -131.4219 | -342.7703 | -763.1988  | 158.5556  | 413.8251  |
| 117   | 799.9142  | -104.5940 | -381.2512 | -535.2573  | 131.1062  | 450.1304  |
| 118   | 582.1904  | -89.3633  | -335.8354 | -417.4159  | 61.2719   | 285.0760  |
| 119   | 485.4183  | -6.5769   | -148.4482 | -447.8352  | 26.8284   | 201.8978  |
| 120   | 504.1514  | 25.3530   | -73.1599  | -538.4166  | -0.0649   | 123.6338  |
| 121   | 578.9643  | -26.4226  | 13.9898   | -508.1812  | 31.4598   | -16.9783  |
| 122   | 532.9540  | -12.6691  | 61.5047   | -481.6690  | 32.9192   | -8.0659   |
| 123   | 543.4959  | 19.1761   | 137.0899  | -563.8617  | 1.0724    | -83.6551  |
| 124   | 620.3129  | 53.3725   | 219.9900  | -752.5725  | -72.2908  | -249.7024 |
| 125   | 800.4882  | 118.4462  | 379.3954  | -1037.9655 | -92.3760  | -311.8415 |
| 126   | 1085.5703 | 122.9051  | 333.4732  | -1334.3403 | -97.4375  | -266.9367 |
| 127   | 1334.3473 | 97.4596   | 266.8660  | -1525.1283 | -72.6801  | -202.9365 |
| 128   | 1525.0411 | 72.6842   | 203.7721  | -1657.4453 | -45.6187  | -133.1446 |
| 129   | 1657.4329 | 45.6218   | 133.1395  | -1730.2823 | -18.5340  | -62.4125  |
| 130   | 1730.2949 | 18.5079   | 62.8102   | -1744.1099 | 7.1005    | 3.8585    |
| 131   | 1744.0837 | -7.1265   | -2.9260   | -1698.7301 | 32.7563   | 69.7506   |
| 132   | 1698.7402 | -32.7747  | -69.8241  | -1594.2698 | 59.8995   | 140.6819  |
| 133   | 1594.2733 | -59.8993  | -140.2824 | -1429.8700 | 87.0440   | 211.1419  |
| 134   | 1429.9032 | -87.0271  | -210.7500 | -1206.2743 | 112.6806  | 277.7257  |
| 135   | 1206.3436 | -112.7086 | -277.4528 | -923.5946  | 138.3444  | 344.4411  |
| 136   | 923.7653  | -138.3388 | -344.0226 | -581.9374  | 165.4805  | 415.0474  |
| 137   | 630.6260  | -111.0208 | -382.3831 | -351.7968  | 137.5218  | 451.2748  |
| 138   | 407.8020  | -83.4863  | -306.6389 | -265.2036  | 55.1058   | 255.8158  |
| 139   | 313.5293  | -12.1401  | -149.6548 | -263.4444  | 32.3867   | 203.0897  |
| 140   | 324.7761  | 19.9488   | -74.2049  | -346.8814  | 5.3758    | 124.7083  |
| 141   | 388.6466  | -5.7239   | -4.9992   | -369.2149  | 10.7964   | 2.0305    |
| 142   | 386.0089  | 4.4874    | 33.1210   | -379.5063  | 11.7153   | 9.6521    |
| 143   | 422.9215  | 31.4935   | 92.7420   | -465.0263  | -15.2979  | -49.9975  |
| 144   | 509.5173  | 63.3885   | 159.7436  | -609.0785  | -47.1806  | -116.9811 |
| 145   | 661.0029  | 104.6059  | 249.6088  | -887.7922  | -127.3204 | -277.0711 |
| 146   | 891.1867  | 129.3667  | 285.6386  | -1101.6702 | -107.1730 | -227.0522 |
| 147   | 1101.6821 | 107.2077  | 227.0518  | -1274.2939 | -85.4943  | -170.1878 |
| 148   | 1274.2532 | 85.4995   | 170.5708  | -1408.3188 | -63.7232  | -113.6971 |
| 149   | 1408.2717 | 63.7037   | 114.1816  | -1504.1335 | -41.5010  | -55.6293  |
| 150   | 1504.1339 | 41.5349   | 55.6291   | -1561.3242 | -22.3300  | -5.0116   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 151   | 1561.3123 | 22.2927   | 5.5341    | -1579.5435 | -0.4229   | 51.4126  |
| 152   | 1579.5503 | 0.4040    | -50.9479  | -1559.0859 | 21.7881   | 109.4968 |
| 153   | 1559.0864 | -21.7513  | -109.4862 | -1499.9387 | 43.9586   | 168.0987 |
| 154   | 1499.9481 | -44.0289  | -168.1146 | -1401.9749 | 65.9722   | 225.1217 |
| 155   | 1402.1082 | -65.9996  | -224.2711 | -1265.7793 | 85.2030   | 274.7729 |
| 156   | 1265.8582 | -85.1968  | -274.3658 | -1090.0911 | 107.3972  | 332.9773 |
| 157   | 1089.9706 | -107.4087 | -333.3295 | -875.4891  | 129.6049  | 391.9447 |
| 158   | 875.6217  | -129.5972 | -391.6589 | -622.3595  | 151.7994  | 450.2108 |
| 159   | 622.4812  | -151.7938 | -450.0289 | -330.5772  | 173.9924  | 508.5882 |
| 160   | 330.7361  | -173.9836 | -508.4814 | 0.0347     | 146.0584  | 426.0244 |

ENVOLVENTE MAXIMOS CORTANTES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 1     | -0.0415    | 195.4604  | 554.1323 | -333.3374  | -176.5832 | -505.1692 |
| 2     | 319.6751   | 177.0873  | 508.3595 | -609.6583  | -155.5760 | -453.0468 |
| 3     | 571.2462   | 157.0961  | 458.4094 | -820.1897  | -135.6509 | -402.9352 |
| 4     | 760.8240   | 138.1568  | 410.2535 | -970.8421  | -116.8189 | -354.7482 |
| 5     | 894.2163   | 120.3432  | 363.8214 | -1081.4500 | -100.1164 | -310.9601 |
| 6     | 990.7907   | 104.6403  | 322.3082 | -1132.7133 | -84.9827  | -271.5349 |
| 7     | 1031.6229  | 90.4791   | 284.4673 | -1142.1633 | -69.4435  | -230.2805 |
| 8     | 1033.6958  | 75.8374   | 245.7828 | -1115.4944 | -54.9751  | -192.0243 |
| 9     | 1003.2010  | 62.3474   | 208.4504 | -1059.0837 | -41.6557  | -155.2201 |
| 10    | 945.5825   | 49.9229   | 174.6156 | -998.7168  | -30.0417  | -122.8695 |
| 11    | 887.0706   | 39.2468   | 143.4383 | -732.9127  | -21.5322  | -72.6712  |
| 12    | 625.6825   | 31.5918   | 95.5143  | -667.9655  | -15.3928  | -52.7517  |
| 13    | 567.5355   | 26.2643   | 77.2426  | -600.2269  | -10.0652  | -34.4760  |
| 14    | 508.7286   | 21.7180   | 61.1347  | -533.2430  | -5.5134   | -18.3541  |
| 15    | 452.5534   | 17.9489   | 46.8756  | -470.2795  | -1.7513   | -4.1156   |
| 16    | 402.0711   | 14.8800   | 34.2562  | -414.2724  | 1.3246    | 8.5247    |
| 17    | 359.7246   | 12.4788   | 24.1637  | -367.6110  | 3.7171    | 18.5935   |
| 18    | 327.7517   | 10.7034   | 15.4566  | -332.4351  | 5.4997    | 27.3195   |
| 19    | 307.8084   | 9.4964    | 8.9459   | -310.3274  | 6.6996    | 33.8116   |
| 20    | 301.2045   | 8.8020    | 4.3178   | 64.8571    | -10.1273  | -17.8514  |
| 21    | -2208.4568 | 250.2113  | 572.7599 | 1585.1693  | -270.9043 | -604.1524 |
| 22    | -1596.4852 | 271.2479  | 606.9837 | 1028.0996  | -246.5436 | -542.9894 |
| 23    | -1060.9932 | 247.6040  | 547.9954 | 547.4558   | -222.7738 | -483.8079 |
| 24    | -601.0562  | 224.6482  | 491.7809 | 141.6615   | -198.2147 | -423.4632 |
| 25    | -215.3010  | 200.9916  | 433.9695 | -180.3821  | -175.0934 | -367.7757 |
| 26    | 88.1390    | 178.8601  | 380.8067 | -440.8762  | -153.8109 | -316.0802 |
| 27    | 332.5159   | 158.6205  | 331.7016 | -635.6007  | -133.5775 | -266.7802 |
| 28    | 514.0609   | 139.4969  | 284.7609 | -769.9340  | -112.9903 | -216.1435 |
| 29    | 638.2325   | 120.0596  | 236.7859 | -832.6119  | -94.2881  | -171.3093 |
| 30    | 694.3175   | 102.5398  | 194.5915 | -862.7178  | -77.7346  | -130.9381 |
| 31    | 721.8324   | 87.1858   | 156.2096 | -852.5779  | -62.5009  | -93.0341  |
| 32    | 712.7427   | 73.1521   | 121.5160 | -558.4016  | -52.3734  | -40.2678  |
| 33    | 423.6827   | 64.2514   | 70.6641  | -545.4640  | -43.9966  | -17.2043  |
| 34    | 419.5773   | 57.0556   | 50.1311  | -525.1694  | -36.8040  | 3.3403    |
| 35    | 411.6463   | 51.0110   | 32.3852  | -503.6418  | -30.7610  | 21.0840   |
| 36    | 405.7493   | 46.0865   | 17.0893  | -486.6521  | -25.8383  | 36.3686   |
| 37    | 407.1945   | 42.2217   | 3.8981   | -479.4286  | -21.9683  | 49.5648   |
| 38    | 420.6502   | 39.3605   | -6.2471  | -486.4242  | -19.1150  | 59.6924   |
| 39    | 449.9315   | 37.4210   | -14.3845 | -511.3529  | -17.1681  | 67.8412   |
| 40    | 498.1058   | 36.3175   | -19.6953 | -126.5377  | -26.9314  | 19.2239   |
| 41    | -2428.0942 | 256.5697  | 560.7831 | 1790.4891  | -277.1465 | -599.1856 |
| 42    | -1802.1024 | 277.4946  | 601.9634 | 1219.5565  | -252.7924 | -537.9941 |
| 43    | -1253.1207 | 253.8847  | 543.2055 | 725.3174   | -229.0460 | -479.0229 |
| 44    | -780.1685  | 230.9627  | 486.8219 | 306.7212   | -204.5358 | -418.5102 |
| 45    | -381.6934  | 207.3606  | 429.0324 | -28.0093   | -181.4798 | -362.8477 |
| 46    | -65.6506   | 185.3064  | 375.7886 | -301.3407  | -160.2707 | -311.0474 |
| 47    | 191.6347   | 165.1466  | 326.5734 | -509.2089  | -140.1065 | -261.6505 |
| 48    | 386.2251   | 146.0933  | 279.7185 | -656.6569  | -119.6039 | -211.1423 |
| 49    | 523.7368   | 126.7232  | 231.7523 | -732.7385  | -100.9737 | -166.2019 |
| 50    | 593.4460   | 109.2883  | 189.1936 | -776.7929  | -84.4920  | -125.6104 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 634.8656   | 93.9973   | 151.3808 | -474.1472 | -69.8865  | -60.4391  |
| 52    | 333.6410   | 80.6007   | 88.3987  | -492.2228 | -60.3534  | -34.9203  |
| 53    | 356.9062   | 72.2751   | 65.6661  | -496.7340 | -52.0258  | -12.1851  |
| 54    | 370.4562   | 65.1353   | 45.2451  | -494.2549 | -44.8809  | 8.2356    |
| 55    | 380.4942   | 59.1385   | 27.2919  | -490.7582 | -38.8915  | 26.1637   |
| 56    | 392.7982   | 54.2531   | 11.7405  | -492.0832 | -34.0058  | 41.7086   |
| 57    | 412.6447   | 50.4283   | -0.9903  | -503.3580 | -30.1702  | 54.4710   |
| 58    | 444.6352   | 47.5926   | -11.5597 | -528.9277 | -27.3476  | 65.0008   |
| 59    | 492.5495   | 45.6736   | -19.3902 | -572.5415 | -25.4225  | 72.8281   |
| 60    | 559.3748   | 44.5814   | -24.6501 | -196.8024 | -34.1284  | 23.8539   |
| 61    | -2487.4246 | 258.2371  | 560.9679 | 1846.0623 | -278.7192 | -599.6691 |
| 62    | -1857.8376 | 279.0697  | 601.9930 | 1271.7946 | -254.3705 | -537.9956 |
| 63    | -1305.4312 | 255.4629  | 543.1820 | 774.1095  | -230.6234 | -479.0074 |
| 64    | -829.0696  | 232.5423  | 486.7807 | 352.1240  | -206.1121 | -418.4667 |
| 65    | -427.2195  | 208.9278  | 428.9760 | 14.0482   | -183.0389 | -362.7793 |
| 66    | -107.7517  | 186.8592  | 375.7575 | -262.7908 | -161.8134 | -311.0084 |
| 67    | 152.8621   | 166.6916  | 326.5511 | -473.8774 | -141.6572 | -261.6212 |
| 68    | 350.8370   | 147.6511  | 279.6328 | -624.8162 | -121.1559 | -211.0035 |
| 69    | 491.7723   | 128.2992  | 231.6071 | -704.2190 | -102.5648 | -166.1126 |
| 70    | 564.8595   | 110.8909  | 189.2405 | -751.7860 | -86.1046  | -125.6944 |
| 71    | 609.8291   | 95.6258   | 151.4306 | -452.2775 | -71.5752  | -60.4248  |
| 72    | 311.7561   | 82.2970   | 88.3573  | -474.1425 | -62.0494  | -34.8882  |
| 73    | 338.8445   | 73.9734   | 65.4875  | -482.5389 | -53.7194  | -11.9883  |
| 74    | 356.2263   | 66.8305   | 45.1891  | -483.8312 | -46.5756  | 8.2893    |
| 75    | 370.1200   | 60.8405   | 27.0799  | -484.1864 | -40.6000  | 26.3572   |
| 76    | 386.2669   | 55.9639   | 11.7164  | -489.4404 | -35.7062  | 41.7683   |
| 77    | 409.9798   | 52.1371   | -1.1047  | -504.4876 | -31.8923  | 54.5535   |
| 78    | 445.8017   | 49.3031   | -11.7693 | -533.9580 | -29.0517  | 65.2245   |
| 79    | 497.5869   | 47.3833   | -19.4624 | -581.4228 | -27.1326  | 72.8922   |
| 80    | 568.2557   | 46.2896   | -24.7173 | -209.0976 | -35.8021  | 23.9535   |
| 81    | -2502.8777 | 258.2688  | 560.6059 | 1861.4657 | -278.7608 | -599.3477 |
| 82    | -1873.1073 | 279.1111  | 602.1091 | 1286.7695 | -254.4036 | -538.1344 |
| 83    | -1320.3861 | 255.4982  | 543.4033 | 789.1683  | -230.6680 | -479.2441 |
| 84    | -844.2361  | 232.5826  | 486.7383 | 367.1973  | -206.1610 | -418.4126 |
| 85    | -442.1782  | 208.9983  | 429.0494 | 28.7271   | -183.1061 | -362.8697 |
| 86    | -122.6126  | 186.9204  | 375.7182 | -247.9469 | -161.8842 | -310.9306 |
| 87    | 138.3033   | 166.7664  | 326.4389 | -459.5273 | -141.7374 | -261.5131 |
| 88    | 336.3733   | 147.7301  | 279.6648 | -610.5076 | -121.2341 | -211.1499 |
| 89    | 477.4095   | 128.3734  | 231.8106 | -690.0604 | -102.6247 | -166.2882 |
| 90    | 550.7253   | 110.9441  | 189.2413 | -737.7687 | -86.1539  | -125.5707 |
| 91    | 595.8944   | 95.6740   | 151.0547 | -438.4910 | -71.6356  | -60.1026  |
| 92    | 297.8990   | 82.3779   | 88.4760  | -460.4931 | -62.1206  | -34.9734  |
| 93    | 325.2368   | 74.0492   | 65.2456  | -469.0552 | -53.8009  | -11.7889  |
| 94    | 342.8046   | 66.9074   | 45.0003  | -470.5515 | -46.6577  | 8.4736    |
| 95    | 356.8679   | 60.9215   | 27.0709  | -471.1661 | -40.6663  | 26.4007   |
| 96    | 373.2093   | 56.0329   | 11.6241  | -476.4887 | -35.7882  | 41.8260   |
| 97    | 397.0776   | 52.2056   | -1.2832  | -491.7691 | -31.9545  | 54.7409   |
| 98    | 433.0834   | 49.3703   | -11.6667 | -521.4064 | -29.1126  | 65.1428   |
| 99    | 485.0214   | 47.4495   | -19.7050 | -568.9895 | -27.2052  | 73.1241   |
| 100   | 555.8391   | 46.3577   | -24.7916 | -196.8940 | -35.8623  | 24.0551   |



ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| ===== | =====      | =====     | =====    | =====     | =====     | =====     |
| 101   | -2487.5623 | 256.3535  | 560.1356 | 1850.4440 | -276.8348 | -598.9014 |
| 102   | -1861.9257 | 277.1869  | 602.2334 | 1280.0641 | -252.4848 | -538.2959 |
| 103   | -1313.8224 | 253.5805  | 543.1662 | 786.9048  | -228.7503 | -478.9847 |
| 104   | -841.8700  | 230.6638  | 486.7019 | 369.0012  | -204.2276 | -418.3741 |
| 105   | -444.0944  | 207.0620  | 428.9049 | 34.9878   | -181.1719 | -362.7089 |
| 106   | -128.7936  | 185.0031  | 375.6055 | -237.5933 | -159.9701 | -310.8405 |
| 107   | 127.7556   | 164.8508  | 326.3533 | -444.5120 | -139.8167 | -261.4467 |
| 108   | 321.4532   | 145.8000  | 279.4984 | -591.2609 | -119.3017 | -210.8683 |
| 109   | 458.2883   | 126.4487  | 231.3764 | -666.6434 | -100.7072 | -165.8740 |
| 110   | 527.2372   | 109.0341  | 189.0982 | -710.0255 | -84.2507  | -125.4996 |
| 111   | 568.1903   | 93.7807   | 150.9683 | -406.6524 | -69.7456  | -60.0177  |
| 112   | 266.1210   | 80.4642   | 88.2390  | -424.3813 | -60.2182  | -34.7565  |
| 113   | 289.1843   | 72.1537   | 65.1890  | -428.7428 | -51.9070  | -11.7188  |
| 114   | 302.5484   | 65.0228   | 44.8937  | -426.0596 | -44.7759  | 8.5813    |
| 115   | 312.4610   | 59.0423   | 26.9435  | -422.5362 | -38.7881  | 26.5332   |
| 116   | 324.6943   | 54.1685   | 11.4670  | -423.7787 | -33.9198  | 41.9848   |
| 117   | 344.4946   | 50.3480   | -1.5824  | -434.9836 | -30.1007  | 55.0293   |
| 118   | 376.4349   | 47.5200   | -11.9696 | -460.5829 | -27.2689  | 65.4178   |
| 119   | 424.3179   | 45.6055   | -19.7126 | -504.1518 | -25.3540  | 73.1620   |
| 120   | 491.0467   | 44.5139   | -25.3089 | -129.4879 | -33.9410  | 24.5084   |
| 121   | -2425.1750 | 249.9587  | 559.2591 | 1802.5022 | -270.3032 | -597.9062 |
| 122   | -1814.0176 | 270.6547  | 601.2160 | 1246.7430 | -245.9358 | -537.2715 |
| 123   | -1280.5635 | 247.0432  | 542.1618 | 768.2904  | -222.1979 | -477.9838 |
| 124   | -823.1776  | 224.1282  | 485.9893 | 365.1033  | -197.6906 | -417.6891 |
| 125   | -440.3187  | 200.5545  | 428.0601 | 45.8724   | -174.6613 | -361.8667 |
| 126   | -139.6181  | 178.5284  | 374.7534 | -212.2139 | -153.4924 | -309.9493 |
| 127   | 102.6156   | 158.4111  | 325.4752 | -404.8841 | -133.3942 | -260.5924 |
| 128   | 282.0892   | 139.4358  | 278.6882 | -537.7124 | -112.9604 | -210.0808 |
| 129   | 405.1784   | 120.1625  | 230.5772 | -599.7882 | -94.4537  | -165.0019 |
| 130   | 461.0494   | 102.8343  | 188.1009 | -630.2723 | -78.0780  | -124.5435 |
| 131   | 489.1919   | 87.6568   | 150.2229 | -317.1639 | -63.8337  | -59.3105  |
| 132   | 177.6747   | 74.6397   | 87.2482  | -322.8107 | -54.3984  | -33.7961  |
| 133   | 188.8184   | 66.4015   | 64.3462  | -315.4477 | -46.1519  | -10.8650  |
| 134   | 190.6231   | 59.3385   | 43.9068  | -301.3740 | -39.0826  | 9.5806    |
| 135   | 189.2288   | 53.4165   | 25.9337  | -286.6390 | -33.1674  | 27.5308   |
| 136   | 190.3695   | 48.6099   | 10.5342  | -276.9535 | -28.3619  | 42.9213   |
| 137   | 199.2144   | 44.8500   | -2.5103  | -277.3455 | -24.6022  | 55.9606   |
| 138   | 220.2505   | 42.0719   | -12.9455 | -292.1423 | -21.8181  | 66.4041   |
| 139   | 257.1032   | 40.1950   | -20.8607 | -324.7518 | -19.9484  | 74.2958   |
| 140   | 312.5166   | 39.1321   | -26.3422 | 22.3964   | -27.9237  | 35.3099   |
| 141   | -2161.9619 | 230.1274  | 442.9145 | 1690.9620 | -254.6623 | -487.2898 |
| 142   | -1698.7991 | 254.8864  | 489.6545 | 1268.8635 | -233.5699 | -434.3492 |
| 143   | -1291.1687 | 234.2620  | 439.6010 | 899.3233  | -212.6791 | -384.0563 |
| 144   | -936.5928  | 213.8909  | 389.9325 | 570.2372  | -191.6808 | -331.2816 |
| 145   | -621.4732  | 193.4599  | 339.8887 | 290.9406  | -174.2641 | -289.2343 |
| 146   | -355.7816  | 176.6728  | 299.5642 | 60.1459   | -154.4763 | -240.9782 |
| 147   | -137.4189  | 157.5346  | 253.4337 | -124.9796 | -135.3391 | -194.8626 |
| 148   | 36.4983    | 139.1183  | 209.2178 | -266.8609 | -116.9300 | -150.7176 |
| 149   | 168.9467   | 121.4627  | 167.0117 | -368.7893 | -99.2615  | -108.4619 |
| 150   | 263.3725   | 104.5843  | 126.7147 | -434.0349 | -85.3763  | -76.0939  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol  | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|----------|-----------|----------|
| ===== | =====     | =====     | =====    | =====    | =====     | =====    |
| 151   | 323.2711  | 91.5286   | 96.3074  | -13.3617 | -72.0507  | -40.7079 |
| 152   | -100.2748 | 79.0655   | 62.8425  | -27.4588 | -62.8661  | -20.0535 |
| 153   | -86.2870  | 70.7586   | 44.0770  | -26.4794 | -54.5608  | -1.3110  |
| 154   | -84.5735  | 63.3864   | 27.2882  | -14.9467 | -47.1943  | 15.5096  |
| 155   | -90.3747  | 56.9515   | 12.4228  | 2.4476   | -40.7540  | 30.3847  |
| 156   | -98.8175  | 51.4668   | -0.5935  | 20.7478  | -35.2604  | 43.3747  |
| 157   | -104.8817 | 46.9537   | -11.6251 | 34.9563  | -30.7561  | 54.3844  |
| 158   | -103.3504 | 43.4262   | -20.6907 | 39.7500  | -27.2231  | 63.4847  |
| 159   | -88.9448  | 40.8978   | -27.8445 | 29.9175  | -24.6991  | 70.6120  |
| 160   | -56.3082  | 39.3741   | -33.0316 | 0.0061   | -23.1707  | 75.8094  |



ENVOLVENTE MAXIMOS TORSORES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | -0.0437    | 163.8861  | 582.5044 | -276.5130 | -145.0088 | -533.5403 |
| 2     | 262.8529   | 145.5156  | 536.7327 | -496.0178 | -124.0043 | -481.4192 |
| 3     | 457.6011   | 125.5261  | 486.7307 | -649.7040 | -104.0809 | -431.2557 |
| 4     | 590.3648   | 106.6023  | 438.5152 | -743.6015 | -85.2644  | -383.0108 |
| 5     | 666.9712   | 88.7880   | 392.0805 | -797.4160 | -68.5612  | -339.2195 |
| 6     | 706.7447   | 73.0754   | 350.4391 | -791.8435 | -53.4178  | -299.6666 |
| 7     | 690.7471   | 58.9168   | 312.6015 | -744.4659 | -37.8812  | -258.4155 |
| 8     | 636.0730   | 44.3075   | 273.6098 | -661.1203 | -23.4452  | -219.8511 |
| 9     | 548.7764   | 30.8307   | 236.4788 | -547.9418 | -10.1390  | -183.2487 |
| 10    | 445.9732   | 19.1438   | 202.1970 | -423.3972 | 0.8663    | -150.7742 |
| 11    | 305.8234   | 7.9978    | 171.3901 | -282.6075 | 10.7721   | -122.5115 |
| 12    | 183.0004   | -0.3424   | 145.0867 | -122.2929 | 20.5409   | -93.0519  |
| 13    | 21.8687    | -9.6601   | 117.5327 | 54.0317   | 29.6605   | -65.9765  |
| 14    | -112.9798  | -16.5938  | 92.3227  | 207.0051  | 23.8134   | -45.3959  |
| 15    | -274.3626  | -10.8617  | 73.6628  | 308.4906  | 27.0593   | -30.9010  |
| 16    | -396.9544  | -14.6783  | 61.3191  | 437.9710  | 30.8829   | -18.5377  |
| 17    | -463.8804  | -16.0827  | 50.2932  | 507.3949  | 32.2786   | -7.5361   |
| 18    | -550.4007  | -17.9664  | 41.8793  | 597.3309  | 34.1695   | 0.8947    |
| 19    | -618.6243  | -19.0782  | 35.0528  | 667.5318  | 35.2742   | 7.7032    |
| 20    | -676.6391  | -19.7668  | 29.9988  | 1094.1372 | 18.4415   | -43.5317  |
| 21    | -1164.1486 | 198.0422  | 613.2301 | 658.2220  | -218.7352 | -644.6234 |
| 22    | -669.5036  | 219.0740  | 647.7784 | 218.5241  | -194.3697 | -583.7840 |
| 23    | -251.4452  | 195.4266  | 589.2956 | -144.6918 | -170.5965 | -525.1084 |
| 24    | 91.0897    | 172.4707  | 533.0819 | -433.0819 | -146.0373 | -464.7636 |
| 25    | 359.4430   | 148.8146  | 475.2710 | -637.7204 | -122.9164 | -409.0788 |
| 26    | 545.4538   | 126.6839  | 422.3924 | -780.7982 | -101.6347 | -357.6665 |
| 27    | 672.4109   | 106.4453  | 373.5008 | -858.1119 | -81.4023  | -308.5790 |
| 28    | 736.5743   | 87.3213   | 326.5618 | -875.0581 | -60.8147  | -257.9445 |
| 29    | 743.3942   | 67.8869   | 278.6218 | -820.3724 | -42.1154  | -213.1451 |
| 30    | 682.1303   | 50.3756   | 236.4209 | -733.1459 | -25.5704  | -172.7656 |
| 31    | 592.2226   | 35.0169   | 198.0818 | -605.6078 | -10.3320  | -134.9061 |
| 32    | 476.1862   | 21.6969   | 163.1496 | -437.5808 | 4.4209    | -97.1506  |
| 33    | 302.4036   | 7.4212    | 127.5450 | -116.8482 | 14.2038   | -64.5162  |
| 34    | -8.5180    | -1.1252   | 97.4380  | 33.8328   | 21.3757   | -43.9751  |
| 35    | -120.8009  | -5.9338   | 79.3419  | 156.9285  | 26.1827   | -25.8817  |
| 36    | -234.3919  | -9.9977   | 63.6406  | 279.6618  | 30.2452   | -10.1881  |
| 37    | -362.9517  | -14.0032  | 50.6660  | 417.2596  | 34.2577   | 2.8056    |
| 38    | -468.9004  | -16.6065  | 39.7274  | 529.0313  | 36.8525   | 13.7221   |
| 39    | -565.5501  | -18.5464  | 31.8556  | 630.0760  | 38.7995   | 21.6116   |
| 40    | -641.0975  | -19.5791  | 25.8565  | 1072.8235 | 22.2570   | -20.6462  |
| 41    | -1138.8547 | 197.4942  | 605.2326 | 634.1377  | -218.0710 | -643.6333 |
| 42    | -645.7214  | 218.4136  | 646.8156 | 196.1081  | -193.7114 | -582.8470 |
| 43    | -229.6893  | 194.8015  | 588.4105 | -165.1459 | -169.9628 | -524.2291 |
| 44    | 110.2790   | 171.8802  | 532.2733 | -450.8004 | -145.4533 | -463.9609 |
| 45    | 375.8255   | 148.2772  | 474.4825 | -652.5996 | -122.3964 | -408.2985 |
| 46    | 558.9079   | 126.2292  | 421.6285 | -792.9896 | -101.1935 | -356.8870 |
| 47    | 683.2657   | 106.0648  | 372.5832 | -867.8926 | -81.0247  | -307.6583 |
| 48    | 744.8978   | 87.0160   | 325.8270 | -882.4435 | -60.5266  | -257.2513 |
| 49    | 749.5540   | 67.6517   | 277.9379 | -825.6355 | -41.9022  | -212.3843 |
| 50    | 686.3414   | 50.2163   | 235.3794 | -736.7613 | -25.4200  | -171.7928 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 595.0050   | 34.9413   | 197.5389 | -608.0242 | -10.2723  | -134.3479 |
| 52    | 467.5160   | 20.9905   | 162.3074 | -427.0748 | 5.1093    | -96.2925  |
| 53    | 303.4526   | 7.4933    | 126.8525 | -118.2263 | 14.1750   | -64.4891  |
| 54    | -7.7200    | -1.0511   | 97.4047  | 32.8793   | 21.3053   | -43.9368  |
| 55    | -117.4295  | -5.6983   | 79.3117  | 153.0275  | 25.9455   | -25.8605  |
| 56    | -250.9844  | -10.5796  | 63.7609  | 297.5548  | 30.8268   | -10.3104  |
| 57    | -359.9871  | -13.7578  | 50.4948  | 413.7567  | 34.0163   | 2.9864    |
| 58    | -472.4748  | -16.5893  | 39.9824  | 532.5646  | 36.8350   | 13.4654   |
| 59    | -565.8600  | -18.4077  | 31.7968  | 630.0613  | 38.6591   | 21.6662   |
| 60    | -641.1081  | -19.4313  | 25.7970  | 1071.0901 | 22.0533   | -20.2803  |
| 61    | -1191.0923 | 199.1948  | 605.1401 | 682.5748  | -219.6769 | -643.8408 |
| 62    | -692.2658  | 219.9655  | 646.8864 | 239.1982  | -195.2663 | -582.8895 |
| 63    | -270.0419  | 196.2662  | 588.4375 | -128.0603 | -171.4267 | -524.2627 |
| 64    | 75.8977    | 173.2337  | 532.2864 | -419.4177 | -146.8035 | -463.9717 |
| 65    | 344.3268   | 149.6151  | 474.4844 | -624.0614 | -123.7262 | -408.2862 |
| 66    | 542.2493   | 127.0484  | 421.4852 | -778.2001 | -102.0026 | -356.7362 |
| 67    | 685.5132   | 106.0791  | 372.6188 | -870.1416 | -81.0447  | -307.6886 |
| 68    | 747.1072   | 87.0431   | 325.6965 | -884.7092 | -60.5479  | -257.0694 |
| 69    | 751.6514   | 67.6942   | 277.7439 | -827.7657 | -41.9598  | -212.2488 |
| 70    | 688.3917   | 50.2803   | 235.4222 | -738.9429 | -25.4940  | -171.8703 |
| 71    | 597.1067   | 35.0286   | 197.5991 | -610.3095 | -10.3638  | -134.4022 |
| 72    | 469.7885   | 21.0913   | 162.3327 | -429.5822 | 5.0039    | -96.2857  |
| 73    | 301.0617   | 7.3063    | 126.7899 | -115.2828 | 14.3397   | -64.4302  |
| 74    | 11.3148    | -0.0773   | 97.3721  | 11.6473   | 20.3304   | -43.9073  |
| 75    | -147.1322  | -7.0708   | 79.3078  | 185.7924  | 27.3113   | -25.8749  |
| 76    | -242.3239  | -10.2181  | 63.6781  | 288.1245  | 30.4769   | -10.1949  |
| 77    | -361.4086  | -13.8093  | 50.4281  | 415.2402  | 34.0541   | 3.0186    |
| 78    | -476.7677  | -16.7437  | 40.0189  | 537.2318  | 36.9955   | 13.4468   |
| 79    | -570.5437  | -18.5612  | 31.6708  | 635.0871  | 38.8116   | 21.7910   |
| 80    | -646.1382  | -19.5895  | 25.6610  | 1076.6494 | 22.2238   | -20.0816  |
| 81    | -1214.7885 | 200.1803  | 604.9611 | 704.0706  | -220.6723 | -643.7036 |
| 82    | -715.7282  | 221.0278  | 646.8643 | 260.1118  | -196.3203 | -582.8899 |
| 83    | -293.5104  | 197.4107  | 588.4480 | -107.0264 | -172.5805 | -524.2889 |
| 84    | 63.3520    | 174.0880  | 532.3456 | -408.7996 | -147.6664 | -464.0208 |
| 85    | 325.9508   | 150.8024  | 474.4437 | -608.4409 | -124.9102 | -408.2636 |
| 86    | 561.6596   | 126.7573  | 421.7067 | -796.8821 | -101.7211 | -356.9204 |
| 87    | 687.2478   | 106.6060  | 372.2763 | -873.0962 | -81.5770  | -307.3502 |
| 88    | 749.9165   | 87.5686   | 325.7610 | -888.6852 | -61.0726  | -257.2461 |
| 89    | 762.9219   | 67.7779   | 278.0875 | -839.2398 | -42.0292  | -212.5661 |
| 90    | 699.9098   | 50.3503   | 235.5201 | -750.6186 | -25.5601  | -171.8496 |
| 91    | 608.7453   | 35.0768   | 197.3318 | -622.0420 | -10.4076  | -134.1928 |
| 92    | 481.5298   | 21.1375   | 162.4464 | -441.4417 | 4.9538    | -96.4025  |
| 93    | 306.2025   | 6.9748    | 126.7607 | -120.6240 | 14.8149   | -64.4072  |
| 94    | -5.6588    | -1.7091   | 97.3711  | 32.2741   | 21.9576   | -43.9211  |
| 95    | -122.8622  | -6.6346   | 79.2832  | 160.5809  | 26.8860   | -25.8178  |
| 96    | -253.1102  | -11.2914  | 63.6582  | 301.2840  | 31.5373   | -10.2091  |
| 97    | -375.7351  | -14.9286  | 50.4928  | 432.1135  | 35.1815   | 2.9697    |
| 98    | -490.8153  | -17.7660  | 39.7941  | 553.5973  | 38.0219   | 13.6848   |
| 99    | -589.9833  | -19.6819  | 31.8159  | 657.0052  | 39.9243   | 21.6323   |
| 100   | -666.7426  | -20.6639  | 25.5779  | 1098.1511 | 23.1588   | -19.9501  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | -1217.4744 | 200.0934  | 604.6036 | 706.9390  | -220.5747 | -643.3686 |
| 102   | -718.4225  | 220.9303  | 646.6940 | 263.1261  | -196.2282 | -582.7569 |
| 103   | -296.6417  | 197.3194  | 588.2648 | -103.6991 | -172.4892 | -524.0837 |
| 104   | 55.3147    | 174.1670  | 532.1103 | -401.0432 | -147.7308 | -463.7832 |
| 105   | 325.9495   | 150.5632  | 474.3101 | -607.9114 | -124.6731 | -408.1153 |
| 106   | 558.9382   | 126.6323  | 421.4240 | -793.9720 | -101.5993 | -356.6588 |
| 107   | 686.4018   | 106.3752  | 372.3298 | -871.6194 | -81.3411  | -307.4250 |
| 108   | 748.5408   | 87.3216   | 325.6158 | -886.7650 | -60.8233  | -256.9861 |
| 109   | 753.7897   | 67.9655   | 277.4964 | -830.5431 | -42.2240  | -211.9934 |
| 110   | 699.7230   | 49.9787   | 235.3238 | -749.6331 | -25.1953  | -171.7265 |
| 111   | 608.0264   | 34.7046   | 197.1962 | -620.5495 | -10.0393  | -134.0199 |
| 112   | 479.9912   | 20.7602   | 162.1806 | -439.1117 | 5.3351    | -96.1640  |
| 113   | 303.9101   | 6.5995    | 126.5967 | -117.5774 | 15.2017   | -64.2483  |
| 114   | -8.6450    | -2.0808   | 97.2012  | 36.0871   | 22.3336   | -43.7447  |
| 115   | -149.7039  | -8.0703   | 79.0985  | 190.6581  | 28.3213   | -25.6284  |
| 116   | -288.5111  | -12.9431  | 63.4591  | 340.3994  | 33.1894   | -10.0081  |
| 117   | -419.6802  | -16.7656  | 50.4072  | 480.1658  | 37.0097   | 3.0437    |
| 118   | -538.7312  | -19.5909  | 39.7124  | 605.6119  | 39.8456   | 13.7532   |
| 119   | -641.9082  | -21.5119  | 31.3141  | 713.1088  | 41.7648   | 22.1489   |
| 120   | -726.2098  | -22.6023  | 25.6985  | 1159.9861 | 25.1391   | -20.1432  |
| 121   | -1223.6268 | 200.7073  | 599.3124 | 711.7688  | -221.0518 | -637.9605 |
| 122   | -723.2854  | 221.4029  | 641.2807 | 266.8231  | -196.6840 | -577.3355 |
| 123   | -297.2771  | 197.6801  | 582.8399 | -103.9364 | -172.8348 | -518.6633 |
| 124   | 49.0489    | 174.7638  | 526.6662 | -396.0594 | -148.3262 | -458.3657 |
| 125   | 324.2575   | 151.0576  | 468.9944 | -607.3120 | -125.1644 | -402.8013 |
| 126   | 558.4829   | 127.1415  | 416.1119 | -794.6722 | -102.1055 | -351.3055 |
| 127   | 684.9499   | 107.0384  | 366.7981 | -871.6888 | -82.0215  | -301.9151 |
| 128   | 759.4067   | 87.5208   | 320.3245 | -898.2052 | -61.0454  | -251.7165 |
| 129   | 765.6627   | 68.2426   | 272.2159 | -843.4438 | -42.5338  | -206.6412 |
| 130   | 707.4081   | 50.7268   | 229.8111 | -759.4106 | -25.9705  | -166.2517 |
| 131   | 618.6101   | 35.5202   | 192.0184 | -633.6693 | -10.8999  | -128.7692 |
| 132   | 494.1852   | 21.7038   | 156.7043 | -457.0228 | 4.2922    | -90.6128  |
| 133   | 323.0184   | 7.7119    | 121.1274 | -139.3689 | 14.0898   | -58.9889  |
| 134   | 14.6070    | -0.9164   | 91.9550  | 10.2527   | 21.1722   | -38.4787  |
| 135   | -122.3943  | -6.8404   | 73.8949  | 160.5619  | 27.0894   | -20.4363  |
| 136   | -256.8548  | -11.6524  | 58.2228  | 305.8453  | 31.9002   | -4.7674   |
| 137   | -383.5831  | -15.4060  | 45.1737  | 441.0196  | 35.6538   | 8.2807    |
| 138   | -498.1299  | -18.1871  | 34.5040  | 561.8323  | 38.4384   | 18.9642   |
| 139   | -596.8280  | -20.0531  | 26.3463  | 664.7390  | 40.3024   | 27.1054   |
| 140   | -676.9259  | -21.1091  | 20.5291  | 1066.1982 | 24.2137   | -5.2104   |
| 141   | -1131.8105 | 201.5165  | 468.9854 | 712.3092  | -226.0514 | -513.3615 |
| 142   | -716.4006  | 226.1678  | 516.1435 | 338.1643  | -204.8513 | -460.8391 |
| 143   | -364.0167  | 205.6529  | 465.6922 | 23.6597   | -184.0700 | -410.1482 |
| 144   | -48.8471   | 184.8821  | 416.7735 | -265.2690 | -162.6720 | -358.1224 |
| 145   | 209.6595   | 164.5987  | 366.6788 | -488.2545 | -145.4029 | -316.0250 |
| 146   | 456.4728   | 146.5903  | 326.6752 | -697.9538 | -124.3938 | -268.0890 |
| 147   | 627.2080   | 127.2219  | 280.5468 | -835.0368 | -105.0264 | -221.9778 |
| 148   | 756.4074   | 108.3886  | 236.5931 | -931.4759 | -86.2003  | -178.0928 |
| 149   | 836.5651   | 90.5807   | 194.6712 | -980.8171 | -68.3795  | -136.1186 |
| 150   | 875.4061   | 73.7177   | 154.3725 | -990.5109 | -54.5097  | -103.7539 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|-----------|-----------|----------|
| 151   | 890.1957 | 60.0595   | 124.2058 | -655.1417 | -32.4686  | -76.2269 |
| 152   | 542.3059 | 39.4246   | 98.5496  | -598.6215 | -23.2298  | -55.7824 |
| 153   | 484.8771 | 31.1441   | 79.8076  | -526.3517 | -14.9451  | -37.0404 |
| 154   | 415.3012 | 23.7358   | 63.0129  | -443.4396 | -7.5368   | -20.2496 |
| 155   | 338.2404 | 17.2689   | 48.4421  | -354.7703 | -1.0682   | -5.6812  |
| 156   | 258.4020 | 11.7787   | 35.5892  | -265.0213 | 4.4252    | 7.1881   |
| 157   | 180.8926 | 7.2643    | 24.4678  | -179.3918 | 8.9338    | 18.2946  |
| 158   | 110.9859 | 3.7400    | 15.4704  | -103.1345 | 12.4638   | 27.3072  |
| 159   | 53.9265  | 1.2138    | 8.3756   | -41.5375  | 14.9832   | 34.3843  |
| 160   | 15.1361  | -0.3080   | 3.2195   | 0.0031    | 16.5082   | 39.5559  |

ENVOLVENTE MINIMOS FLECTORES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | -0.0440    | 163.8513  | 579.0018  | -200.4401 | -103.2909 | -407.5830 |
| 2     | -55.6541   | -30.9220  | 27.9501   | 111.3043  | 30.9220   | -27.9494  |
| 3     | -111.3152  | -30.9222  | 27.8992   | 166.9903  | 30.9222   | -27.8987  |
| 4     | -166.9976  | -30.9129  | 27.8411   | 222.6252  | 30.9129   | -27.8419  |
| 5     | -222.6295  | -30.9137  | 27.8386   | 278.2645  | 30.9137   | -27.8387  |
| 6     | -278.2768  | -30.9231  | 27.7125   | 333.9462  | 30.9231   | -27.7136  |
| 7     | -333.9520  | -30.9206  | 27.7158   | 389.6190  | 30.9206   | -27.7167  |
| 8     | -389.6433  | -30.8967  | 27.4154   | 445.2554  | 30.8967   | -27.4152  |
| 9     | -445.2390  | -30.8791  | 27.6124   | 514.4595  | 40.1087   | -38.7732  |
| 10    | -514.4774  | -40.0832  | 38.3338   | 587.6607  | 41.5820   | -34.3695  |
| 11    | -587.6675  | -41.5949  | 34.4166   | 664.2065  | 43.0961   | -30.4479  |
| 12    | -664.2187  | -43.1110  | 30.1788   | 744.0130  | 45.1113   | -24.8857  |
| 13    | -744.0073  | -45.1020  | 24.8755   | 826.9879  | 47.1014   | -19.5747  |
| 14    | -827.0059  | -47.0770  | 19.2577   | 913.1638  | 49.0775   | -13.9326  |
| 15    | -913.1673  | -49.0906  | 13.6621   | 1002.5174 | 50.5899   | -9.7065   |
| 16    | -1002.5021 | -50.5871  | 10.0008   | 1095.2759 | 52.0859   | -5.9547   |
| 17    | -1095.4642 | -54.1165  | -3.3057   | 1195.0444 | 56.1165   | 8.6597    |
| 18    | -1246.4858 | -113.5752 | -140.9650 | 1452.7573 | 115.5773  | 146.2508  |
| 19    | -1494.6973 | -163.6818 | -256.0253 | 1790.6418 | 165.6827  | 261.4272  |
| 20    | -1824.8673 | -208.8980 | -364.6287 | 2201.9458 | 167.4108  | 278.2948  |
| 21    | -2227.5203 | 246.9408  | 566.0488  | 1605.6843 | -263.1931 | -587.9866 |
| 22    | -1629.2379 | 244.3485  | 542.9368  | 1134.5580 | -200.3060 | -413.0616 |
| 23    | -1191.2000 | 147.9679  | 283.6238  | 858.2503  | -147.9694 | -283.5598 |
| 24    | -906.6312  | 105.0215  | 177.4885  | 670.3248  | -105.0208 | -177.4892 |
| 25    | -735.9534  | 51.0093   | 32.9438   | 621.1768  | -51.0085  | -32.8922  |
| 26    | -694.9676  | -3.4217   | -0.0797   | 702.6589  | 3.4216    | 0.1751    |
| 27    | -702.6701  | -3.4239   | -0.5202   | 710.3681  | 3.4229    | 0.5676    |
| 28    | -710.3613  | -3.4279   | -0.5621   | 718.0662  | 3.4278    | 0.5835    |
| 29    | -718.0599  | -3.4273   | -0.7873   | 725.7708  | 3.4276    | 0.8389    |
| 30    | -725.7653  | -3.4295   | -1.2297   | 733.4760  | 3.4289    | 1.2482    |
| 31    | -733.4660  | -3.4311   | -1.0301   | 741.1881  | 3.4295    | 1.0512    |
| 32    | -741.1904  | -3.4154   | -1.7103   | 748.8724  | 3.4168    | 1.7469    |
| 33    | -748.8773  | -3.4416   | -1.7532   | 774.0772  | 23.2313   | 10.4551   |
| 34    | -774.0855  | -23.2612  | -10.4654  | 828.4197  | 25.2628   | 15.7755   |
| 35    | -828.4214  | -25.2700  | -16.2320  | 887.7606  | 27.2709   | 21.5835   |
| 36    | -887.7727  | -27.2809  | -22.0715  | 952.1417  | 29.7806   | 28.6836   |
| 37    | -973.0434  | -60.2612  | -49.3976  | 1111.2754 | 62.7602   | 56.0695   |
| 38    | -1166.9746 | -108.8911 | -186.3001 | 1413.9177 | 110.8907  | 191.6407  |
| 39    | -1479.9064 | -165.3241 | -327.6115 | 1854.4369 | 167.3234  | 332.9556  |
| 40    | -1909.5026 | -219.4143 | -462.6510 | 2406.2227 | 179.0430  | 372.0368  |
| 41    | -2446.6167 | 253.2910  | 554.1319  | 1810.9248 | -269.4327 | -583.0255 |
| 42    | -1835.6272 | 250.6202  | 537.9464  | 1363.5978 | -207.7625 | -408.1586 |
| 43    | -1424.7225 | 155.5755  | 278.9939  | 1074.5789 | -155.5750 | -278.9211 |
| 44    | -1129.7377 | 100.8824  | 142.3199  | 902.7697  | -100.8815 | -142.2901 |
| 45    | -949.8004  | 59.1320   | 28.1508   | 816.7574  | -59.1306  | -28.0928  |
| 46    | -901.2978  | 5.1730    | -4.9627   | 889.6566  | -5.1697   | 5.0478    |
| 47    | -889.6437  | 5.1651    | -5.2855   | 878.0082  | -5.1634   | 5.3310    |
| 48    | -877.9961  | 5.1463    | -5.5233   | 866.4172  | -5.1483   | 5.5689    |
| 49    | -866.4222  | 5.1715    | -5.8205   | 854.7741  | -5.1735   | 5.8475    |
| 50    | -854.7602  | 5.1972    | -5.8443   | 843.0598  | -5.1992   | 5.8715    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -843.0662  | 5.2119    | -6.3246   | 831.3255  | -5.2170   | 6.3622    |
| 52    | -831.3249  | 5.2401    | -6.3712   | 819.5242  | -5.2427   | 6.3922    |
| 53    | -819.5152  | 5.2510    | -6.8558   | 819.3433  | 15.5104   | 15.5675   |
| 54    | -819.3275  | -15.5098  | -15.8321  | 856.2293  | 17.5095   | 21.1325   |
| 55    | -856.2318  | -17.5027  | -21.3416  | 898.1072  | 19.5021   | 26.6331   |
| 56    | -898.1075  | -19.4903  | -26.6411  | 944.9357  | 21.9909   | 33.2972   |
| 57    | -976.2885  | -70.5977  | -66.4831  | 1137.8168 | 73.0978   | 73.1331   |
| 58    | -1183.8317 | -114.7855 | -187.2261 | 1444.0345 | 116.7840  | 192.5441  |
| 59    | -1511.0170 | -171.4424 | -329.3307 | 1899.2626 | 173.4418  | 334.7563  |
| 60    | -1954.8910 | -225.6118 | -464.5433 | 2465.4995 | 185.3319  | 373.5854  |
| 61    | -2505.8911 | 254.9604  | 554.3191  | 1866.4934 | -271.0073 | -583.5096 |
| 62    | -1891.4359 | 252.1999  | 537.9762  | 1417.9979 | -209.3930 | -408.1206 |
| 63    | -1479.5476 | 157.2146  | 278.9171  | 1125.7379 | -157.2169 | -278.8465 |
| 64    | -1181.6392 | 102.5440  | 142.2012  | 950.9451  | -102.5484 | -142.1695 |
| 65    | -998.7064  | 60.8261   | 28.0213   | 861.8623  | -60.8296  | -27.9900  |
| 66    | -946.9969  | 7.2799    | -4.9551   | 930.6036  | -7.2813   | 5.0421    |
| 67    | -930.6271  | 7.2882    | -5.5345   | 914.2253  | -7.2882   | 5.5914    |
| 68    | -914.2316  | 7.2989    | -5.5868   | 897.8076  | -7.2990   | 5.6023    |
| 69    | -897.8121  | 7.2811    | -5.8078   | 881.4347  | -7.2812   | 5.8467    |
| 70    | -881.4275  | 7.2913    | -6.1066   | 865.0161  | -7.2908   | 6.1581    |
| 71    | -865.0353  | 7.2864    | -6.6487   | 848.6438  | -7.2863   | 6.6780    |
| 72    | -848.6486  | 7.3005    | -6.6828   | 832.2201  | -7.3017   | 6.6920    |
| 73    | -832.2180  | 7.3088    | -6.9509   | 827.1252  | 13.4956   | 15.6644   |
| 74    | -827.1035  | -13.5159  | -16.1380  | 859.5108  | 15.5166   | 21.4312   |
| 75    | -859.5138  | -15.5273  | -21.3880  | 896.9301  | 17.5270   | 26.6912   |
| 76    | -896.9305  | -17.5211  | -27.0171  | 939.3582  | 20.0211   | 33.6880   |
| 77    | -973.9863  | -72.4987  | -66.7656  | 1139.6864 | 74.9981   | 73.3827   |
| 78    | -1185.8380 | -116.7057 | -187.2166 | 1450.4429 | 118.7056  | 192.5498  |
| 79    | -1517.4677 | -173.3677 | -329.6615 | 1910.0223 | 175.3682  | 335.1263  |
| 80    | -1965.6733 | -227.5399 | -464.9164 | 2480.6311 | 187.2511  | 373.9515  |
| 81    | -2521.3345 | 254.9915  | 553.9524  | 1881.8868 | -271.0479 | -583.1889 |
| 82    | -1906.6993 | 252.2358  | 538.0831  | 1433.1140 | -209.4506 | -408.2880 |
| 83    | -1494.6698 | 157.2807  | 279.1902  | 1140.8304 | -157.2813 | -279.0875 |
| 84    | -1196.7742 | 102.6145  | 142.1036  | 965.9244  | -102.6167 | -142.0621 |
| 85    | -1013.6010 | 60.9079   | 28.1231   | 876.5387  | -60.9078  | -28.0670  |
| 86    | -960.0661  | 8.4390    | -5.3399   | 941.0809  | -8.4385   | 5.4015    |
| 87    | -941.0843  | 8.4292    | -5.1869   | 922.1233  | -8.4292   | 5.2119    |
| 88    | -922.1454  | 8.4243    | -5.6987   | 903.1921  | -8.4267   | 5.7898    |
| 89    | -903.1919  | 8.4497    | -6.2809   | 884.1760  | -8.4524   | 6.3236    |
| 90    | -884.1830  | 8.4764    | -6.3292   | 865.1131  | -8.4788   | 6.3292    |
| 91    | -865.0983  | 8.5174    | -6.3309   | 845.9279  | -8.5161   | 6.3682    |
| 92    | -845.9429  | 8.4825    | -7.1082   | 826.8611  | -8.4793   | 7.1384    |
| 93    | -826.8654  | 8.4503    | -6.8736   | 819.1615  | 12.3546   | 15.5482   |
| 94    | -819.1595  | -12.3575  | -16.0203  | 848.9527  | 14.3575   | 21.3315   |
| 95    | -848.9568  | -14.3747  | -21.5984  | 883.8028  | 16.3763   | 26.9129   |
| 96    | -883.8092  | -16.3829  | -27.1318  | 923.6517  | 18.8832   | 33.7784   |
| 97    | -959.2194  | -72.4394  | -66.5529  | 1124.8302 | 74.9394   | 73.2166   |
| 98    | -1170.9542 | -116.6397 | -187.6634 | 1435.4889 | 118.6385  | 192.9727  |
| 99    | -1502.7037 | -173.2968 | -329.2337 | 1894.9917 | 175.2958  | 334.6619  |
| 100   | -1950.5385 | -227.4679 | -464.9834 | 2465.3218 | 187.1912  | 374.0890  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -2505.9956 | 253.0750  | 553.4803  | 1870.8494 | -269.1197 | -582.7464 |
| 102   | -1895.5103 | 250.3151  | 538.2333  | 1426.4336 | -207.5415 | -408.4842 |
| 103   | -1488.1182 | 155.3681  | 278.9605  | 1138.5675 | -155.3695 | -278.8451 |
| 104   | -1194.4520 | 100.7103  | 142.1372  | 967.8130  | -100.7109 | -142.0991 |
| 105   | -1015.5423 | 59.0175   | 27.9735   | 882.7366  | -59.0173  | -27.9125  |
| 106   | -960.6644  | 10.3971   | -5.1322   | 937.2622  | -10.3977  | 5.2168    |
| 107   | -937.2545  | 10.4062   | -5.4338   | 913.8447  | -10.4072  | 5.4821    |
| 108   | -913.8356  | 10.4280   | -5.7297   | 890.3653  | -10.4313  | 5.7558    |
| 109   | -890.3514  | 10.4439   | -5.7554   | 866.8479  | -10.4427  | 5.7903    |
| 110   | -866.8573  | 10.4232   | -6.2633   | 843.4106  | -10.4226  | 6.3032    |
| 111   | -843.4185  | 10.4315   | -6.3086   | 819.9412  | -10.4361  | 6.3338    |
| 112   | -819.9480  | 10.4841   | -6.8026   | 796.3561  | -10.4870  | 6.8302    |
| 113   | -796.3484  | 10.4921   | -6.8364   | 782.9314  | 10.2556   | 15.5216   |
| 114   | -782.9351  | -10.2405  | -15.9772  | 807.9650  | 12.2400   | 21.2924   |
| 115   | -807.9677  | -12.2427  | -21.5496  | 838.0160  | 14.2428   | 26.8623   |
| 116   | -838.0016  | -14.2458  | -27.0501  | 873.0406  | 16.7472   | 33.6695   |
| 117   | -909.7552  | -70.6961  | -66.2452  | 1071.4178 | 73.1971   | 72.8821   |
| 118   | -1118.2247 | -114.9461 | -187.3149 | 1378.8533 | 116.9461  | 192.7116  |
| 119   | -1446.5881 | -171.6413 | -329.8025 | 1835.2876 | 173.6415  | 335.1655  |
| 120   | -1891.6010 | -225.8197 | -463.9105 | 2402.7227 | 185.6855  | 372.9840  |
| 121   | -2443.1721 | 246.6650  | 552.6043  | 1822.9136 | -220.0973 | -452.0870 |
| 122   | -1847.6892 | 201.3020  | 407.5498  | 1394.7560 | -201.3016 | -407.4741 |
| 123   | -1456.8486 | 149.2105  | 277.9869  | 1121.1466 | -149.2091 | -277.9110 |
| 124   | -1177.5930 | 94.7587   | 141.5807  | 964.3953  | -94.7597  | -141.5460 |
| 125   | -1012.4133 | 48.6070   | 11.8194   | 903.0168  | -48.6063  | -11.7255  |
| 126   | -950.7751  | 18.0844   | -9.8116   | 910.0802  | -18.0802  | 9.8652    |
| 127   | -910.0729  | 18.0569   | -9.8166   | 869.4638  | -18.0549  | 9.8623    |
| 128   | -869.4637  | 18.0576   | -10.3448  | 828.8215  | -18.0567  | 10.3936   |
| 129   | -828.8144  | 18.0581   | -10.3946  | 788.1813  | -18.0602  | 10.4099   |
| 130   | -788.1943  | 18.0782   | -10.6008  | 747.5166  | -18.0810  | 10.6506   |
| 131   | -747.5061  | 18.0963   | -11.0908  | 706.7663  | -18.0976  | 11.1241   |
| 132   | -706.7713  | 18.1041   | -11.0866  | 666.0438  | -18.1070  | 11.0964   |
| 133   | -666.0208  | 18.1082   | -11.2928  | 625.2745  | -18.1087  | 11.3127   |
| 134   | -625.2573  | 18.1035   | -11.5179  | 610.8990  | 3.1472    | 26.0446   |
| 135   | -610.9045  | -3.1336   | -26.2075  | 620.4414  | 5.1329    | 31.5228   |
| 136   | -620.4400  | -5.1369   | -31.8389  | 634.9905  | 7.6369    | 38.4647   |
| 137   | -683.6663  | -62.1002  | -71.1303  | 825.9951  | 64.6004   | 77.7578   |
| 138   | -881.8759  | -118.6344 | -222.5220 | 1150.8414 | 120.6350  | 227.8591  |
| 139   | -1199.0409 | -163.5992 | -334.2278 | 1569.5585 | 165.5992  | 339.5838  |
| 140   | -1630.7231 | -217.9350 | -468.8456 | 2124.1514 | 178.1832  | 384.2369  |
| 141   | -2166.0039 | 228.5843  | 439.2242  | 1743.9819 | -204.8945 | -354.8450 |
| 142   | -1760.9294 | 189.6100  | 319.1908  | 1419.5884 | -189.6102 | -319.1880 |
| 143   | -1462.8672 | 146.3999  | 217.1594  | 1199.4004 | -146.4031 | -217.1092 |
| 144   | -1244.1270 | 98.3126   | 106.8867  | 1067.0762 | -98.3124  | -106.7887 |
| 145   | -1118.9829 | 40.8840   | -25.8187  | 1045.4116 | -40.8794  | 25.8542   |
| 146   | -1048.8813 | 38.8442   | -34.4529  | 978.9493  | -38.8393  | 34.4984   |
| 147   | -978.9585  | 38.8103   | -34.5009  | 909.0967  | -38.8114  | 34.5377   |
| 148   | -909.0929  | 38.8075   | -34.7993  | 839.2626  | -38.8108  | 34.8704   |
| 149   | -839.2451  | 38.8233   | -35.1559  | 769.3612  | -38.8190  | 35.1881   |
| 150   | -769.3669  | 38.8036   | -35.1892  | 699.5294  | -38.8026  | 35.2232   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|----------|-----------|----------|
| 151   | -699.5174 | 38.8245   | -35.4573 | 629.6028 | -38.8311  | 35.5130  |
| 152   | -629.5893 | 38.8393   | -35.6968 | 559.6748 | -38.8389  | 35.7183  |
| 153   | -559.6764 | 38.8176   | -35.7198 | 489.8186 | -38.8188  | 35.7185  |
| 154   | -489.8210 | 38.8531   | -35.7141 | 419.8746 | -38.8600  | 35.7480  |
| 155   | -419.8513 | 38.8713   | -36.0025 | 349.8920 | -38.8718  | 36.0479  |
| 156   | -349.8750 | 38.8720   | -36.1625 | 279.8937 | -38.8695  | 36.1664  |
| 157   | -279.8992 | 38.8731   | -36.0746 | 209.9417 | -38.8736  | 36.0715  |
| 158   | -209.9299 | 38.8700   | -36.1414 | 139.9472 | -38.8707  | 36.1575  |
| 159   | -139.9341 | 38.8679   | -36.1991 | 69.9860  | -38.8662  | 36.2065  |
| 160   | -69.9715  | 38.8639   | -36.2295 | 0.0138   | 11.8864   | 165.2530 |

ENVOLVENTE MINIMOS CORTANTES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0058    | -15.2357  | 67.5190   | 39.1889   | 31.5389   | -24.1428 |
| 2     | -12.7714   | -16.8582  | 61.7376   | 44.5663   | 33.5780   | -17.1429 |
| 3     | 4.6403     | -19.9004  | 52.7704   | 23.8367   | 37.0403   | -7.3637  |
| 4     | 44.5670    | -24.3602  | 41.0418   | -15.4519  | 41.9034   | 5.1468   |
| 5     | 99.5510    | -30.2179  | 26.5891   | -47.1580  | 47.2394   | 18.1748  |
| 6     | 143.5506   | -36.5332  | 11.6449   | -99.1036  | 54.6867   | 35.7420  |
| 7     | 204.4429   | -44.9215  | -7.8662   | -148.3951 | 63.4753   | 56.0225  |
| 8     | 259.5001   | -54.6570  | -30.0020  | -188.1545 | 73.5981   | 78.9625  |
| 9     | 301.8793   | -65.6915  | -54.9754  | -211.6984 | 85.0014   | 104.7149 |
| 10    | 325.3979   | -77.9792  | -82.5335  | -212.8468 | 96.1607   | 129.0814 |
| 11    | 323.5287   | -90.0208  | -108.9025 | -164.2842 | 109.5855  | 159.7792 |
| 12    | 269.7574   | -104.2646 | -141.5080 | -104.2492 | 124.4576  | 193.2195 |
| 13    | 202.1529   | -119.9213 | -176.8913 | -5.6233   | 140.4397  | 229.4092 |
| 14    | 94.1492    | -136.6606 | -215.0694 | 136.1784  | 157.5024  | 268.3646 |
| 15    | -58.8468   | -154.4351 | -255.9888 | 325.2148  | 174.0512  | 306.1629 |
| 16    | -260.5053  | -171.6563 | -295.5075 | 576.6504  | 191.9251  | 348.2270 |
| 17    | -525.1226  | -190.1501 | -340.3608 | 867.5213  | 211.6616  | 395.3780 |
| 18    | -830.5860  | -210.4524 | -388.4617 | 1214.1573 | 231.9975  | 443.6956 |
| 19    | -1191.6022 | -231.3020 | -439.3374 | 1615.8408 | 252.7746  | 494.8140 |
| 20    | -1607.9871 | -252.5504 | -492.4629 | 2076.0693 | 238.9118  | 476.1792 |
| 21    | 62.8209    | -36.6975  | 2.5068    | -250.7190 | 31.1780   | -19.9672 |
| 22    | 262.9507   | -11.9908  | 67.9367   | -213.1827 | 32.2433   | -14.4703 |
| 23    | 248.2110   | -13.8647  | 60.0956   | -194.2264 | 34.1157   | -6.6318  |
| 24    | 251.3353   | -16.6458  | 49.5858   | -191.0977 | 36.8968   | 3.8768   |
| 25    | 268.8490   | -20.4098  | 36.5385   | -200.1409 | 40.6608   | 16.9237  |
| 26    | 296.4072   | -25.2207  | 21.1316   | -225.3777 | 45.7650   | 55.6432  |
| 27    | 337.4678   | -31.4352  | -20.0322  | -287.2335 | 53.8116   | 78.5151  |
| 28    | 411.9999   | -40.6340  | -45.5696  | -342.3159 | 63.3081   | 104.6853 |
| 29    | 476.3270   | -51.3046  | -74.1281  | -407.1768 | 75.7426   | 137.2302 |
| 30    | 546.6524   | -64.9449  | -109.0328 | -423.9444 | 88.3428   | 169.7235 |
| 31    | 564.8565   | -78.7514  | -144.3593 | -408.8660 | 102.4075  | 205.6492 |
| 32    | 547.6483   | -94.0274  | -182.3664 | -376.0045 | 118.3596  | 244.7620 |
| 33    | 508.4781   | -111.1559 | -224.2250 | -270.9189 | 136.8974  | 291.1101 |
| 34    | 393.6061   | -130.8474 | -273.0963 | -110.2690 | 155.2918  | 336.5222 |
| 35    | 219.9990   | -150.3584 | -321.0194 | 112.5062  | 174.9725  | 384.6485 |
| 36    | -18.7770   | -171.1029 | -371.7326 | 390.3594  | 196.6766  | 437.0726 |
| 37    | -315.3229  | -193.8208 | -426.4185 | 757.9328  | 220.2565  | 494.7400 |
| 38    | -702.7027  | -218.3190 | -487.4289 | 1202.1477 | 243.3199  | 551.9550 |
| 39    | -1168.6989 | -242.2134 | -546.0346 | 1726.9922 | 267.2609  | 610.8513 |
| 40    | -1715.1874 | -266.9105 | -608.5046 | 2333.2993 | 258.3408  | 595.7824 |
| 41    | 221.1679   | -42.3638  | -11.8466  | -493.1385 | 38.5161   | -18.5400 |
| 42    | 506.2212   | -19.3558  | 66.5485   | -439.8892 | 39.6060   | -13.1085 |
| 43    | 476.1529   | -21.2671  | 58.7139   | -405.4951 | 41.5230   | -5.2563  |
| 44    | 464.0452   | -24.1007  | 48.2873   | -387.0420 | 44.3494   | 5.1618   |
| 45    | 466.3292   | -27.9199  | 35.2318   | -380.7366 | 48.1683   | 18.2104  |
| 46    | 478.5461   | -32.7974  | 19.9212   | -381.9865 | 53.0444   | 33.5118  |
| 47    | 495.5933   | -38.7730  | 2.0465    | -396.4270 | 59.3798   | 80.2736  |
| 48    | 522.5726   | -46.2622  | -47.2400  | -441.3285 | 68.9930   | 106.3124 |
| 49    | 576.5555   | -57.0530  | -75.7264  | -495.6547 | 81.5649   | 138.8346 |
| 50    | 636.1273   | -70.8331  | -110.8940 | -500.7305 | 94.2710   | 171.5515 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 642.6528   | -84.7498  | -145.8475 | -473.4855 | 108.4499  | 207.1173 |
| 52    | 612.8011   | -100.1194 | -184.1423 | -427.8011 | 124.4902  | 246.5802 |
| 53    | 560.8697   | -117.3513 | -225.9140 | -309.5237 | 143.1172  | 292.6885 |
| 54    | 432.6340   | -137.1261 | -274.5984 | -135.1397 | 161.5947  | 338.0114 |
| 55    | 244.9647   | -156.7173 | -322.4768 | 101.8426  | 181.3451  | 386.1753 |
| 56    | -8.2249    | -177.5199 | -373.1582 | 394.2289  | 203.0943  | 438.5098 |
| 57    | -318.8647  | -200.2543 | -428.3181 | 776.0409  | 226.6929  | 496.5977 |
| 58    | -721.2290  | -224.7728 | -488.5534 | 1235.1678 | 249.7668  | 553.1196 |
| 59    | -1201.5226 | -248.6793 | -547.9262 | 1774.1891 | 273.7136  | 612.7487 |
| 60    | -1762.4071 | -273.3615 | -610.4377 | 2394.8584 | 264.7297  | 597.3589 |
| 61    | 289.3694   | -44.2395  | -12.6068  | -568.1644 | 40.6743   | -18.0469 |
| 62    | 581.3205   | -21.5161  | 66.2124   | -510.1340 | 41.7650   | -12.7895 |
| 63    | 546.5066   | -23.4288  | 58.4201   | -470.9901 | 43.6836   | -4.9693  |
| 64    | 529.6741   | -26.2677  | 48.0233   | -447.8057 | 46.5159   | 5.4217   |
| 65    | 527.2409   | -30.0936  | 34.9832   | -436.7649 | 50.3420   | 18.4604  |
| 66    | 534.7514   | -34.9654  | 19.5855   | -433.2797 | 55.2185   | 33.8605  |
| 67    | 547.0291   | -40.9670  | 1.8427    | -437.1999 | 61.2787   | 80.4690  |
| 68    | 563.4868   | -48.1605  | -47.5438  | -477.9814 | 70.9039   | 106.6460 |
| 69    | 613.2464   | -58.9880  | -76.1141  | -528.1375 | 83.5006   | 139.1964 |
| 70    | 668.6960   | -72.7769  | -111.1007 | -528.9861 | 96.2186   | 171.7220 |
| 71    | 670.9360   | -86.6938  | -145.9715 | -497.4516 | 110.3917  | 207.2293 |
| 72    | 636.7808   | -102.0755 | -184.2325 | -447.3932 | 126.4452  | 246.6885 |
| 73    | 580.4615   | -119.3072 | -226.0883 | -324.6466 | 145.0806  | 292.8819 |
| 74    | 447.8086   | -139.0777 | -274.7430 | -145.9229 | 163.5400  | 338.1470 |
| 75    | 255.6060   | -158.6654 | -322.6222 | 95.4267   | 183.2878  | 386.3065 |
| 76    | -1.6678    | -179.4504 | -373.3597 | 392.2325  | 205.0305  | 438.7102 |
| 77    | -316.9743  | -202.2016 | -428.4494 | 778.2236  | 228.6254  | 496.7030 |
| 78    | -723.4874  | -226.7062 | -488.4838 | 1241.9353 | 251.7046  | 553.0809 |
| 79    | -1208.1711 | -250.6160 | -548.2218 | 1785.1370 | 275.6484  | 613.0460 |
| 80    | -1773.3484 | -275.2924 | -610.7392 | 2410.1392 | 266.6369  | 597.6723 |
| 81    | 301.4903   | -44.1770  | -12.5903  | -580.9922 | 40.6163   | -18.0949 |
| 82    | 594.1565   | -21.4540  | 66.1377   | -523.0830 | 41.7086   | -12.6876 |
| 83    | 559.4579   | -23.3801  | 58.2647   | -484.0829 | 43.6277   | -4.8389  |
| 84    | 542.7517   | -26.2124  | 48.0534   | -461.0101 | 46.4592   | 5.3866   |
| 85    | 540.4550   | -30.0312  | 34.9029   | -450.0863 | 50.2854   | 18.5492  |
| 86    | 548.0330   | -34.9211  | 19.7563   | -446.7094 | 55.1665   | 33.6728  |
| 87    | 560.4276   | -40.9041  | 1.6069    | -450.4563 | 61.2023   | 80.7191  |
| 88    | 576.7698   | -48.0979  | -47.5222  | -491.4413 | 70.8394   | 106.5859 |
| 89    | 626.7726   | -58.9168  | -75.8312  | -541.7787 | 83.4399   | 138.8965 |
| 90    | 682.3069   | -72.7114  | -110.9200 | -542.7213 | 96.1546   | 171.6095 |
| 91    | 684.5874   | -86.6511  | -146.1603 | -511.1720 | 110.3492  | 207.4042 |
| 92    | 650.6570   | -102.0185 | -184.0238 | -461.3230 | 126.3914  | 246.4509 |
| 93    | 594.1957   | -119.2378 | -226.0524 | -338.6108 | 144.9972  | 292.9181 |
| 94    | 461.7113   | -139.0132 | -274.7978 | -160.1051 | 163.4684  | 338.1580 |
| 95    | 269.9431   | -158.5742 | -322.6169 | 81.1546   | 183.2081  | 386.3002 |
| 96    | 12.4994    | -179.3811 | -373.3244 | 377.6440  | 204.9482  | 438.6651 |
| 97    | -302.4399  | -202.1130 | -428.3012 | 763.6322  | 228.5455  | 496.5803 |
| 98    | -708.6510  | -226.6158 | -488.8484 | 1227.0526 | 251.6180  | 553.4248 |
| 99    | -1193.6013 | -250.5362 | -547.7577 | 1770.2451 | 275.5651  | 612.5827 |
| 100   | -1758.3026 | -275.2129 | -610.8140 | 2394.8901 | 266.5647  | 597.7728 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | 289.2353   | -42.5003  | -12.5537  | -572.4882 | 38.9473   | -18.1424 |
| 102   | 585.6678   | -19.7914  | 65.9847   | -518.3613 | 40.0400   | -12.5479 |
| 103   | 554.7277   | -21.7111  | 58.2857   | -483.1071 | 41.9589   | -4.8629  |
| 104   | 541.7975   | -24.5393  | 47.9608   | -463.7835 | 44.7933   | 5.4978   |
| 105   | 543.2317   | -28.3655  | 34.9097   | -456.6058 | 48.6190   | 18.5427  |
| 106   | 554.5888   | -33.2510  | 19.6492   | -456.9788 | 53.5032   | 33.7948  |
| 107   | 570.6825   | -39.2496  | 1.7513    | -464.4920 | 59.5426   | 80.5401  |
| 108   | 590.7771   | -46.4392  | -47.4481  | -509.1498 | 69.1836   | 106.5463 |
| 109   | 644.4225   | -57.2555  | -76.1295  | -563.1189 | 81.7757   | 139.2243 |
| 110   | 703.6706   | -71.0609  | -110.9713 | -567.8149 | 94.5004   | 171.6128 |
| 111   | 709.6631   | -84.9803  | -146.1514 | -539.9856 | 108.6844  | 207.4254 |
| 112   | 679.3552   | -100.3794 | -184.1814 | -493.7469 | 124.7559  | 246.6090 |
| 113   | 626.6276   | -117.6265 | -226.1064 | -374.6334 | 143.4039  | 292.9294 |
| 114   | 497.6705   | -137.4321 | -274.7759 | -199.6034 | 161.8924  | 338.1322 |
| 115   | 309.3576   | -157.0143 | -322.5635 | 38.2803   | 181.6489  | 386.2512 |
| 116   | 55.2696    | -177.8360 | -373.2557 | 331.5010  | 203.4113  | 438.6095 |
| 117   | -256.5397  | -200.5683 | -428.1000 | 714.1682  | 226.9928  | 496.3833 |
| 118   | -659.2979  | -225.0839 | -488.6424 | 1174.0632 | 250.0811  | 553.2254 |
| 119   | -1140.3698 | -248.9920 | -548.3151 | 1713.7515 | 274.0254  | 613.0922 |
| 120   | -1702.2910 | -273.6707 | -609.7775 | 2335.4668 | 264.9674  | 596.7337 |
| 121   | 219.3611   | -35.3266  | -17.0159  | -519.6934 | 31.8147   | -13.6533 |
| 122   | 532.9540   | -12.6691  | 61.5047   | -481.6690 | 32.9192   | -8.0659  |
| 123   | 518.1364   | -14.6082  | 53.7831   | -462.4929 | 34.8567   | -0.3479  |
| 124   | 521.2603   | -17.4668  | 43.2630   | -459.1815 | 37.7160   | 10.1821  |
| 125   | 538.6548   | -21.3209  | 30.3695   | -467.8803 | 41.5750   | 23.0755  |
| 126   | 565.8007   | -26.2456  | 15.1333   | -483.9485 | 46.4992   | 38.3223  |
| 127   | 597.4339   | -32.2914  | -2.9626   | -506.9367 | 52.5731   | 85.2604  |
| 128   | 632.9158   | -39.5172  | -51.9860  | -566.7069 | 62.2804   | 111.0763 |
| 129   | 701.4891   | -50.4134  | -80.6432  | -635.2620 | 74.9672   | 143.7621 |
| 130   | 775.0933   | -64.3111  | -115.6834 | -654.1921 | 87.7718   | 176.2958 |
| 131   | 795.2763   | -78.3245  | -150.4452 | -640.1615 | 102.0522  | 211.7268 |
| 132   | 778.3468   | -93.8213  | -188.7747 | -606.9712 | 118.2302  | 251.2230 |
| 133   | 738.7097   | -111.1640 | -230.6012 | -500.8415 | 136.9533  | 297.4145 |
| 134   | 622.5186   | -131.0257 | -279.2872 | -338.2630 | 155.5148  | 342.7151 |
| 135   | 446.5575   | -150.7182 | -327.1476 | -112.7578 | 175.3711  | 390.8155 |
| 136   | 205.0001   | -171.6113 | -377.7960 | 168.3327  | 197.2050  | 443.1380 |
| 137   | -94.6897   | -194.4315 | -432.6355 | 538.8580  | 220.8725  | 500.9242 |
| 138   | -485.1270  | -218.9939 | -493.1298 | 986.4484  | 243.9979  | 557.7120 |
| 139   | -953.7031  | -242.9312 | -552.3970 | 1513.3420 | 267.9622  | 617.1868 |
| 140   | -1502.0221 | -267.6219 | -614.3434 | 2121.4712 | 258.7945  | 602.0072 |
| 141   | 22.3778    | -18.6963  | -47.1387  | -376.8966 | 11.0214   | 5.0263   |
| 142   | 386.0089   | 4.4874    | 33.1210   | -379.5063 | 11.7153   | 9.6521   |
| 143   | 404.1280   | 3.2704    | 26.3423   | -395.4426 | 12.9252   | 16.4021  |
| 144   | 435.3268   | 1.5012    | 18.1016   | -423.4361 | 14.7067   | 24.6606  |
| 145   | 477.9316   | -0.9126   | 7.5491    | -461.7165 | 17.1093   | 35.1969  |
| 146   | 529.9407   | -3.9742   | -4.7224   | -508.2027 | 20.1747   | 47.4799  |
| 147   | 588.8457   | -7.7366   | -19.1280  | -560.3389 | 23.9354   | 61.8892  |
| 148   | 651.7984   | -12.2694  | -35.2875  | -615.1546 | 28.4640   | 78.0195  |
| 149   | 715.5952   | -17.6020  | -53.2624  | -698.2110 | 35.2642   | 134.5255 |
| 150   | 805.4248   | -25.1904  | -111.9672 | -769.7515 | 42.7370   | 158.2445 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 151   | 881.4460  | -33.5619  | -137.3001 | -854.0195 | 52.7066   | 187.6677 |
| 152   | 967.4463  | -44.4178  | -168.6585 | -919.9158 | 63.8852   | 219.7958 |
| 153   | 1032.2485 | -56.4777  | -202.9977 | -961.2349 | 76.2557   | 254.9470 |
| 154   | 1069.5286 | -69.8608  | -240.1246 | -971.4285 | 89.9750   | 292.7713 |
| 155   | 1072.6726 | -84.5091  | -279.2139 | -924.6890 | 102.7848  | 327.1134 |
| 156   | 1015.3810 | -98.2637  | -315.7646 | -855.3710 | 118.8469  | 369.6278 |
| 157   | 931.8736  | -115.3344 | -360.8625 | -734.9855 | 136.2095  | 415.5221 |
| 158   | 794.3660  | -133.6757 | -408.1661 | -557.0497 | 154.8528  | 463.2154 |
| 159   | 595.4170  | -153.3273 | -457.8899 | -314.4046 | 174.7742  | 513.2654 |
| 160   | 328.2283  | -174.2555 | -509.9664 | 0.0467    | 193.1860  | 559.1615 |

ENVOLVENTE MINIMOS TORSORES TREN IPF-B, l=30 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0036    | 16.3357   | 39.1468   | -17.6306  | -0.0325   | 4.2285   |
| 2     | 44.0458    | 14.7105   | 33.3644   | -69.0648  | 2.0093    | 11.2296  |
| 3     | 118.2748   | 11.6662   | 24.4491   | -146.6332 | 5.4737    | 20.9569  |
| 4     | 215.0323   | 7.1949    | 12.7800   | -242.7002 | 10.3483   | 33.4094  |
| 5     | 326.8038   | 1.3380    | -1.6701   | -331.2016 | 15.6835   | 46.4341  |
| 6     | 427.5588   | -4.9728   | -16.4858  | -439.9285 | 23.1263   | 63.8736  |
| 7     | 545.2736   | -13.3637  | -36.0002  | -546.0396 | 31.9175   | 84.1574  |
| 8     | 656.1018   | -23.2086  | -57.8288  | -641.3615 | 42.1497   | 106.7892 |
| 9     | 756.1064   | -34.1890  | -83.0036  | -722.6181 | 53.4989   | 132.7434 |
| 10    | 826.2151   | -47.1262  | -110.1150 | -769.2228 | 65.3077   | 156.6628 |
| 11    | 879.9114   | -59.1549  | -136.5310 | -776.1995 | 78.7196   | 187.4091 |
| 12    | 879.0664   | -73.5160  | -168.8699 | -768.8972 | 93.7090   | 220.5810 |
| 13    | 866.6316   | -89.1896  | -204.2428 | -725.4202 | 109.7080  | 256.7630 |
| 14    | 786.6165   | -107.1200 | -242.1106 | -609.4772 | 127.9618  | 295.4064 |
| 15    | 668.2594   | -125.6174 | -282.7760 | -453.7589 | 145.2335  | 332.9482 |
| 16    | 539.9463   | -142.0456 | -322.5705 | -277.1143 | 162.3144  | 375.2894 |
| 17    | 298.7221   | -161.5805 | -366.4905 | -7.7392   | 183.0921  | 421.5075 |
| 18    | 48.0222    | -181.7680 | -414.8844 | 283.9090  | 203.3131  | 470.1204 |
| 19    | -264.9004  | -202.7194 | -465.4444 | 637.6978  | 224.1920  | 520.9224 |
| 20    | -629.8298  | -223.9727 | -518.1439 | 1046.4586 | 210.3341  | 501.8595 |
| 21    | -981.1569  | 15.4384   | -37.9636  | 882.2722  | -27.2125  | 27.2287  |
| 22    | -870.0888  | 46.4063   | 20.4170   | 770.6479  | -25.5744  | 34.7134  |
| 23    | -735.6599  | 43.9688   | 10.4061   | 635.6686  | -22.8825  | 45.2872  |
| 24    | -578.5579  | 40.3526   | -2.3337   | 481.3258  | -18.9936  | 58.6164  |
| 25    | -403.5751  | 35.4801   | -18.2022  | 293.0829  | -13.0335  | 77.1228  |
| 26    | -196.7957  | 28.4705   | -39.3500  | 114.6179  | -6.3899   | 97.2293  |
| 27    | -2.5352    | 20.7087   | -61.8312  | -64.5437  | 1.6677    | 120.3139 |
| 28    | 189.3226   | 11.5129   | -87.3704  | -236.9638 | 11.1612   | 146.4863 |
| 29    | 370.9032   | 0.8350    | -115.9640 | -419.0806 | 23.6030   | 179.0659 |
| 30    | 558.3946   | -12.8245  | -150.8621 | -552.9735 | 36.2224   | 211.5510 |
| 31    | 694.0948   | -26.6125  | -186.2315 | -655.3972 | 50.2686   | 247.5212 |
| 32    | 785.3174   | -42.4966  | -224.0000 | -729.6237 | 66.8288   | 286.3940 |
| 33    | 862.0945   | -59.6163  | -265.8551 | -740.5059 | 85.3578   | 332.7408 |
| 34    | 863.1951   | -79.3001  | -314.7219 | -695.8409 | 103.7445  | 378.1469 |
| 35    | 782.7053   | -99.8744  | -362.2854 | -563.7868 | 124.4885  | 425.9130 |
| 36    | 631.2958   | -121.7225 | -412.5826 | -370.8053 | 147.2962  | 477.9243 |
| 37    | 449.2566   | -144.3151 | -467.4814 | -118.0627 | 170.7508  | 535.8026 |
| 38    | 166.4543   | -169.0617 | -527.7068 | 222.1840  | 194.0626  | 592.2329 |
| 39    | -188.5065  | -192.9496 | -586.5823 | 635.9378  | 217.9971  | 651.3997 |
| 40    | -626.5182  | -217.7226 | -648.3752 | 1133.9524 | 209.1529  | 635.6523 |
| 41    | -1068.0857 | 16.7132   | -56.2959  | 957.4773  | -29.4817  | 33.2853  |
| 42    | -944.3777  | 48.6413   | 14.3187   | 836.3849  | -27.6977  | 40.7448  |
| 43    | -800.1044  | 46.0388   | 4.5085    | 692.3976  | -24.8402  | 51.1602  |
| 44    | -633.8312  | 42.2618   | -8.3742   | 529.7171  | -20.8060  | 64.6293  |
| 45    | -450.4272  | 37.2364   | -24.2351  | 332.8047  | -14.6605  | 83.0953  |
| 46    | -234.9632  | 30.0252   | -45.3530  | 147.5925  | -7.8702   | 103.1977 |
| 47    | -33.9676   | 22.1462   | -67.8094  | -37.7150  | 0.3027    | 126.2815 |
| 48    | 163.8720   | 12.8104   | -93.3484  | -215.5030 | 9.9204    | 152.4214 |
| 49    | 350.7504   | 2.0200    | -121.9119 | -402.7732 | 22.4919   | 185.0169 |
| 50    | 543.2473   | -11.7596  | -157.0797 | -540.7809 | 35.1975   | 217.7338 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 682.4222   | -25.7008  | -192.0056 | -646.1110 | 49.4009   | 253.2753 |
| 52    | 785.4291   | -41.0744  | -230.3000 | -733.2766 | 65.4452   | 292.7384 |
| 53    | 856.5709   | -58.8753  | -271.8862 | -736.7868 | 84.6412   | 338.6595 |
| 54    | 857.9674   | -78.7470  | -320.4250 | -691.8583 | 103.2156  | 383.8381 |
| 55    | 776.8670   | -99.4851  | -368.1509 | -558.8125 | 124.1129  | 431.8502 |
| 56    | 652.4273   | -120.2921 | -418.8293 | -395.1646 | 145.8665  | 484.1818 |
| 57    | 447.8809   | -143.8883 | -473.4562 | -117.5819 | 170.3270  | 541.7368 |
| 58    | 172.3894   | -168.4115 | -533.7501 | 214.7633  | 193.4055  | 598.3160 |
| 59    | -184.4384  | -192.4270 | -592.7742 | 630.5320  | 217.4613  | 657.5973 |
| 60    | -620.9050  | -217.1792 | -654.5715 | 1126.9436 | 208.5474  | 641.4930 |
| 61    | -1006.8291 | 14.7891   | -56.7788  | 900.2195  | -27.5928  | 33.4730  |
| 62    | -889.2338  | 46.8243   | 13.9709   | 785.1873  | -25.8772  | 41.1185  |
| 63    | -748.7986  | 44.2145   | 4.1504    | 645.0466  | -23.0142  | 51.5101  |
| 64    | -591.7520  | 40.6296   | -8.7064   | 491.1661  | -19.1743  | 64.9552  |
| 65    | -411.7354  | 35.6007   | -24.5537  | 297.6023  | -13.0204  | 83.3952  |
| 66    | -207.9634  | 28.7512   | -45.5699  | 123.3437  | -6.5849   | 103.4319 |
| 67    | -30.0420   | 21.7858   | -68.0686  | -40.9220  | 0.6685    | 126.5363 |
| 68    | 167.2029   | 12.4452   | -93.6074  | -218.0694 | 10.2982   | 152.7119 |
| 69    | 353.3482   | 1.6147    | -122.2509 | -404.5665 | 22.8979   | 185.3326 |
| 70    | 545.0208   | -12.1800  | -157.2823 | -541.6556 | 35.6217   | 217.8979 |
| 71    | 681.9520   | -26.2310  | -192.1400 | -644.5021 | 49.9289   | 253.3984 |
| 72    | 783.8307   | -41.6183  | -230.3996 | -730.4627 | 65.9880   | 292.8576 |
| 73    | 858.4552   | -59.1374  | -272.1622 | -738.0462 | 84.9108   | 338.9566 |
| 74    | 848.7502   | -79.5510  | -320.5587 | -680.8188 | 104.0133  | 383.9635 |
| 75    | 804.4236   | -98.4950  | -368.4700 | -588.7088 | 123.1174  | 432.1557 |
| 76    | 638.4207   | -121.1204 | -418.9385 | -379.1497 | 146.7005  | 484.2898 |
| 77    | 448.4291   | -144.1008 | -473.5987 | -117.8699 | 170.5246  | 541.8529 |
| 78    | 175.4475   | -168.5049 | -533.8869 | 212.0349  | 193.5033  | 598.4834 |
| 79    | -181.5620  | -192.5250 | -592.9798 | 627.8224  | 217.5574  | 657.8037 |
| 80    | -618.1499  | -217.2665 | -654.7739 | 1124.3925 | 208.6110  | 641.7073 |
| 81    | -984.3109  | 13.8466   | -56.9453  | 879.7882  | -26.6717  | 33.6192  |
| 82    | -868.7500  | 45.8937   | 14.0244   | 766.7661  | -24.9364  | 41.0420  |
| 83    | -730.3774  | 43.2616   | 4.2458    | 628.7832  | -22.0681  | 51.4254  |
| 84    | -581.0679  | 39.8750   | -8.7733   | 482.1821  | -18.4172  | 65.0282  |
| 85    | -395.4718  | 34.5695   | -24.5247  | 283.6538  | -11.9800  | 83.3866  |
| 86    | -233.0282  | 29.3206   | -45.6758  | 147.1370  | -7.1626   | 103.5104 |
| 87    | -33.2815   | 21.4155   | -68.0781  | -36.8423  | 1.0396    | 126.5562 |
| 88    | 156.7759   | 12.3953   | -93.6183  | -207.5585 | 10.3462   | 152.6821 |
| 89    | 341.0250   | 1.6924    | -122.1081 | -392.3949 | 22.8307   | 185.1744 |
| 90    | 532.9176   | -12.1039  | -157.1987 | -529.6975 | 35.5471   | 217.8884 |
| 91    | 671.5629   | -26.0402  | -192.4374 | -634.5173 | 49.7383   | 253.6825 |
| 92    | 774.0016   | -41.4028  | -230.1823 | -721.0807 | 65.7757   | 292.6106 |
| 93    | 853.9675   | -58.6259  | -272.2981 | -734.7429 | 84.3853   | 339.1624 |
| 94    | 857.8531   | -78.3968  | -320.7945 | -692.6131 | 102.8520  | 384.1583 |
| 95    | 782.5281   | -98.8707  | -368.4348 | -565.7781 | 123.5046  | 432.1181 |
| 96    | 650.5031   | -120.0519 | -418.9579 | -393.8218 | 145.6190  | 484.2986 |
| 97    | 466.4645   | -142.8835 | -473.6754 | -138.5478 | 169.3160  | 541.9560 |
| 98    | 190.9402   | -167.4776 | -533.9137 | 194.3506  | 192.4798  | 598.4909 |
| 99    | -160.8982  | -191.4011 | -592.8867 | 604.5242  | 216.4300  | 657.7106 |
| 100   | -594.6804  | -216.1488 | -654.8195 | 1098.3867 | 207.5005  | 641.7780 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | -980.8301  | 13.7592   | -57.0217  | 876.5173  | -26.5777  | 33.6504  |
| 102   | -863.3358  | 45.7301   | 14.1985   | 761.7476  | -24.7806  | 40.8542  |
| 103   | -725.3536  | 43.1052   | 4.2460    | 624.1088  | -21.9074  | 51.4333  |
| 104   | -568.4922  | 39.4394   | -8.6449   | 470.5702  | -17.9756  | 64.9183  |
| 105   | -391.1213  | 34.4054   | -24.5069  | 279.6752  | -11.8165  | 83.3777  |
| 106   | -229.2975  | 29.1722   | -45.5979  | 143.7303  | -7.0061   | 103.4537 |
| 107   | -30.1539   | 21.2658   | -68.0657  | -39.6328  | 1.1827    | 126.5184 |
| 108   | 156.9094   | 12.3875   | -93.5656  | -207.6500 | 10.3569   | 152.6641 |
| 109   | 342.2100   | 1.6177    | -122.2495 | -393.3868 | 22.9025   | 185.3437 |
| 110   | 531.0935   | -11.9995  | -157.1969 | -528.1296 | 35.4390   | 217.8397 |
| 111   | 669.9793   | -25.9163  | -192.3793 | -633.1996 | 49.6204   | 253.6568 |
| 112   | 772.4863   | -41.3071  | -230.3522 | -719.7796 | 65.6836   | 292.7769 |
| 113   | 852.6649   | -58.5533  | -272.2745 | -733.5750 | 84.3307   | 339.0959 |
| 114   | 856.6034   | -78.3578  | -320.7204 | -691.4433 | 102.8181  | 384.0749 |
| 115   | 801.2156   | -97.9369  | -368.3352 | -586.5225 | 122.5715  | 432.0223 |
| 116   | 680.0835   | -118.7564 | -418.8574 | -426.2164 | 144.3317  | 484.2111 |
| 117   | 501.1743   | -141.4843 | -473.6983 | -176.4661 | 167.9088  | 541.9816 |
| 118   | 231.3531   | -165.9994 | -533.9371 | 150.4636  | 190.9966  | 598.5203 |
| 119   | -116.7386  | -189.9046 | -592.9721 | 557.1675  | 214.9380  | 657.7493 |
| 120   | -545.7114  | -214.5859 | -654.4288 | 1045.9460 | 205.8826  | 641.3854 |
| 121   | -982.2631  | 13.9270   | -57.0691  | 877.3486  | -26.7939  | 33.7653  |
| 122   | -864.0863  | 45.9399   | 14.0757   | 761.9777  | -24.9832  | 40.9782  |
| 123   | -728.7094  | 43.4001   | 4.1249    | 626.7706  | -22.1949  | 51.5292  |
| 124   | -568.0031  | 39.5861   | -8.6114   | 469.7573  | -18.1138  | 64.8700  |
| 125   | -394.0567  | 34.6551   | -24.5761  | 282.0761  | -12.0423  | 83.4616  |
| 126   | -229.1590  | 29.2656   | -45.6767  | 143.4517  | -7.0820   | 103.5318 |
| 127   | -29.9710   | 21.2816   | -68.1388  | -39.7444  | 1.1800    | 126.5831 |
| 128   | 153.1958   | 12.5229   | -93.6223  | -204.0925 | 10.2403   | 152.7121 |
| 129   | 338.6740   | 1.6438    | -122.2819 | -389.5846 | 22.9100   | 185.4014 |
| 130   | 528.1587   | -12.1643  | -157.3936 | -524.5662 | 35.6250   | 218.0040 |
| 131   | 665.4476   | -26.1548  | -192.2407 | -627.7541 | 49.8825   | 253.5242 |
| 132   | 765.9663   | -41.6526  | -230.5695 | -711.9357 | 66.0615   | 293.0186 |
| 133   | 843.6116   | -58.9869  | -272.3612 | -723.1442 | 84.7762   | 339.1751 |
| 134   | 844.8337   | -78.8487  | -320.9721 | -678.0104 | 103.3378  | 384.3989 |
| 135   | 786.3180   | -98.5439  | -368.7332 | -569.9065 | 123.1968  | 432.4003 |
| 136   | 662.1749   | -119.4338 | -419.1024 | -406.2275 | 145.0275  | 484.4426 |
| 137   | 479.8715   | -142.2578 | -473.9353 | -153.0824 | 168.6988  | 542.2244 |
| 138   | 206.8288   | -166.8172 | -534.1995 | 177.0746  | 191.8212  | 598.7830 |
| 139   | -144.3176  | -190.7529 | -593.2353 | 586.5732  | 215.7839  | 658.0259 |
| 140   | -575.2883  | -215.4514 | -654.8634 | 1077.3389 | 206.6240  | 642.5276 |
| 141   | -1007.4747 | 9.9066    | -73.2096  | 930.9348  | -27.2134  | 39.5171  |
| 142   | -925.3431  | 42.8234   | -1.7871   | 843.8196  | -26.0330  | 46.0552  |
| 143   | -815.8637  | 40.9157   | -9.6621   | 731.3397  | -23.8876  | 54.6896  |
| 144   | -698.9195  | 38.5630   | -20.9350  | 612.5196  | -21.2602  | 66.7981  |
| 145   | -558.0188  | 35.0581   | -34.5377  | 491.8981  | -18.2111  | 79.1103  |
| 146   | -448.7772  | 32.2729   | -48.9561  | 366.9299  | -14.5495  | 95.9143  |
| 147   | -286.2956  | 26.9596   | -67.5646  | 209.7209  | -8.9362   | 115.2916 |
| 148   | -141.4373  | 21.5884   | -88.9498  | 71.0864   | -3.2620   | 137.4153 |
| 149   | 18.9886    | 14.6167   | -112.9425 | -79.2656  | 4.0327    | 162.1822 |
| 150   | 186.4738   | 6.0251    | -139.6250 | -206.9856 | 11.5215   | 185.9045 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 313.4907 | -2.0351   | -165.1985 | -342.8281 | 21.1798   | 215.5676 |
| 152   | 456.2166 | -12.8793  | -196.7465 | -465.4540 | 32.3467   | 247.8821 |
| 153   | 577.7853 | -24.9609  | -231.0857 | -563.4988 | 44.7389   | 283.0349 |
| 154   | 671.7900 | -38.3093  | -268.2077 | -630.4822 | 58.4235   | 320.8556 |
| 155   | 731.6629 | -52.9379  | -307.5582 | -640.4982 | 71.2136   | 355.4566 |
| 156   | 731.1907 | -66.6905  | -344.2245 | -628.0242 | 87.2737   | 398.0886 |
| 157   | 704.5348 | -83.7592  | -389.2296 | -564.4678 | 104.6343  | 443.8895 |
| 158   | 623.8501 | -102.1024 | -436.6048 | -443.3744 | 123.2795  | 491.6548 |
| 159   | 481.7549 | -121.7569 | -486.3719 | -257.5559 | 143.2038  | 541.7469 |
| 160   | 271.3942 | -142.6874 | -538.4713 | 0.0489    | 161.6179  | 587.6659 |



ENVOLVENTE MAXIMOS FLECTORES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0006   | -0.0006   | -0.4084   | -57.1362   | -31.1950  | -85.0478  |
| 2     | 313.2272  | 165.4050  | 464.6794  | -590.9245  | -144.6539 | -410.7347 |
| 3     | 590.7718  | 144.6542  | 410.9491  | -832.9058  | -123.8753 | -356.9532 |
| 4     | 832.7973  | 123.8528  | 357.1848  | -1039.0522 | -104.4518 | -307.5559 |
| 5     | 1039.0654 | 104.4528  | 307.5694  | -1209.8503 | -85.1358  | -257.3548 |
| 6     | 1209.7618 | 85.1503   | 257.7934  | -1344.0911 | -65.8110  | -207.4999 |
| 7     | 1344.1033 | 65.8214   | 207.4917  | -1442.4224 | -44.9649  | -153.2227 |
| 8     | 1442.3320 | 44.8979   | 154.1412  | -1504.4609 | -24.0324  | -99.7541  |
| 9     | 1504.4973 | 24.0099   | 99.2149   | -1530.4956 | -3.1421   | -44.7955  |
| 10    | 1530.4541 | 3.0961    | 45.8887   | -1520.2742 | 16.2856   | 4.6209    |
| 11    | 1520.2891 | -16.2691  | -4.7239   | -1473.5703 | 34.3285   | 51.4154   |
| 12    | 1473.5894 | -34.3048  | -50.8837  | -1391.1016 | 55.1855   | 105.5789  |
| 13    | 1391.0962 | -55.1940  | -105.5601 | -1272.6060 | 76.0749   | 160.3454  |
| 14    | 1272.6738 | -76.1121  | -159.8845 | -1118.1069 | 97.0001   | 214.7153  |
| 15    | 1118.1478 | -96.9766  | -214.3893 | -927.8074  | 116.3515  | 265.3760  |
| 16    | 927.7213  | -116.3608 | -265.6546 | -701.4567  | 134.3896  | 313.1533  |
| 17    | 701.9083  | -132.3648 | -304.2173 | -443.8534  | 153.2157  | 359.2688  |
| 18    | 495.2046  | -95.7546  | -226.7750 | -309.1638  | 81.8276   | 203.0846  |
| 19    | 351.2085  | -33.7179  | -93.6047  | -275.9624  | 49.9139   | 136.3622  |
| 20    | 310.3432  | -6.7011   | -33.6768  | -283.6996  | 22.9020   | 76.2533   |
| 21    | 308.9407  | -30.8372  | 23.0759   | -239.5684  | 30.8366   | -23.2714  |
| 22    | 262.9507  | -11.9908  | 67.9367   | -213.1827  | 32.2433   | -14.4703  |
| 23    | 269.5520  | 20.0951   | 143.4610  | -304.4149  | -24.5853  | -140.7824 |
| 24    | 352.7937  | 67.5294   | 246.8569  | -479.3489  | -45.6534  | -189.1706 |
| 25    | 544.9796  | 99.6623   | 333.7170  | -743.6712  | -77.3985  | -275.5330 |
| 26    | 817.2965  | 131.8335  | 308.6069  | -1088.2335 | -109.0467 | -249.1568 |
| 27    | 1088.1079 | 109.0475  | 249.7357  | -1306.9471 | -86.1207  | -190.0299 |
| 28    | 1306.9403 | 86.1246   | 190.0278  | -1472.7842 | -61.5656  | -126.1341 |
| 29    | 1472.7415 | 61.5674   | 126.5559  | -1584.0847 | -36.8964  | -62.5149  |
| 30    | 1584.0428 | 36.8956   | 63.3543   | -1640.9075 | -13.6227  | -2.9673   |
| 31    | 1640.9054 | 13.6317   | 2.5065    | -1643.0488 | 11.1583   | 62.3438   |
| 32    | 1643.1038 | -11.1876  | -60.9928  | -1590.3025 | 36.0802   | 125.5611  |
| 33    | 1590.3098 | -36.0396  | -125.5514 | -1481.3433 | 60.9706   | 190.4700  |
| 34    | 1481.3583 | -60.9244  | -190.4514 | -1317.1625 | 85.7785   | 255.5945  |
| 35    | 1317.2981 | -85.7651  | -254.9124 | -1097.9496 | 109.2596  | 316.0799  |
| 36    | 1098.1304 | -109.2411 | -315.4867 | -823.3621  | 134.2418  | 380.8881  |
| 37    | 844.1744  | -103.7685 | -360.1457 | -581.9773  | 128.7660  | 425.7402  |
| 38    | 638.0061  | -82.6367  | -295.8660 | -435.9046  | 71.0047   | 277.2973  |
| 39    | 501.7787  | -16.5688  | -141.1211 | -441.7036  | 36.8220   | 194.5819  |
| 40    | 497.0636  | 15.2636   | -65.5890  | -508.6268  | 8.0581    | 117.2961  |
| 41    | 548.9180  | -34.5672  | 20.2198   | -464.2592  | 37.6371   | -21.9732  |
| 42    | 488.7949  | -18.8273  | 66.6577   | -423.6522  | 39.0775   | -13.2117  |
| 43    | 484.6279  | 13.1115   | 142.1183  | -491.3456  | 7.1441    | -88.6551  |
| 44    | 546.4023  | 47.5510   | 225.1480  | -660.2932  | -51.7877  | -217.8351 |
| 45    | 707.3165  | 93.5338   | 331.9736  | -892.6161  | -71.2574  | -273.7941 |
| 46    | 976.9835  | 125.2183  | 306.9389  | -1233.2197 | -102.4305 | -247.4709 |
| 47    | 1233.1266 | 102.4398  | 247.8205  | -1437.2478 | -79.5050  | -188.1065 |
| 48    | 1437.1879 | 79.5244   | 188.4375  | -1588.2410 | -54.9671  | -124.5793 |
| 49    | 1588.2158 | 54.9400   | 125.0471  | -1684.6547 | -30.2643  | -60.9360  |
| 50    | 1684.6276 | 30.2334   | 60.9312   | -1726.4949 | -6.9564   | -0.5987   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 51    | 1726.5024 | 6.9295    | 1.4976    | -1713.5337 | 17.8623   | 63.3503   |
| 52    | 1713.5327 | -17.8898  | -63.3384  | -1645.6117 | 42.7748   | 127.9489  |
| 53    | 1645.6583 | -42.7875  | -127.0947 | -1521.4479 | 67.7290   | 191.8825  |
| 54    | 1521.4795 | -67.7311  | -191.4421 | -1341.8982 | 92.5914   | 256.5942  |
| 55    | 1341.9624 | -92.6031  | -256.2885 | -1107.2119 | 116.0879  | 317.5422  |
| 56    | 1107.2222 | -116.1030 | -317.5326 | -817.0374  | 141.0937  | 382.9182  |
| 57    | 848.6123  | -92.4843  | -349.8019 | -611.7737  | 117.4747  | 415.3787  |
| 58    | 657.7655  | -75.7854  | -301.2615 | -473.4670  | 63.6984   | 282.6956  |
| 59    | 540.5945  | -9.0452   | -146.1609 | -497.4583  | 29.2963   | 199.6077  |
| 60    | 553.3873  | 22.8744   | -70.5222  | -582.0761  | 0.7503    | 121.9463  |
| 61    | 622.4732  | -36.2408  | 19.4551   | -533.3375  | 39.6158   | -21.4925  |
| 62    | 557.9830  | -20.8088  | 66.3319   | -488.3878  | 41.0576   | -12.8980  |
| 63    | 549.7861  | 11.1225   | 141.8445  | -552.0262  | 9.1321    | -88.3869  |
| 64    | 607.8204  | 45.5420   | 224.9226  | -714.5085  | -49.8821  | -217.6212 |
| 65    | 762.2644  | 91.5887   | 331.7670  | -943.2131  | -69.3086  | -273.5715 |
| 66    | 1028.2562 | 122.8582  | 306.5773  | -1279.2307 | -100.0600 | -247.0939 |
| 67    | 1279.1252 | 100.0426  | 247.8208  | -1477.8601 | -77.1019  | -188.1087 |
| 68    | 1477.8613 | 77.1006   | 188.1072  | -1623.4879 | -52.5355  | -124.1951 |
| 69    | 1623.4601 | 52.5476   | 124.5728  | -1714.5066 | -27.8834  | -60.5016  |
| 70    | 1714.4738 | 27.8767   | 61.0069   | -1751.0408 | -4.6090   | -0.7268   |
| 71    | 1751.0603 | 4.6126    | 1.6768    | -1732.8955 | 20.1766   | 63.1739   |
| 72    | 1732.8987 | -20.2004  | -63.1692  | -1659.7748 | 45.0842   | 127.8208  |
| 73    | 1659.8118 | -45.0993  | -127.3455 | -1530.3856 | 70.0404   | 192.1529  |
| 74    | 1530.4680 | -70.0092  | -191.3628 | -1345.7570 | 94.8645   | 256.5137  |
| 75    | 1345.7539 | -94.8559  | -256.5791 | -1106.0430 | 118.3304  | 317.8153  |
| 76    | 1106.1520 | -118.3246 | -317.4250 | -810.8023  | 143.3284  | 382.8140  |
| 77    | 845.6060  | -90.8548  | -349.7952 | -612.5898  | 115.8327  | 415.3552  |
| 78    | 658.6321  | -74.1265  | -301.4079 | -478.1765  | 62.0235   | 282.8785  |
| 79    | 545.4704  | -7.3657   | -146.2263 | -506.1208  | 27.6155   | 199.6668  |
| 80    | 562.0739  | 24.5596   | -70.5790  | -594.5510  | -0.9358   | 121.9842  |
| 81    | 634.9238  | -36.1752  | 19.4900   | -545.9413  | 39.5496   | -21.5381  |
| 82    | 570.5885  | -20.7388  | 66.2566   | -501.1244  | 40.9933   | -12.7993  |
| 83    | 562.5638  | 11.1784   | 141.6884  | -564.9360  | 9.0697    | -88.2538  |
| 84    | 620.6472  | 45.5937   | 224.9908  | -727.2684  | -49.9410  | -217.6901 |
| 85    | 775.0365  | 91.6540   | 331.6528  | -956.1797  | -69.3711  | -273.4719 |
| 86    | 1039.4650 | 121.8287  | 307.0190  | -1288.0483 | -99.0356  | -247.5181 |
| 87    | 1288.1240 | 99.0497   | 247.1987  | -1484.6484 | -76.1166  | -187.4751 |
| 88    | 1484.5881 | 76.1167   | 188.2945  | -1628.0015 | -51.5516  | -124.4956 |
| 89    | 1627.9423 | 51.5246   | 125.3781  | -1716.6807 | -26.8467  | -61.3008  |
| 90    | 1716.6881 | 26.8188   | 61.3042   | -1750.8641 | -3.5438   | -0.8967   |
| 91    | 1750.8455 | 3.4906    | 0.9003    | -1730.1268 | 21.2969   | 63.9096   |
| 92    | 1730.1937 | -21.2470  | -62.4978  | -1654.7028 | 46.1301   | 127.1188  |
| 93    | 1654.6621 | -46.0911  | -127.5995 | -1523.0453 | 71.0223   | 192.4851  |
| 94    | 1523.1414 | -71.0271  | -191.6886 | -1336.2106 | 95.8777   | 256.7810  |
| 95    | 1336.2985 | -95.8445  | -256.3923 | -1094.1959 | 119.3336  | 317.6298  |
| 96    | 1094.2755 | -119.3281 | -317.3655 | -796.8633  | 144.3155  | 382.7466  |
| 97    | 832.5404  | -90.7617  | -350.0075 | -599.6725  | 115.7481  | 415.5777  |
| 98    | 645.9236  | -74.0403  | -301.2699 | -465.6359  | 61.9456   | 282.7604  |
| 99    | 532.8220  | -7.2959   | -146.4534 | -493.6435  | 27.5400   | 199.8822  |
| 100   | 549.6532  | 24.6321   | -70.6402  | -582.2964  | -1.0043   | 122.0342  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 622.6537  | -34.5011  | 19.5420   | -537.4257  | 37.8802   | -21.5868  |
| 102   | 562.0884  | -19.0759  | 66.1060   | -496.3917  | 39.3247   | -12.6628  |
| 103   | 557.8106  | 12.8521   | 141.7272  | -563.9493  | 7.3956    | -88.2939  |
| 104   | 619.7012  | 47.2582   | 224.8659  | -730.1013  | -51.5963  | -217.5534 |
| 105   | 777.8388  | 93.2902   | 331.6880  | -962.6651  | -71.0075  | -273.4974 |
| 106   | 1040.4321 | 119.6294  | 306.6345  | -1284.1431 | -96.8292  | -247.1435 |
| 107   | 1284.0791 | 96.8180   | 247.4621  | -1475.4915 | -73.8844  | -187.7679 |
| 108   | 1475.4286 | 73.8564   | 188.1856  | -1613.7377 | -49.2887  | -124.2746 |
| 109   | 1613.7209 | 49.2808   | 124.2682  | -1697.4086 | -24.6044  | -60.1894  |
| 110   | 1697.3853 | 24.6157   | 61.1098   | -1726.6343 | -1.3538   | -0.7809   |
| 111   | 1726.6567 | 1.3476    | 0.7833    | -1701.1212 | 23.4552   | 64.0641   |
| 112   | 1701.1671 | -23.5247  | -63.1564  | -1620.5538 | 48.4105   | 127.7656  |
| 113   | 1620.5374 | -48.4170  | -127.7536 | -1483.6793 | 73.3509   | 192.5886  |
| 114   | 1483.7776 | -73.3772  | -191.8133 | -1291.5635 | 98.2375   | 256.9045  |
| 115   | 1291.6472 | -98.2287  | -256.5210 | -1044.1699 | 121.7153  | 317.7616  |
| 116   | 1044.2312 | -121.7167 | -317.5337 | -741.4304  | 146.7018  | 382.9383  |
| 117   | 778.1458  | -92.7402  | -350.3644 | -540.9073  | 117.7179  | 415.9377  |
| 118   | 587.8404  | -75.9750  | -301.6427 | -403.7493  | 63.8488   | 283.0823  |
| 119   | 471.7517  | -9.1538   | -146.4545 | -428.3725  | 29.4048   | 199.9086  |
| 120   | 484.6887  | 22.7766   | -71.1707  | -513.1564  | 0.8622    | 122.5797  |
| 121   | 553.7041  | -27.3497  | 15.0439   | -484.5462  | 30.7375   | -17.0976  |
| 122   | 509.3190  | -11.9468  | 61.6240   | -459.6592  | 32.1969   | -8.1782   |
| 123   | 521.4861  | 19.8984   | 137.2022  | -543.4769  | 0.3500    | -83.7605  |
| 124   | 599.9281  | 54.0949   | 220.0954  | -725.7185  | -58.3853  | -212.7844 |
| 125   | 773.6342  | 104.5407  | 342.4774  | -983.7377  | -82.2315  | -284.2961 |
| 126   | 1031.3425 | 112.7606  | 305.9278  | -1259.5548 | -89.9516  | -246.4088 |
| 127   | 1259.5618 | 89.9737   | 246.3381  | -1435.4733 | -67.0330  | -186.6612 |
| 128   | 1435.3861 | 67.0371   | 187.4968  | -1558.2566 | -42.4575  | -123.6196 |
| 129   | 1558.2441 | 42.4606   | 123.6145  | -1626.4865 | -17.7684  | -59.4860  |
| 130   | 1626.4990 | 17.7423   | 59.8837   | -1640.1427 | 5.5315    | 0.3880    |
| 131   | 1640.1166 | -5.5575   | 0.5445    | -1598.9481 | 30.3608   | 64.3300   |
| 132   | 1598.9583 | -30.3792  | -64.4035  | -1502.8514 | 55.2659   | 129.0429  |
| 133   | 1502.8550 | -55.2657  | -128.6434 | -1350.5155 | 80.2063   | 193.4768  |
| 134   | 1350.5487 | -80.1894  | -193.0849 | -1142.8938 | 105.0527  | 258.2415  |
| 135   | 1142.9631 | -105.0807 | -257.9686 | -880.1803  | 128.5649  | 319.1708  |
| 136   | 880.3510  | -128.5593 | -318.7523 | -562.2964  | 153.5420  | 384.1405  |
| 137   | 610.9850  | -99.0823  | -351.4762 | -359.7424  | 124.0549  | 417.0540  |
| 138   | 415.7476  | -70.0194  | -272.4181 | -250.8625  | 57.7041   | 253.8226  |
| 139   | 299.1882  | -14.7384  | -147.6616 | -243.2566  | 34.9851   | 201.1021  |
| 140   | 304.5883  | 17.3504   | -72.2173  | -320.8467  | 6.3135    | 123.6478  |
| 141   | 362.6119  | -6.6616   | -3.9387   | -344.4813  | 10.0727   | 1.8988    |
| 142   | 361.2753  | 5.2111    | 33.2527   | -356.0755  | 10.9911   | 9.5207    |
| 143   | 399.4907  | 32.2177   | 92.8734   | -442.8967  | -16.0210  | -50.1244  |
| 144   | 487.3877  | 64.1116   | 159.8705  | -588.2511  | -47.9031  | -117.0996 |
| 145   | 640.1755  | 105.3284  | 249.7273  | -848.9661  | -116.5451 | -253.5155 |
| 146   | 852.3606  | 118.5914  | 262.0830  | -1045.2537 | -99.7719  | -212.2280 |
| 147   | 1045.2656 | 99.8066   | 212.2276  | -1205.0332 | -79.2162  | -157.9218 |
| 148   | 1204.9924 | 79.2214   | 158.3048  | -1330.2986 | -60.1013  | -108.1268 |
| 149   | 1330.2515 | 60.0818   | 108.6113  | -1420.7523 | -39.3363  | -54.1166  |
| 150   | 1420.7527 | 39.3702   | 54.1164   | -1475.7046 | -21.5772  | -7.4895   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 151   | 1475.6926 | 21.5399   | 8.0120    | -1494.0691 | -0.6897   | 46.5716  |
| 152   | 1494.0759 | 0.6708    | -46.1069  | -1476.2333 | 20.2077   | 100.7970 |
| 153   | 1476.2338 | -20.1709  | -100.7864 | -1422.0223 | 41.1124   | 155.5900 |
| 154   | 1422.0317 | -41.1827  | -155.6059 | -1330.9952 | 62.1737   | 210.3763 |
| 155   | 1331.1284 | -62.2011  | -209.5257 | -1203.1011 | 80.2284   | 256.3978 |
| 156   | 1203.1799 | -80.2222  | -255.9907 | -1037.2510 | 101.3045  | 310.9913 |
| 157   | 1037.1306 | -101.3160 | -311.3435 | -833.7791  | 122.4324  | 366.4128 |
| 158   | 833.9116  | -122.4247 | -366.1270 | -593.5522  | 144.6262  | 424.6937 |
| 159   | 593.6739  | -144.6206 | -424.5118 | -315.8037  | 165.7829  | 479.6082 |
| 160   | 315.9626  | -165.7741 | -479.5014 | 0.0349     | 151.8079  | 422.5408 |

ENVOLVENTE MAXIMOS CORTANTES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 1     | -0.0376    | 183.1396  | 510.6669 | -313.2326  | -165.4105 | -464.6827 |
| 2     | 299.5703   | 165.9146  | 467.8730 | -577.3214  | -146.5910 | -418.4980 |
| 3     | 538.9093   | 148.1111  | 423.8606 | -782.6859  | -128.7063 | -374.2413 |
| 4     | 723.3202   | 131.2122  | 381.5596 | -934.3779  | -111.7539 | -331.6724 |
| 5     | 857.7521   | 115.2782  | 340.7456 | -1037.8447 | -96.2703  | -291.9433 |
| 6     | 947.1856   | 100.7942  | 303.2914 | -1105.1503 | -82.4292  | -255.4396 |
| 7     | 1004.0599  | 87.9256   | 268.3720 | -1128.4758 | -68.3579  | -217.8884 |
| 8     | 1020.0083  | 74.7518   | 233.3907 | -1118.5134 | -55.1806  | -182.5869 |
| 9     | 1006.2201  | 62.5529   | 199.0130 | -1080.7096 | -42.9898  | -147.9805 |
| 10    | 967.2084   | 51.2570   | 167.3760 | -1019.7039 | -32.2032  | -117.4061 |
| 11    | 908.0577   | 41.4083   | 137.9749 | -953.2265  | -23.0605  | -89.5715  |
| 12    | 845.9963   | 33.1201   | 112.4146 | -667.9655  | -15.3928  | -52.7517  |
| 13    | 567.5355   | 26.2643   | 77.2426  | -600.2269  | -10.0652  | -34.4760  |
| 14    | 508.7286   | 21.7180   | 61.1347  | -533.2430  | -5.5134   | -18.3541  |
| 15    | 452.5534   | 17.9489   | 46.8756  | -470.2795  | -1.7513   | -4.1156   |
| 16    | 402.0711   | 14.8800   | 34.2562  | -414.2724  | 1.3246    | 8.5247    |
| 17    | 359.7246   | 12.4788   | 24.1637  | -367.6110  | 3.7171    | 18.5935   |
| 18    | 327.7517   | 10.7034   | 15.4566  | -332.4351  | 5.4997    | 27.3195   |
| 19    | 307.8084   | 9.4964    | 8.9459   | -310.3274  | 6.6996    | 33.8116   |
| 20    | 301.2045   | 8.8020    | 4.3178   | -98.2642   | -1.3603   | 12.4663   |
| 21    | -2045.3356 | 241.4443  | 542.4422 | 1476.1733  | -251.1834 | -551.1745 |
| 22    | -1487.4893 | 251.5270  | 554.0058 | 964.9879   | -229.1466 | -494.9818 |
| 23    | -997.8815  | 230.2070  | 499.9878 | 521.8297   | -207.6553 | -440.7466 |
| 24    | -575.4301  | 209.5297  | 448.7196 | 152.1262   | -186.0282 | -387.5388 |
| 25    | -225.7657  | 188.8051  | 398.0451 | -159.5024  | -165.3741 | -337.0031 |
| 26    | 67.2593    | 169.1408  | 350.0341 | -408.5158  | -146.0829 | -290.1442 |
| 27    | 300.1555   | 150.8925  | 305.7656 | -598.9554  | -127.7256 | -245.6260 |
| 28    | 477.4156   | 133.6450  | 263.6067 | -727.4459  | -109.3291 | -201.0098 |
| 29    | 595.7444   | 116.3984  | 221.6522 | -814.0834  | -92.5152  | -159.6972 |
| 30    | 675.7890   | 100.7669  | 182.9794 | -857.5425  | -77.3220  | -122.0484 |
| 31    | 716.6571   | 86.7732   | 147.3199 | -864.2992  | -63.2912  | -86.2406  |
| 32    | 724.4640   | 73.9424   | 114.7225 | -574.0652  | -50.4678  | -42.2328  |
| 33    | 439.3463   | 62.3458   | 72.6291  | -556.8422  | -42.0927  | -19.1697  |
| 34    | 430.9555   | 55.1517   | 52.0965  | -532.2622  | -34.8997  | 1.3711    |
| 35    | 418.7391   | 49.1067   | 34.3544  | -506.4512  | -28.8572  | 19.1126   |
| 36    | 408.5587   | 44.1827   | 19.0607  | -485.1785  | -23.9345  | 34.3965   |
| 37    | 405.7209   | 40.3179   | 5.8702   | -473.6690  | -20.0643  | 47.5947   |
| 38    | 414.8906   | 37.4565   | -4.2770  | -476.3802  | -17.2112  | 57.7236   |
| 39    | 439.8875   | 35.5172   | -12.4157 | -497.0247  | -15.2640  | 65.8758   |
| 40    | 483.7776   | 34.4134   | -17.7299 | -284.9323  | -18.2285  | 49.2724   |
| 41    | -2269.6995 | 247.8668  | 530.7346 | 1685.6572  | -257.5445 | -546.2504 |
| 42    | -1697.2705 | 257.8926  | 549.0282 | 1160.0381  | -235.5007 | -490.0157 |
| 43    | -1193.6023 | 236.5930  | 495.2271 | 702.7203   | -214.0258 | -435.9833 |
| 44    | -757.5714  | 215.9425  | 443.7823 | 319.5581   | -192.4335 | -382.6067 |
| 45    | -394.5303  | 195.2583  | 393.1289 | -5.3420    | -171.8251 | -332.0915 |
| 46    | -88.3179   | 175.6517  | 345.0324 | -267.6501  | -152.5941 | -285.1303 |
| 47    | 157.9441   | 157.4700  | 300.6563 | -471.6231  | -134.2979 | -240.5099 |
| 48    | 348.6393   | 140.2847  | 258.5779 | -613.5369  | -115.9820 | -196.0101 |
| 49    | 480.6168   | 123.1013  | 216.6201 | -713.9680  | -99.2109  | -154.6045 |
| 50    | 574.6755   | 107.5255  | 177.5962 | -771.5761  | -84.0809  | -116.7266 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 629.6488   | 93.5862   | 142.4970 | -792.5573 | -70.1128  | -81.3983  |
| 52    | 652.0510   | 80.8270   | 109.3579 | -513.1537 | -57.8041  | -36.9019  |
| 53    | 377.8371   | 69.7258   | 67.6477  | -511.9351 | -49.4775  | -14.1760  |
| 54    | 385.6573   | 62.5870   | 47.2360  | -503.7217 | -42.3338  | 6.2411    |
| 55    | 389.9610   | 56.5914   | 29.2864  | -494.4954 | -36.3450  | 24.1679   |
| 56    | 396.5354   | 51.7066   | 13.7363  | -490.0883 | -31.4589  | 39.7140   |
| 57    | 410.6498   | 47.8814   | 1.0043   | -495.6279 | -27.6227  | 52.4767   |
| 58    | 436.9051   | 45.0451   | -9.5654  | -515.4655 | -24.7998  | 63.0085   |
| 59    | 479.0873   | 43.1258   | -17.3979 | -553.3460 | -22.8747  | 70.8441   |
| 60    | 540.1793   | 42.0336   | -22.6661 | -354.7666 | -25.4076  | 53.9112   |
| 61    | -2329.4602 | 249.5163  | 530.9106 | 1741.6339 | -259.1262 | -546.7188 |
| 62    | -1753.4093 | 259.4767  | 549.0427 | 1212.6215 | -237.0849 | -490.0169 |
| 63    | -1246.2581 | 238.1773  | 495.2033 | 751.8120  | -215.6103 | -435.9644 |
| 64    | -806.7721  | 217.5292  | 443.7377 | 365.1901  | -194.0176 | -382.5610 |
| 65    | -440.2856  | 196.8333  | 393.0703 | 36.8839   | -173.3964 | -332.0237 |
| 66    | -130.5874  | 177.2167  | 345.0019 | -228.9708 | -154.1506 | -285.0865 |
| 67    | 119.0421   | 159.0288  | 300.6292 | -436.2255 | -135.8545 | -240.4778 |
| 68    | 313.1851   | 141.8484  | 258.4894 | -581.6637 | -117.5383 | -195.8766 |
| 69    | 448.6198   | 124.6816  | 216.4802 | -685.4404 | -100.8054 | -154.5114 |
| 70    | 546.0809   | 109.1315  | 177.6393 | -746.5626 | -85.6951  | -116.8077 |
| 71    | 604.6057   | 95.2163   | 142.5439 | -771.1700 | -71.7421  | -81.4469  |
| 72    | 630.6486   | 82.4639   | 109.3794 | -495.2755 | -59.4787  | -36.8741  |
| 73    | 359.9775   | 71.4027   | 67.4734  | -497.8786 | -51.1479  | -13.9821  |
| 74    | 371.5660   | 64.2590   | 47.1829  | -493.3812 | -44.0042  | 6.2914    |
| 75    | 379.6700   | 58.2691   | 29.0778  | -487.9533 | -38.0277  | 24.3572   |
| 76    | 390.0338   | 53.3916   | 13.7164  | -487.4145 | -33.1332  | 39.7688   |
| 77    | 407.9539   | 49.5641   | 0.8948   | -496.6756 | -29.3193  | 52.5534   |
| 78    | 437.9897   | 46.7301   | -9.7692  | -520.3572 | -26.4786  | 63.2277   |
| 79    | 483.9861   | 44.8102   | -17.4656 | -562.0330 | -24.5604  | 70.9061   |
| 80    | 548.8659   | 43.7174   | -22.7312 | -367.0160 | -27.0847  | 53.9851   |
| 81    | -2344.9592 | 249.5514  | 530.5743 | 1757.0579 | -259.1746 | -546.4022 |
| 82    | -1768.6995 | 259.5249  | 549.1636 | 1227.6234 | -237.1271 | -490.1421 |
| 83    | -1261.2400 | 238.2217  | 495.4110 | 766.8578  | -215.6614 | -436.1948 |
| 84    | -821.9256  | 217.5760  | 443.6890 | 380.2475  | -194.0669 | -382.5085 |
| 85    | -455.2284  | 196.9042  | 393.1453 | 51.5493   | -173.4634 | -332.1088 |
| 86    | -145.4348  | 177.2777  | 344.9573 | -214.1484 | -154.2216 | -285.0171 |
| 87    | 104.5048   | 159.1038  | 300.5254 | -421.8728 | -135.9286 | -240.3770 |
| 88    | 298.7188   | 141.9213  | 258.5287 | -567.3560 | -117.6109 | -196.0134 |
| 89    | 434.2579   | 124.7502  | 216.6741 | -671.2762 | -100.8636 | -154.6828 |
| 90    | 531.9411   | 109.1830  | 177.6359 | -732.5475 | -85.7430  | -116.6887 |
| 91    | 590.6732   | 95.2631   | 142.1727 | -757.3303 | -71.7893  | -81.1262  |
| 92    | 616.7383   | 82.5316   | 109.4996 | -481.6260 | -59.5462  | -36.9686  |
| 93    | 346.3697   | 71.4748   | 67.2408  | -484.3979 | -51.2251  | -13.7839  |
| 94    | 358.1473   | 64.3316   | 46.9953  | -480.0988 | -44.0839  | 6.4720    |
| 95    | 366.4152   | 58.3477   | 29.0725  | -474.9273 | -38.0949  | 24.3980   |
| 96    | 376.9705   | 53.4615   | 13.6268  | -474.4600 | -33.2156  | 39.8225   |
| 97    | 395.0489   | 49.6330   | 0.7203   | -483.9496 | -29.3808  | 52.7390   |
| 98    | 425.2639   | 46.7966   | -9.6648  | -507.7948 | -26.5395  | 63.1422   |
| 99    | 471.4098   | 44.8764   | -17.7044 | -549.5900 | -24.6323  | 71.1328   |
| 100   | 536.4396   | 43.7848   | -22.8003 | -354.7578 | -27.1482  | 54.0656   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | -2329.6985 | 247.6394  | 530.1251 | 1746.0895 | -257.2565 | -545.9666 |
| 102   | -1757.5712 | 257.6086  | 549.2986 | 1220.9500 | -235.2153 | -490.3106 |
| 103   | -1254.7083 | 236.3110  | 495.1809 | 764.6183  | -213.7499 | -435.9466 |
| 104   | -819.5834  | 215.6634  | 443.6638 | 382.0615  | -192.1444 | -382.4716 |
| 105   | -457.1547  | 194.9788  | 393.0024 | 57.8055   | -171.5409 | -331.9524 |
| 106   | -151.6113  | 175.3721  | 344.8490 | -203.8017 | -152.3065 | -284.9236 |
| 107   | 93.9640    | 157.1872  | 300.4364 | -406.8842 | -134.0173 | -240.3040 |
| 108   | 283.8254   | 140.0006  | 258.3557 | -548.1338 | -115.6867 | -195.7420 |
| 109   | 415.1612   | 122.8337  | 216.2501 | -647.8837 | -98.9501  | -154.2700 |
| 110   | 508.4775   | 107.2770  | 177.4942 | -704.7928 | -83.8390  | -116.6159 |
| 111   | 562.9576   | 93.3690   | 142.0846 | -725.3808 | -69.8891  | -80.9980  |
| 112   | 584.8494   | 80.6077   | 109.2193 | -445.5005 | -57.6405  | -36.7434  |
| 113   | 310.3035   | 69.5760   | 67.1759  | -444.0632 | -49.3281  | -13.7104  |
| 114   | 317.8688   | 62.4439   | 46.8853  | -435.5842 | -42.1970  | 6.5834    |
| 115   | 321.9856   | 56.4634   | 28.9414  | -426.2611 | -36.2102  | 24.5331   |
| 116   | 328.4192   | 51.5906   | 13.4671  | -421.7065 | -31.3439  | 39.9850   |
| 117   | 342.4224   | 47.7721   | 0.4174   | -427.1174 | -27.5247  | 53.0298   |
| 118   | 368.5687   | 44.9440   | -9.9701  | -446.9163 | -24.6920  | 63.4241   |
| 119   | 410.6513   | 43.0286   | -17.7189 | -484.6891 | -22.7776  | 71.1728   |
| 120   | 471.5840   | 41.9375   | -23.3197 | -285.9087 | -25.2798  | 54.5542   |
| 121   | -2268.7542 | 241.2975  | 529.2133 | 1699.3002 | -250.8786 | -544.9908 |
| 122   | -1710.8156 | 251.2301  | 548.3006 | 1188.4404 | -228.8195 | -489.3073 |
| 123   | -1222.2609 | 229.9269  | 494.1976 | 746.4629  | -207.3482 | -434.9616 |
| 124   | -801.3501  | 209.2785  | 442.9671 | 378.2694  | -185.7420 | -381.8045 |
| 125   | -453.4848  | 188.6059  | 392.1755 | 68.4898   | -165.1530 | -331.1308 |
| 126   | -162.2355  | 169.0201  | 344.0175 | -178.8560 | -145.9463 | -284.0654 |
| 127   | 69.2577    | 150.8650  | 299.5913 | -367.8366 | -127.6922 | -239.4810 |
| 128   | 245.0417   | 133.7338  | 257.5768 | -495.1370 | -109.4050 | -194.9901 |
| 129   | 362.6030   | 116.6071  | 215.4865 | -581.2713 | -92.7112  | -153.4598 |
| 130   | 442.5325   | 101.0918  | 176.5588 | -624.8355 | -77.6533  | -115.7356 |
| 131   | 483.7551   | 87.2321   | 141.4150 | -632.4143 | -63.7479  | -80.2899  |
| 132   | 492.9251   | 74.5539   | 108.2276 | -343.5517 | -51.7985  | -35.7812  |
| 133   | 209.5594   | 63.8016   | 66.3313  | -330.3389 | -43.5519  | -12.8568  |
| 134   | 205.5143   | 56.7385   | 45.8986  | -310.4204 | -36.4827  | 7.5847    |
| 135   | 198.2752   | 50.8166   | 27.9296  | -289.8359 | -30.5676  | 25.5324   |
| 136   | 193.5664   | 46.0101   | 12.5326  | -274.3061 | -25.7635  | 40.9233   |
| 137   | 196.5670   | 42.2516   | -0.5123  | -268.8507 | -22.0044  | 53.9641   |
| 138   | 211.7557   | 39.4741   | -10.9490 | -277.8012 | -19.2198  | 64.4109   |
| 139   | 242.7621   | 37.5967   | -18.8675 | -304.5640 | -17.3500  | 72.3082   |
| 140   | 292.3288   | 36.5337   | -24.3546 | -98.9669  | -19.8347  | 58.5956   |
| 141   | -2040.5988 | 222.0384  | 419.6288 | 1608.9895 | -236.4735 | -445.4431 |
| 142   | -1616.8265 | 236.6976  | 447.8078 | 1224.3185 | -218.3048 | -398.4726 |
| 143   | -1246.6237 | 218.9969  | 403.7244 | 883.4525  | -200.3948 | -354.1367 |
| 144   | -920.7220  | 201.6066  | 360.0129 | 586.8298  | -182.7773 | -310.1054 |
| 145   | -638.0658  | 184.5564  | 318.7125 | 328.0571  | -166.9748 | -272.3244 |
| 146   | -392.8981  | 169.3835  | 282.6543 | 118.7126  | -150.2527 | -232.4050 |
| 147   | -195.9856  | 153.3110  | 244.8605 | -48.7355  | -133.9807 | -194.3684 |
| 148   | -39.7458   | 137.7599  | 208.7236 | -175.4925 | -118.2321 | -158.0229 |
| 149   | 77.5783    | 122.7648  | 174.3170 | -263.6948 | -103.0411 | -123.3111 |
| 150   | 158.2780   | 108.3639  | 141.5639 | -326.7069 | -90.3422  | -94.5995  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|-----------|-----------|----------|
| 151   | 215.9431 | 96.4945   | 114.8130 | -346.5587 | -76.4852  | -63.4364 |
| 152   | 232.9222 | 83.5000   | 85.5710  | -350.1014 | -62.3392  | -30.4837 |
| 153   | 236.3556 | 70.2317   | 54.5072  | -59.2781  | -51.9586  | -3.7028  |
| 154   | -51.7748 | 60.7842   | 29.6800  | -43.0580  | -44.5910  | 13.1072  |
| 155   | -62.2634 | 54.3482   | 14.8252  | -20.9797  | -38.1508  | 27.9679  |
| 156   | -75.3902 | 48.8636   | 1.8233   | 2.0051    | -32.6574  | 40.9567  |
| 157   | -86.1390 | 44.3507   | -9.2071  | 20.8988   | -28.1534  | 51.9678  |
| 158   | -89.2929 | 40.8235   | -18.2741 | 30.3799   | -24.6193  | 61.0621  |
| 159   | -79.5747 | 38.2940   | -25.4219 | 25.2329   | -22.0963  | 68.1872  |
| 160   | -51.6236 | 36.7713   | -30.6068 | 0.0056    | -20.5690  | 73.3844  |

ENVOLVENTE MAXIMOS TORSORES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | -0.0398    | 151.5653  | 539.0390 | -256.4082 | -133.8361 | -493.0538 |
| 2     | 242.7481   | 134.3429  | 496.2462 | -463.6809 | -115.0193 | -446.8704 |
| 3     | 425.2642   | 116.5411  | 452.1819 | -612.2002 | -97.1363  | -402.5618 |
| 4     | 552.8610   | 99.6577   | 409.8213 | -707.1373 | -80.1994  | -359.9350 |
| 5     | 630.5070   | 83.7230   | 369.0047 | -753.8109 | -64.7151  | -320.2027 |
| 6     | 663.1396   | 69.2293   | 331.4223 | -764.2805 | -50.8643  | -283.5713 |
| 7     | 663.1841   | 56.3633   | 296.5062 | -730.7784 | -36.7956  | -246.0234 |
| 8     | 622.3855   | 43.2219   | 261.2177 | -664.1394 | -23.6507  | -210.4137 |
| 9     | 551.7955   | 31.0362   | 227.0414 | -569.5677 | -11.4731  | -176.0091 |
| 10    | 467.5991   | 20.4779   | 194.9574 | -464.6700 | -1.4241   | -144.9875 |
| 11    | 347.0962   | 10.2882   | 165.6034 | -336.2759 | 8.0596    | -117.2013 |
| 12    | 236.6688   | 2.3701    | 139.7765 | -196.3018 | 17.1196   | -88.1769  |
| 13    | 95.8776    | -6.2388   | 112.6577 | 119.7691  | 20.6755   | -61.8298  |
| 14    | -178.7172  | -7.6088   | 88.1760  | 207.0051  | 23.8134   | -45.3959  |
| 15    | -274.3626  | -10.8617  | 73.6628  | 308.4906  | 27.0593   | -30.9010  |
| 16    | -396.9544  | -14.6783  | 61.3191  | 437.9710  | 30.8829   | -18.5377  |
| 17    | -463.8804  | -16.0827  | 50.2932  | 507.3949  | 32.2786   | -7.5361   |
| 18    | -550.4007  | -17.9664  | 41.8793  | 597.3309  | 34.1695   | 0.8947    |
| 19    | -618.6243  | -19.0782  | 35.0528  | 667.5318  | 35.2742   | 7.7032    |
| 20    | -676.6391  | -19.7668  | 29.9988  | 942.2832  | 27.3401   | -13.2301  |
| 21    | -1012.2946 | 189.1436  | 582.9285 | 549.2260  | -199.0143 | -591.6455 |
| 22    | -560.5076  | 199.3531  | 594.8005 | 155.4124  | -176.9727 | -535.7764 |
| 23    | -188.3335  | 178.0296  | 541.2880 | -170.3179 | -155.4780 | -482.0471 |
| 24    | 116.7158   | 157.3522  | 490.0206 | -422.6172 | -133.8508 | -428.8392 |
| 25    | 348.9783   | 136.6281  | 439.3466 | -616.8407 | -113.1971 | -378.3062 |
| 26    | 524.5741   | 116.9646  | 391.6198 | -748.4378 | -93.9067  | -331.7305 |
| 27    | 640.0505   | 98.7173   | 347.5648 | -821.4666 | -75.5504  | -287.4248 |
| 28    | 699.9290   | 81.4694   | 305.4076 | -832.5699 | -57.1535  | -242.8108 |
| 29    | 700.9061   | 64.2257   | 263.4881 | -801.8439 | -40.3425  | -201.5330 |
| 30    | 663.6018   | 48.6027   | 224.8088 | -727.9706 | -25.1578  | -163.8759 |
| 31    | 587.0473   | 34.6043   | 189.1921 | -617.3291 | -11.1223  | -128.1126 |
| 32    | 487.9075   | 22.4872   | 156.3561 | -476.4933 | 2.1339    | -92.3738  |
| 33    | 341.3161   | 9.7082    | 122.7682 | -116.8482 | 14.2038   | -64.5162  |
| 34    | -8.5180    | -1.1252   | 97.4380  | 33.8328   | 21.3757   | -43.9751  |
| 35    | -120.8009  | -5.9338   | 79.3419  | 156.9285  | 26.1827   | -25.8817  |
| 36    | -234.3919  | -9.9977   | 63.6406  | 279.6618  | 30.2452   | -10.1881  |
| 37    | -362.9517  | -14.0032  | 50.6660  | 417.2596  | 34.2577   | 2.8056    |
| 38    | -468.9004  | -16.6065  | 39.7274  | 529.0313  | 36.8525   | 13.7221   |
| 39    | -565.5501  | -18.5464  | 31.8556  | 630.0760  | 38.7995   | 21.6116   |
| 40    | -641.0975  | -19.5791  | 25.8565  | 925.3688  | 31.0961   | 9.3861    |
| 41    | -991.4001  | 188.6551  | 575.2003 | 529.3058  | -198.4690 | -590.6981 |
| 42    | -540.8895  | 198.8116  | 593.8804 | 136.5896  | -176.4197 | -534.8686 |
| 43    | -170.1708  | 177.5098  | 540.4321 | -187.7430 | -154.9426 | -481.1895 |
| 44    | 132.8761   | 156.8600  | 489.2337 | -437.9635 | -133.3510 | -428.0574 |
| 45    | 362.9886   | 136.1749  | 438.5790 | -629.9323 | -112.7417 | -377.5423 |
| 46    | 536.2406   | 116.5745  | 390.8723 | -759.2990 | -93.5169  | -330.9699 |
| 47    | 649.5751   | 98.3882   | 346.6661 | -830.3068 | -75.2161  | -286.5177 |
| 48    | 707.3120   | 81.2074   | 304.6864 | -839.3235 | -56.9047  | -242.1191 |
| 49    | 706.4340   | 64.0298   | 262.8057 | -806.8650 | -40.1394  | -200.7869 |
| 50    | 667.5709   | 48.4535   | 223.7820 | -731.5445 | -25.0089  | -162.9090 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 589.7882   | 34.5302   | 188.6551 | -619.8241 | -11.0568  | -127.5561 |
| 52    | 479.3159   | 21.7750   | 155.5156 | -466.1769 | 2.8421    | -91.5119  |
| 53    | 342.5547   | 9.7605    | 122.0719 | -118.2263 | 14.1750   | -64.4891  |
| 54    | -7.7200    | -1.0511   | 97.4047  | 32.8793   | 21.3053   | -43.9368  |
| 55    | -117.4295  | -5.6983   | 79.3117  | 153.0275  | 25.9455   | -25.8605  |
| 56    | -250.9844  | -10.5796  | 63.7609  | 297.5548  | 30.8268   | -10.3104  |
| 57    | -359.9871  | -13.7578  | 50.4948  | 413.7567  | 34.0163   | 2.9864    |
| 58    | -472.4748  | -16.5893  | 39.9824  | 532.5646  | 36.8350   | 13.4654   |
| 59    | -565.8600  | -18.4077  | 31.7968  | 630.0613  | 38.6591   | 21.6662   |
| 60    | -641.1081  | -19.4313  | 25.7970  | 924.0367  | 30.9088   | 9.7597    |
| 61    | -1044.0389 | 190.3393  | 575.1001 | 578.1464  | -200.0839 | -590.8905 |
| 62    | -587.8374  | 200.3725  | 593.9361 | 180.0251  | -177.9807 | -534.9108 |
| 63    | -210.8688  | 178.9806  | 540.4588 | -150.3578 | -156.4136 | -481.2197 |
| 64    | 98.1952    | 158.2206  | 489.2434 | -406.3516 | -134.7090 | -428.0660 |
| 65    | 331.2607   | 137.5206  | 438.5787 | -601.2257 | -114.0837 | -377.5306 |
| 66    | 519.4136   | 117.4059  | 390.7296 | -744.3801 | -94.3398  | -330.8143 |
| 67    | 651.6932   | 98.4163   | 346.6969 | -832.4897 | -75.2420  | -286.5452 |
| 68    | 709.4553   | 81.2404   | 304.5531 | -841.5567 | -56.9303  | -241.9425 |
| 69    | 708.4989   | 64.0766   | 262.6170 | -808.9872 | -40.2004  | -200.6476 |
| 70    | 669.6131   | 48.5209   | 223.8210 | -733.7195 | -25.0845  | -162.9836 |
| 71    | 591.8833   | 34.6191   | 188.7124 | -622.1110 | -11.1449  | -127.6159 |
| 72    | 481.5900   | 21.8724   | 155.5464 | -468.6718 | 2.7377    | -91.5068  |
| 73    | 340.1513   | 9.5725    | 122.0110 | -115.2828 | 14.3397   | -64.4302  |
| 74    | 11.3148    | -0.0773   | 97.3721  | 11.6473   | 20.3304   | -43.9073  |
| 75    | -147.1322  | -7.0708   | 79.3078  | 185.7924  | 27.3113   | -25.8749  |
| 76    | -242.3239  | -10.2181  | 63.6781  | 288.1245  | 30.4769   | -10.1949  |
| 77    | -361.4086  | -13.8093  | 50.4281  | 415.2402  | 34.0541   | 3.0186    |
| 78    | -476.7677  | -16.7437  | 40.0189  | 537.2318  | 36.9955   | 13.4468   |
| 79    | -570.5437  | -18.5612  | 31.6708  | 635.0871  | 38.8116   | 21.7910   |
| 80    | -646.1382  | -19.5895  | 25.6610  | 929.6393  | 31.0762   | 9.9354    |
| 81    | -1067.7783 | 191.3279  | 574.9441 | 599.6627  | -201.0861 | -590.7581 |
| 82    | -611.3203  | 201.4416  | 593.9188 | 200.9657  | -179.0438 | -534.8976 |
| 83    | -234.3643  | 180.1342  | 540.4557 | -129.3369 | -157.5739 | -481.2396 |
| 84    | 85.6625    | 159.0814  | 489.2963 | -395.7494 | -135.5723 | -428.1167 |
| 85    | 312.9006   | 138.7083  | 438.5396 | -585.6187 | -115.2675 | -377.5027 |
| 86    | 538.8374   | 117.1146  | 390.9458 | -763.0836 | -94.0585  | -331.0069 |
| 87    | 653.4493   | 98.9434   | 346.3628 | -835.4417 | -75.7682  | -286.2141 |
| 88    | 712.2620   | 81.7598   | 304.6249 | -845.5336 | -57.4494  | -242.1096 |
| 89    | 719.7703   | 64.1547   | 262.9510 | -820.4556 | -40.2681  | -200.9607 |
| 90    | 681.1256   | 48.5892   | 223.9147 | -745.3974 | -25.1492  | -162.9676 |
| 91    | 603.5241   | 34.6659   | 188.4498 | -633.8420 | -11.1921  | -127.4045 |
| 92    | 493.3298   | 21.9220   | 155.6581 | -480.5177 | 2.6901    | -91.6262  |
| 93    | 345.2785   | 9.2385    | 121.9844 | -120.3826 | 14.7743   | -64.4064  |
| 94    | -5.9002    | -1.6685   | 97.3703  | 32.4257   | 21.9167   | -43.9202  |
| 95    | -123.0138  | -6.5937   | 79.2823  | 160.6419  | 26.8439   | -25.8169  |
| 96    | -253.1712  | -11.2493  | 63.6573  | 301.2503  | 31.4952   | -10.2082  |
| 97    | -375.7014  | -14.8865  | 50.4919  | 431.9855  | 35.1396   | 2.9706    |
| 98    | -490.6873  | -17.7241  | 39.7932  | 553.3824  | 37.9814   | 13.6856   |
| 99    | -589.7684  | -19.6414  | 31.8151  | 656.7243  | 39.8871   | 21.6329   |
| 100   | -666.4617  | -20.6267  | 25.5773  | 951.1930  | 32.0081   | 10.0468   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | -1070.5162 | 191.2441  | 574.6068 | 602.5845  | -200.9964 | -590.4338 |
| 102   | -614.0680  | 201.3520  | 593.7592 | 204.0120  | -178.9587 | -534.7716 |
| 103   | -237.5276  | 180.0499  | 540.2795 | -125.9857 | -157.4888 | -481.0456 |
| 104   | 77.6013    | 159.1666  | 489.0722 | -387.9829 | -135.6476 | -427.8807 |
| 105   | 312.8892   | 138.4800  | 438.4076 | -585.0937 | -115.0421 | -377.3588 |
| 106   | 536.1205   | 117.0013  | 390.6675 | -760.1805 | -93.9357  | -330.7419 |
| 107   | 652.6102   | 98.7116   | 346.4129 | -833.9916 | -75.5417  | -286.2823 |
| 108   | 710.9130   | 81.5222   | 304.4731 | -843.6379 | -57.2083  | -241.8598 |
| 109   | 710.6626   | 64.3505   | 262.3701 | -811.7834 | -40.4669  | -200.3894 |
| 110   | 680.9633   | 48.2216   | 223.7198 | -744.4004 | -24.7836  | -162.8428 |
| 111   | 602.7937   | 34.2929   | 188.3125 | -632.2920 | -10.8130  | -127.2294 |
| 112   | 491.7337   | 21.5339   | 155.3901 | -478.0493 | 3.0795    | -91.3773  |
| 113   | 342.8477   | 8.8551    | 121.8100 | -117.2734 | 15.1505   | -64.2474  |
| 114   | -8.9490    | -2.0296   | 97.2003  | 36.2945   | 22.2773   | -43.7435  |
| 115   | -149.9113  | -8.0140   | 79.0973  | 190.7339  | 28.2685   | -25.6273  |
| 116   | -288.5869  | -12.8903  | 63.4580  | 340.3562  | 33.1367   | -10.0070  |
| 117   | -419.6370  | -16.7129  | 50.4061  | 480.0087  | 36.9585   | 3.0448    |
| 118   | -538.5741  | -19.5397  | 39.7113  | 605.3261  | 39.7919   | 13.7541   |
| 119   | -641.6224  | -21.4582  | 31.3132  | 712.6892  | 41.7093   | 22.1498   |
| 120   | -725.7902  | -22.5468  | 25.6976  | 1014.3973 | 33.9382   | 9.8867    |
| 121   | -1078.0380 | 191.9082  | 569.2825 | 608.5668  | -201.6272 | -585.0451 |
| 122   | -620.0834  | 201.9783  | 588.3653 | 208.5204  | -179.5677 | -529.3713 |
| 123   | -238.9744  | 180.5638  | 534.8757 | -125.7639 | -157.9851 | -475.6411 |
| 124   | 70.8764    | 159.9141  | 483.6440 | -382.8933 | -136.3776 | -422.4811 |
| 125   | 311.0914   | 139.1090  | 433.1098 | -584.6946 | -115.6561 | -372.0654 |
| 126   | 535.8655   | 117.6332  | 385.3760 | -761.3144 | -94.5594  | -325.4216 |
| 127   | 651.5920   | 99.4923   | 340.9142 | -834.6413 | -76.3195  | -280.8037 |
| 128   | 722.3592   | 81.8188   | 299.2131 | -855.6298 | -57.4900  | -236.6258 |
| 129   | 723.0873   | 64.6872   | 257.1252 | -824.9269 | -40.7913  | -195.0991 |
| 130   | 688.8912   | 48.9843   | 218.2690 | -753.9738 | -25.5458  | -157.4438 |
| 131   | 613.1733   | 35.0955   | 183.2105 | -644.4852 | -11.6113  | -122.0873 |
| 132   | 505.0011   | 22.4152   | 150.0224 | -493.4340 | 2.1875    | -85.9868  |
| 133   | 359.4296   | 9.8166    | 116.5014 | -139.0471 | 14.0336   | -58.9879  |
| 134   | 14.2852    | -0.8602   | 91.9540  | 10.4548   | 21.1140   | -38.4777  |
| 135   | -122.5964  | -6.7822   | 73.8939  | 160.6272  | 27.0359   | -20.4352  |
| 136   | -256.9201  | -11.5989  | 58.2217  | 305.7873  | 31.8440   | -4.7663   |
| 137   | -383.5251  | -15.3498  | 45.1726  | 440.8350  | 35.5976   | 8.2817    |
| 138   | -497.9453  | -18.1309  | 34.5030  | 561.5351  | 38.3847   | 18.9652   |
| 139   | -596.5308  | -19.9994  | 26.3453  | 664.2856  | 40.2441   | 27.1062   |
| 140   | -676.4725  | -21.0508  | 20.5283  | 944.8349  | 32.3027   | 18.0753   |
| 141   | -1010.4473 | 193.4275  | 445.6997 | 630.3367  | -207.8626 | -471.5148 |
| 142   | -634.4281  | 207.9790  | 474.2968 | 293.6193  | -189.5862 | -424.9625 |
| 143   | -319.4717  | 190.3878  | 429.8156 | 7.7889    | -171.7857 | -380.2286 |
| 144   | -32.9763   | 172.5978  | 386.8539 | -248.6764 | -153.7685 | -336.9462 |
| 145   | 193.0669   | 155.6952  | 345.5026 | -451.1380 | -138.1136 | -299.1151 |
| 146   | 419.3563   | 139.3010  | 309.7653 | -639.3871 | -120.1702 | -259.5158 |
| 147   | 568.6413   | 122.9983  | 271.9736 | -758.7927 | -103.6680 | -221.4836 |
| 148   | 680.1633   | 107.0302  | 236.0989 | -840.1075 | -87.5024  | -185.3981 |
| 149   | 745.1967   | 91.8828   | 201.9765 | -875.7227 | -72.1591  | -150.9678 |
| 150   | 770.3116   | 77.4973   | 169.2217 | -883.1829 | -59.4756  | -122.2595 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|-----------|-----------|----------|
| 151   | 782.8677 | 65.0254   | 142.7114 | -856.8225 | -45.0161  | -91.3363 |
| 152   | 743.9867 | 51.9721   | 113.6590 | -804.4164 | -30.8113  | -58.5700 |
| 153   | 690.6720 | 38.7256   | 82.5952  | -525.6733 | -14.9989  | -37.0396 |
| 154   | 414.6228 | 23.7896   | 63.0121  | -442.8880 | -7.5877   | -20.2488 |
| 155   | 337.6888 | 17.3198   | 48.4413  | -354.2628 | -1.1246   | -5.6799  |
| 156   | 257.8945 | 11.8351   | 35.5879  | -264.6261 | 4.3703    | 7.1894   |
| 157   | 180.4974 | 7.3192    | 24.4665  | -179.0954 | 8.8789    | 18.2959  |
| 158   | 110.6895 | 3.7949    | 15.4691  | -102.9315 | 12.4074   | 27.3086  |
| 159   | 53.7235  | 1.2702    | 8.3742   | -41.4387  | 14.9283   | 34.3857  |
| 160   | 15.0373  | -0.2531   | 3.2181   | 0.0031    | 16.4559   | 39.5573  |

ENVOLVENTE MINIMOS FLECTORES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | -0.0403    | 150.5601  | 537.0841  | -200.4401 | -103.2909 | -407.5830 |
| 2     | -55.6541   | -30.9220  | 27.9501   | 111.3043  | 30.9220   | -27.9494  |
| 3     | -111.3152  | -30.9222  | 27.8992   | 166.9903  | 30.9222   | -27.8987  |
| 4     | -166.9976  | -30.9129  | 27.8411   | 222.6252  | 30.9129   | -27.8419  |
| 5     | -222.6295  | -30.9137  | 27.8386   | 278.2645  | 30.9137   | -27.8387  |
| 6     | -278.2768  | -30.9231  | 27.7125   | 333.9462  | 30.9231   | -27.7136  |
| 7     | -333.9520  | -30.9206  | 27.7158   | 389.6190  | 30.9206   | -27.7167  |
| 8     | -389.6433  | -30.8967  | 27.4154   | 445.2554  | 30.8967   | -27.4152  |
| 9     | -445.2390  | -30.8791  | 27.6124   | 500.8093  | 30.8792   | -27.6125  |
| 10    | -500.8272  | -30.8537  | 27.1731   | 556.3872  | 30.8537   | -27.1730  |
| 11    | -556.3940  | -30.8666  | 27.2201   | 611.9277  | 30.8666   | -27.2215  |
| 12    | -611.9399  | -30.8815  | 26.9524   | 683.2279  | 42.3007   | -22.2941  |
| 13    | -683.2222  | -42.2914  | 22.2839   | 761.1447  | 44.2908   | -16.9975  |
| 14    | -761.1627  | -44.2664  | 16.6805   | 842.2599  | 46.2664   | -11.3819  |
| 15    | -842.2635  | -46.2795  | 11.1114   | 926.5573  | 47.7798   | -7.1551   |
| 16    | -926.5420  | -47.7770  | 7.4494    | 1014.2552 | 49.2768   | -3.4349   |
| 17    | -1014.4436 | -51.3074  | -5.8255   | 1108.9669 | 53.3069   | 11.1485   |
| 18    | -1160.4083 | -110.7656 | -143.4538 | 1361.6219 | 112.7659  | 148.7383  |
| 19    | -1403.5619 | -160.8704 | -258.5128 | 1694.4447 | 162.8711  | 263.8779  |
| 20    | -1728.6702 | -206.0864 | -367.0794 | 2100.6790 | 175.7979  | 304.8086  |
| 21    | -2126.2534 | 238.5537  | 539.5350  | 1544.1978 | -246.5759 | -544.0820 |
| 22    | -1567.7513 | 227.7313  | 499.0322  | 1076.0125 | -198.4012 | -414.9141 |
| 23    | -1132.6544 | 146.0631  | 285.4763  | 803.9932  | -146.0641 | -285.4308 |
| 24    | -852.3741  | 103.1162  | 179.3595  | 620.3563  | -103.1165 | -179.3589 |
| 25    | -685.9849  | 49.1050   | 34.8135   | 575.4943  | -49.1051  | -34.7755  |
| 26    | -649.2851  | -5.3251   | 1.8036    | 661.2654  | 5.3253    | -1.7361   |
| 27    | -661.2766  | -5.3276   | 1.3910    | 673.2610  | 5.3288    | -1.3575   |
| 28    | -673.2542  | -5.3338   | 1.3630    | 685.2500  | 5.3345    | -1.3487   |
| 29    | -685.2437  | -5.3340   | 1.1449    | 697.2407  | 5.3335    | -1.1044   |
| 30    | -697.2352  | -5.3354   | 0.7136    | 709.2345  | 5.3357    | -0.7010   |
| 31    | -709.2245  | -5.3379   | 0.9191    | 721.2358  | 5.3369    | -0.9045   |
| 32    | -721.2381  | -5.3228   | 0.2454    | 733.2088  | 5.3224    | -0.2181   |
| 33    | -733.2137  | -5.3472   | 0.2118    | 745.2470  | 5.3498    | -0.2124   |
| 34    | -745.2553  | -5.3797   | 0.2021    | 768.0671  | 22.4509   | 17.9156   |
| 35    | -768.0688  | -22.4581  | -18.3721  | 821.0799  | 24.4583   | 23.6830   |
| 36    | -821.0920  | -24.4683  | -24.1710  | 879.1317  | 26.9683   | 30.7729   |
| 37    | -900.0334  | -57.4489  | -51.4869  | 1031.9370 | 59.9485   | 58.1334   |
| 38    | -1087.6362 | -106.0794 | -188.3640 | 1328.2555 | 108.0791  | 193.6798  |
| 39    | -1394.2441 | -162.5125 | -329.6506 | 1762.4487 | 164.5122  | 334.9781  |
| 40    | -1817.5144 | -216.6031 | -464.6735 | 2307.9028 | 187.3892  | 398.3177  |
| 41    | -2348.2969 | 244.9448  | 527.8510  | 1752.1353 | -252.8948 | -539.1482 |
| 42    | -1776.8376 | 234.0823  | 494.0691  | 1285.3906 | -205.2164 | -409.9960 |
| 43    | -1346.5154 | 153.0294  | 280.8313  | 1002.1046 | -153.0295 | -280.7816 |
| 44    | -1057.2634 | 98.3369   | 144.1804  | 836.0211  | -98.3376  | -144.1600 |
| 45    | -883.0519  | 56.5881   | 30.0207   | 755.7356  | -56.5871  | -29.9826  |
| 46    | -840.2760  | 2.6295    | -3.0729   | 834.3625  | -2.6289   | 3.1301    |
| 47    | -834.3496  | 2.6243    | -3.3678   | 828.4369  | -2.6223   | 3.3996    |
| 48    | -828.4248  | 2.6052    | -3.5919   | 822.5670  | -2.6053   | 3.6213    |
| 49    | -822.5720  | 2.6285    | -3.8729   | 816.6525  | -2.6306   | 3.8927    |
| 50    | -816.6386  | 2.6543    | -3.8895   | 810.6655  | -2.6554   | 3.9068    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -810.6719  | 2.6681    | -4.3599   | 804.6587  | -2.6697   | 4.3866    |
| 52    | -804.6581  | 2.6928    | -4.3956   | 798.5933  | -2.6934   | 4.4106    |
| 53    | -798.5843  | 2.7017    | -4.8742   | 792.4967  | -2.7020   | 4.8914    |
| 54    | -792.4809  | 2.7026    | -5.1560   | 795.7608  | 14.7246   | 23.2573   |
| 55    | -795.7633  | -14.7178  | -23.4664  | 831.3735  | 16.7177   | 28.7495   |
| 56    | -831.3738  | -16.7059  | -28.7575  | 871.9393  | 19.2060   | 35.3880   |
| 57    | -903.2921  | -67.8128  | -68.5739  | 1058.5505 | 70.3131   | 75.2015   |
| 58    | -1104.5654 | -112.0008 | -189.2945 | 1358.5070 | 114.0001  | 194.6003  |
| 59    | -1425.4894 | -168.6585 | -331.3869 | 1807.4695 | 170.6579  | 336.7695  |
| 60    | -1863.0979 | -222.8279 | -466.5565 | 2367.4434 | 193.6895  | 399.8731  |
| 61    | -2407.8347 | 246.6028  | 528.0314  | 1807.9598 | -254.4732 | -539.6165 |
| 62    | -1832.9023 | 235.6658  | 494.0831  | 1339.0054 | -206.8246 | -409.9662 |
| 63    | -1400.5551 | 154.6462  | 280.7627  | 1052.5264 | -154.6474 | -280.7154 |
| 64    | -1108.4275 | 99.9745   | 144.0701  | 883.5142  | -99.9769  | -144.0484 |
| 65    | -931.2755  | 58.2546   | 29.9002   | 800.2140  | -58.2578  | -29.8800  |
| 66    | -885.3486  | 4.7081    | -3.0651   | 874.7460  | -4.7087   | 3.1236    |
| 67    | -874.7695  | 4.7156    | -3.6160   | 864.1550  | -4.7162   | 3.6546    |
| 68    | -864.1613  | 4.7269    | -3.6500   | 853.5263  | -4.7279   | 3.6605    |
| 69    | -853.5308  | 4.7100    | -3.8660   | 842.9361  | -4.7095   | 3.8912    |
| 70    | -842.9289  | 4.7196    | -4.1511   | 832.3108  | -4.7191   | 4.1862    |
| 71    | -832.3300  | 4.7147    | -4.6768   | 821.7229  | -4.7153   | 4.6969    |
| 72    | -821.7277  | 4.7295    | -4.7017   | 811.0871  | -4.7310   | 4.7061    |
| 73    | -811.0850  | 4.7381    | -4.9650   | 800.4272  | -4.7377   | 4.9821    |
| 74    | -800.4056  | 4.7174    | -5.4557   | 799.0634  | 12.7328   | 23.5540   |
| 75    | -799.0664  | -12.7435  | -23.5108  | 830.2218  | 14.7431   | 28.8011   |
| 76    | -830.2223  | -14.7372  | -29.1270  | 866.3834  | 17.2372   | 35.7640   |
| 77    | -901.0115  | -69.7148  | -68.8416  | 1060.4506 | 72.2149   | 75.4495   |
| 78    | -1106.6022 | -113.9225 | -189.2834 | 1364.9447 | 115.9223  | 194.6008  |
| 79    | -1431.9695 | -170.5844 | -331.7125 | 1818.2603 | 172.5846  | 337.1215  |
| 80    | -1873.9113 | -224.7563 | -466.9116 | 2382.5996 | 195.6071  | 400.2208  |
| 81    | -2423.3030 | 246.6355  | 527.6831  | 1823.3655 | -254.5173 | -539.3076 |
| 82    | -1848.1780 | 235.7052  | 494.2018  | 1354.0768 | -206.8771 | -410.1209 |
| 83    | -1415.6326 | 154.7072  | 281.0231  | 1067.5776 | -154.7083 | -280.9542 |
| 84    | -1123.5215 | 100.0415  | 143.9703  | 898.4620  | -100.0428 | -143.9421 |
| 85    | -946.1384  | 58.3340   | 30.0031   | 814.8655  | -58.3356  | -29.9660  |
| 86    | -898.3929  | 5.8668    | -3.4409   | 885.1915  | -5.8653   | 3.4816    |
| 87    | -885.1949  | 5.8560    | -3.2670   | 872.0281  | -5.8542   | 3.2825    |
| 88    | -872.0502  | 5.8493    | -3.7693   | 858.8842  | -5.8512   | 3.8319    |
| 89    | -858.8840  | 5.8742    | -4.3230   | 845.6595  | -5.8763   | 4.3528    |
| 90    | -845.6666  | 5.9003    | -4.3584   | 832.3871  | -5.9017   | 4.3564    |
| 91    | -832.3723  | 5.9403    | -4.3581   | 819.0019  | -5.9402   | 4.3842    |
| 92    | -819.0169  | 5.9066    | -5.1242   | 805.7282  | -5.9049   | 5.1432    |
| 93    | -805.7324  | 5.8759    | -4.8784   | 792.5104  | -5.8746   | 4.8800    |
| 94    | -792.5084  | 5.8717    | -5.3521   | 788.5387  | 11.5751   | 23.4547   |
| 95    | -788.5428  | -11.5923  | -23.7216  | 817.1238  | 13.5927   | 29.0158   |
| 96    | -817.1302  | -13.5993  | -29.2347  | 850.7099  | 16.0997   | 35.8592   |
| 97    | -886.2776  | -69.6559  | -68.6337  | 1045.6251 | 72.1558   | 75.2721   |
| 98    | -1091.7491 | -113.8561 | -189.7189 | 1350.0167 | 115.8553  | 195.0171  |
| 99    | -1417.2316 | -170.5136 | -331.2781 | 1803.2598 | 172.5130  | 336.6650  |
| 100   | -1858.8066 | -224.6851 | -466.9865 | 2367.3213 | 195.5445  | 400.3451  |



ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -2407.9951 | 244.7217  | 527.2242  | 1812.3622 | -252.5940 | -538.8706 |
| 102   | -1837.0231 | 233.7894  | 494.3575  | 1347.3999 | -204.9697 | -410.3076 |
| 103   | -1409.0844 | 152.7963  | 280.7839  | 1065.3228 | -152.7965 | -280.7061 |
| 104   | -1121.2072 | 98.1373   | 143.9982  | 900.3603  | -98.1386  | -143.9706 |
| 105   | -948.0896  | 56.4452   | 29.8450   | 821.0677  | -56.4451  | -29.8034  |
| 106   | -898.9955  | 7.8249    | -3.2413   | 881.3864  | -7.8237   | 3.2969    |
| 107   | -881.3787  | 7.8322    | -3.5139   | 863.7580  | -7.8341   | 3.5460    |
| 108   | -863.7489  | 7.8549    | -3.7936   | 846.0699  | -7.8570   | 3.8102    |
| 109   | -846.0562  | 7.8696    | -3.8098   | 828.3514  | -7.8687   | 3.8337    |
| 110   | -828.3608  | 7.8492    | -4.3067   | 810.7006  | -7.8501   | 4.3354    |
| 111   | -810.7084  | 7.8590    | -4.3408   | 793.0236  | -7.8611   | 4.3553    |
| 112   | -793.0304  | 7.9091    | -4.8241   | 775.2369  | -7.9093   | 4.8433    |
| 113   | -775.2292  | 7.9144    | -4.8495   | 757.4225  | -7.9153   | 4.8592    |
| 114   | -757.4262  | 7.9304    | -5.3148   | 748.0203  | 9.4825    | 23.4158   |
| 115   | -748.0230  | -9.4852   | -23.6730  | 771.8670  | 11.4855   | 28.9663   |
| 116   | -771.8526  | -11.4885  | -29.1541  | 800.6891  | 13.9894   | 35.7641   |
| 117   | -837.4037  | -67.9383  | -68.3398  | 992.8602  | 70.4386   | 74.9626   |
| 118   | -1039.6671 | -112.1876 | -189.3954 | 1294.0872 | 114.1873  | 194.7526  |
| 119   | -1361.8220 | -168.8825 | -331.8435 | 1744.3127 | 170.8826  | 337.1802  |
| 120   | -1800.6260 | -223.0608 | -465.9252 | 2305.5361 | 194.0096  | 399.2611  |
| 121   | -2345.9856 | 238.3409  | 526.3272  | 1764.7910 | -246.1121 | -537.8829 |
| 122   | -1789.5667 | 227.3168  | 493.3457  | 1315.5773 | -198.7042 | -409.3073 |
| 123   | -1377.6699 | 146.6131  | 279.8201  | 1047.8104 | -146.6130 | -279.7683 |
| 124   | -1104.2568 | 92.1626   | 143.4380  | 896.9016  | -92.1613  | -143.4166 |
| 125   | -944.9196  | 46.0086   | 13.6900   | 841.3756  | -46.0074  | -13.6274  |
| 126   | -889.1339  | 15.4855   | -7.9097   | 854.2830  | -15.4855  | 7.9467    |
| 127   | -854.2756  | 15.4622   | -7.8981   | 819.5029  | -15.4600  | 7.9289    |
| 128   | -819.5028  | 15.4627   | -8.4114   | 784.7078  | -15.4620  | 8.4430    |
| 129   | -784.7007  | 15.4634   | -8.4440   | 749.9015  | -15.4657  | 8.4544    |
| 130   | -749.9146  | 15.4837   | -8.6453   | 715.0846  | -15.4859  | 8.6795    |
| 131   | -715.0741  | 15.5012   | -9.1197   | 680.1796  | -15.5015  | 9.1431    |
| 132   | -680.1846  | 15.5080   | -9.1056   | 645.3028  | -15.5071  | 9.1113    |
| 133   | -645.2798  | 15.5083   | -9.3077   | 610.3833  | -15.5087  | 9.3209    |
| 134   | -610.3661  | 15.5035   | -9.5261   | 575.4683  | -15.5035  | 9.5355    |
| 135   | -575.4739  | 15.5171   | -9.6984   | 571.6104  | 3.0979    | 33.5014   |
| 136   | -571.6090  | -3.1019   | -33.8175  | 581.5794  | 5.6019    | 40.4281   |
| 137   | -630.2552  | -60.0652  | -73.0937  | 768.0059  | 62.5654   | 79.7116   |
| 138   | -823.8867  | -116.5994 | -224.4758 | 1088.2711 | 118.5997  | 229.7946  |
| 139   | -1136.4705 | -161.5639 | -336.1633 | 1502.4077 | 163.5638  | 341.4988  |
| 140   | -1563.5724 | -215.8996 | -470.7606 | 2052.4124 | 187.0370  | 408.8488  |
| 141   | -2094.2649 | 219.7305  | 414.6123  | 1659.5563 | -232.1651 | -433.8094 |
| 142   | -1676.5039 | 216.8806  | 398.1552  | 1335.3058 | -187.0105 | -321.4222 |
| 143   | -1378.5846 | 143.8002  | 219.3936  | 1119.7979 | -143.7991 | -219.3608 |
| 144   | -1164.5244 | 95.7086   | 109.1383  | 992.1656  | -95.7087  | -109.0717 |
| 145   | -1044.0723 | 38.2803   | -23.5357  | 975.1781  | -38.2792  | 23.5613   |
| 146   | -978.6479  | 36.2440   | -32.1600  | 913.4032  | -36.2411  | 32.1889   |
| 147   | -913.4124  | 36.2121   | -32.1914  | 848.2223  | -36.2121  | 32.2170   |
| 148   | -848.2185  | 36.2082   | -32.4786  | 783.0663  | -36.2086  | 32.5265   |
| 149   | -783.0488  | 36.2211   | -32.8120  | 717.8460  | -36.2213  | 32.8336   |
| 150   | -717.8517  | 36.2059   | -32.8347  | 652.6880  | -36.2068  | 32.8562   |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|----------|-----------|----------|
| 151   | -652.6760 | 36.2287   | -33.0903 | 587.4421 | -36.2299  | 33.1292  |
| 152   | -587.4286 | 36.2381   | -33.3130 | 522.1997 | -36.2364  | 33.3263  |
| 153   | -522.2013 | 36.2151   | -33.3278 | 457.0199 | -36.2166  | 33.3267  |
| 154   | -457.0223 | 36.2509   | -33.3223 | 391.7633 | -36.2567  | 33.3456  |
| 155   | -391.7400 | 36.2680   | -33.6001 | 326.4647 | -36.2686  | 33.6311  |
| 156   | -326.4477 | 36.2688   | -33.7457 | 261.1510 | -36.2665  | 33.7484  |
| 157   | -261.1565 | 36.2701   | -33.6566 | 195.8842 | -36.2709  | 33.6549  |
| 158   | -195.8724 | 36.2673   | -33.7248 | 130.5771 | -36.2669  | 33.7349  |
| 159   | -130.5640 | 36.2641   | -33.7765 | 65.3014  | -36.2634  | 33.7817  |
| 160   | -65.2869  | 36.2611   | -33.8047 | 0.0122   | -2.0804   | 123.1438 |



ENVOLVENTE MINIMOS CORTANTES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0058    | -15.2357  | 67.5190   | 39.1889   | 31.5389   | -24.1428 |
| 2     | -12.7714   | -16.8582  | 61.7376   | 44.5663   | 33.5780   | -17.1429 |
| 3     | 4.6403     | -19.9004  | 52.7704   | 23.8367   | 37.0403   | -7.3637  |
| 4     | 44.5670    | -24.3602  | 41.0418   | -15.4519  | 41.9034   | 5.1468   |
| 5     | 99.5510    | -30.2179  | 26.5891   | -47.1580  | 47.2394   | 18.1748  |
| 6     | 143.5506   | -36.5332  | 11.6449   | -99.1036  | 54.6867   | 35.7420  |
| 7     | 204.4429   | -44.9215  | -7.8662   | -148.3951 | 63.4753   | 56.0225  |
| 8     | 259.5001   | -54.6570  | -30.0020  | -188.1545 | 73.5981   | 78.9625  |
| 9     | 301.8793   | -65.6915  | -54.9754  | -210.8366 | 84.9304   | 104.0375 |
| 10    | 324.5361   | -77.9082  | -81.8561  | -208.3743 | 95.7436   | 127.1956 |
| 11    | 319.0562   | -89.6037  | -107.0167 | -158.0591 | 108.8872  | 157.0928 |
| 12    | 263.5323   | -103.5663 | -138.8216 | -93.7195  | 122.9969  | 188.5381 |
| 13    | 191.6232   | -118.4606 | -172.2099 | 8.0928    | 137.9508  | 222.2005 |
| 14    | 80.4331    | -134.1717 | -207.8607 | 150.5873  | 153.7106  | 258.1043 |
| 15    | -73.2557   | -150.6433 | -245.7285 | 336.5124  | 168.6917  | 292.3192 |
| 16    | -271.8029  | -166.2968 | -281.6638 | 578.9544  | 185.6830  | 332.3882 |
| 17    | -527.4266  | -183.9080 | -324.5220 | 856.9479  | 203.4720  | 375.4361 |
| 18    | -820.0126  | -202.2628 | -368.5198 | 1184.4464 | 221.8169  | 419.7802 |
| 19    | -1161.8912 | -221.1214 | -415.4220 | 1561.1909 | 240.6440  | 466.9063 |
| 20    | -1553.3372 | -240.4198 | -464.5552 | 1995.1335 | 233.5185  | 460.6523 |
| 21    | 143.7566   | -31.3042  | 18.0337   | -250.7190 | 31.1780   | -19.9672 |
| 22    | 262.9507   | -11.9908  | 67.9367   | -213.1827 | 32.2433   | -14.4703 |
| 23    | 248.2110   | -13.8647  | 60.0956   | -194.2264 | 34.1157   | -6.6318  |
| 24    | 251.3353   | -16.6458  | 49.5858   | -191.0977 | 36.8968   | 3.8768   |
| 25    | 268.8490   | -20.4098  | 36.5385   | -224.6927 | 41.6450   | 33.5717  |
| 26    | 320.9590   | -26.2049  | 4.4836    | -274.3783 | 48.0205   | 53.1894  |
| 27    | 386.4684   | -33.6907  | -17.5784  | -323.9822 | 55.6973   | 75.8803  |
| 28    | 448.7486   | -42.5197  | -42.9348  | -366.6001 | 64.7133   | 101.6024 |
| 29    | 500.6112   | -52.7098  | -71.0452  | -414.3903 | 76.2219   | 132.7758 |
| 30    | 553.8659   | -65.4242  | -104.5784 | -420.3348 | 88.0568   | 163.8568 |
| 31    | 561.2469   | -78.4654  | -138.4926 | -396.5379 | 101.2549  | 197.9547 |
| 32    | 535.3202   | -92.8748  | -174.6719 | -335.7284 | 115.7999  | 234.3100 |
| 33    | 468.2020   | -108.5962 | -213.7730 | -246.2443 | 133.0998  | 277.0488 |
| 34    | 368.9315   | -127.0498 | -259.0350 | -88.0595  | 150.2670  | 319.2737 |
| 35    | 197.7895   | -145.3336 | -303.7709 | 127.5752  | 168.6421  | 364.1773 |
| 36    | -33.8460   | -164.7725 | -351.2614 | 394.5525  | 188.2514  | 411.6940 |
| 37    | -319.5160  | -185.3956 | -401.0399 | 743.3895  | 210.3642  | 466.0705 |
| 38    | -688.1594  | -208.4267 | -458.7594 | 1163.3032 | 231.9153  | 520.0024 |
| 39    | -1129.8544 | -230.8088 | -514.0820 | 1658.2173 | 254.3151  | 575.5960 |
| 40    | -1646.4125 | -253.9647 | -573.2493 | 2229.0637 | 252.5679  | 575.7576 |
| 41    | 325.4036   | -36.5909  | 8.1782    | -475.7122 | 37.9876   | -18.6492 |
| 42    | 488.7949   | -18.8273  | 66.6577   | -423.6522 | 39.0775   | -13.2117 |
| 43    | 459.9159   | -20.7386  | 58.8171   | -390.4479 | 40.9942   | -5.3544  |
| 44    | 448.9980   | -23.5719  | 48.3854   | -373.1850 | 43.8208   | 5.0658   |
| 45    | 452.4722   | -27.3913  | 35.3278   | -368.0688 | 47.6399   | 18.1184  |
| 46    | 465.8783   | -32.2690  | 20.0132   | -397.1737 | 53.6441   | 54.7497  |
| 47    | 510.7805   | -39.3727  | -19.1914  | -435.9060 | 61.4035   | 77.5130  |
| 48    | 562.0516   | -48.2859  | -44.4794  | -467.2790 | 70.4955   | 103.1231 |
| 49    | 602.5060   | -58.5555  | -72.5371  | -503.4822 | 82.0848   | 134.3090 |
| 50    | 643.9548   | -71.3530  | -106.3684 | -497.2428 | 94.0023   | 165.6279 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 639.1651   | -84.4811  | -139.9239 | -460.9786 | 107.2754  | 199.3808 |
| 52    | 600.2942   | -98.9449  | -176.4058 | -387.0939 | 121.8871  | 236.0828 |
| 53    | 520.1625   | -114.7482 | -215.4166 | -284.4394 | 139.2586  | 278.5937 |
| 54    | 407.5497   | -133.2675 | -260.5036 | -112.6069 | 156.4914  | 320.7381 |
| 55    | 222.4319   | -151.6140 | -305.2035 | 117.0618  | 174.9241  | 365.6700 |
| 56    | -23.4441   | -171.0989 | -352.6529 | 398.3568  | 194.5674  | 413.0901 |
| 57    | -322.9926  | -191.7274 | -402.8984 | 761.1963  | 216.6900  | 467.9012 |
| 58    | -706.3844  | -214.7699 | -459.8569 | 1195.7736 | 238.2537  | 521.1358 |
| 59    | -1162.1283 | -237.1662 | -515.9424 | 1704.6453 | 260.6618  | 577.4501 |
| 60    | -1692.8633 | -260.3097 | -575.1391 | 2289.6423 | 258.9182  | 577.3234 |
| 61    | 394.5855   | -38.4280  | 7.4287    | -544.8269 | 39.9670   | -18.1664 |
| 62    | 557.9830   | -20.8088  | 66.3319   | -488.3878 | 41.0576   | -12.8980 |
| 63    | 524.7604   | -22.7214  | 58.5286   | -450.8358 | 42.9760   | -5.0709  |
| 64    | 509.5198   | -25.5601  | 48.1249   | -429.2440 | 45.8078   | 5.3225   |
| 65    | 508.6792   | -29.3855  | 35.0824   | -419.7954 | 49.6336   | 18.3646  |
| 66    | 517.7819   | -34.2570  | 19.6813   | -442.2435 | 55.5320   | 55.0957  |
| 67    | 555.9929   | -41.2805  | -19.3925  | -476.8645 | 63.3138   | 77.7065  |
| 68    | 603.1514   | -50.1956  | -44.7813  | -504.0454 | 72.4145   | 103.4612 |
| 69    | 639.3104   | -60.4986  | -72.9293  | -536.0098 | 84.0226   | 134.6704 |
| 70    | 676.5683   | -73.2989  | -106.5747 | -525.5049 | 95.9438   | 165.8007 |
| 71    | 667.4548   | -86.4190  | -140.0502 | -484.9315 | 109.2160  | 199.4965 |
| 72    | 624.2607   | -100.8998 | -176.4997 | -406.6708 | 123.8372  | 236.1931 |
| 73    | 539.7391   | -116.6992 | -215.5929 | -299.5437 | 141.2066  | 278.7938 |
| 74    | 422.7057   | -135.2037 | -260.6549 | -123.3990 | 158.4248  | 320.8775 |
| 75    | 233.0821   | -153.5502 | -305.3527 | 110.6362  | 176.8530  | 365.8088 |
| 76    | -16.8773   | -173.0156 | -352.8620 | 396.3393  | 196.4980  | 413.3010 |
| 77    | -321.0811  | -193.6691 | -403.0402 | 763.3510  | 218.6206  | 468.0187 |
| 78    | -708.6148  | -216.7014 | -459.7995 | 1202.4883 | 240.1886  | 521.1043 |
| 79    | -1168.7241 | -239.1000 | -516.2452 | 1715.5391 | 262.5936  | 577.7498 |
| 80    | -1703.7505 | -262.2376 | -575.4430 | 2304.8604 | 260.8265  | 577.6296 |
| 81    | 406.7690   | -38.3666  | 7.4524    | -557.4242 | 39.9011   | -18.2138 |
| 82    | 570.5885   | -20.7388  | 66.2566   | -501.1244 | 40.9933   | -12.7993 |
| 83    | 537.4993   | -22.6648  | 58.3764   | -463.7328 | 42.9129   | -4.9417  |
| 84    | 522.4016   | -25.4976  | 48.1562   | -442.2678 | 45.7444   | 5.2875   |
| 85    | 521.7127   | -29.3164  | 35.0020   | -432.9530 | 49.5704   | 18.4556  |
| 86    | 530.8997   | -34.2061  | 19.8499   | -455.3769 | 55.4660   | 54.9105  |
| 87    | 569.0951   | -41.2036  | -19.6308  | -490.1300 | 63.2363   | 77.9635  |
| 88    | 616.4435   | -50.1319  | -44.7666  | -517.5103 | 72.3516   | 103.3918 |
| 89    | 652.8416   | -60.4290  | -72.6371  | -549.6491 | 83.9592   | 134.3683 |
| 90    | 690.1773   | -73.2307  | -106.3918 | -539.2432 | 95.8785   | 165.6872 |
| 91    | 681.1093   | -86.3750  | -140.2380 | -498.6606 | 109.1735  | 199.6732 |
| 92    | 638.1456   | -100.8428 | -176.2928 | -420.6117 | 123.7821  | 235.9640 |
| 93    | 553.4844   | -116.6285 | -215.5655 | -313.5307 | 141.1322  | 278.8241 |
| 94    | 436.6312   | -135.1482 | -260.7038 | -137.5780 | 158.3620  | 320.8907 |
| 95    | 247.4160   | -153.4678 | -305.3496 | 96.3462   | 176.7805  | 365.8041 |
| 96    | -2.6922    | -172.9535 | -352.8283 | 381.7439  | 196.4217  | 413.2581 |
| 97    | -306.5398  | -193.5865 | -402.8942 | 748.7500  | 218.5412  | 467.8941 |
| 98    | -693.7688  | -216.6115 | -460.1622 | 1187.5977 | 240.1061  | 521.4533 |
| 99    | -1154.1464 | -239.0243 | -515.7862 | 1700.6440 | 262.5118  | 577.2932 |
| 100   | -1688.7017 | -262.1596 | -575.5245 | 2289.6191 | 260.7551  | 577.7227 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | 394.5063   | -36.6907  | 7.4964    | -548.9088 | 38.2318   | -18.2637 |
| 102   | 562.0884   | -19.0759  | 66.1060   | -496.3917 | 39.3247   | -12.6628 |
| 103   | 532.7581   | -20.9958  | 58.4006   | -462.7458 | 41.2435   | -4.9674  |
| 104   | 521.4362   | -23.8239  | 48.0653   | -445.0334 | 44.0779   | 5.3968   |
| 105   | 524.4816   | -27.6501  | 35.0107   | -439.4660 | 47.9039   | 18.4475  |
| 106   | 537.4490   | -32.5359  | 19.7444   | -465.6517 | 53.8034   | 55.0252  |
| 107   | 579.3554   | -39.5498  | -19.4791  | -504.1571 | 61.5784   | 77.7776  |
| 108   | 630.4422   | -48.4750  | -44.6856  | -535.2119 | 70.6959   | 103.3606 |
| 109   | 670.4846   | -58.7678  | -72.9438  | -570.9896 | 82.3002   | 134.6996 |
| 110   | 711.5413   | -71.5854  | -106.4466 | -564.3356 | 94.2290   | 165.6912 |
| 111   | 706.1838   | -84.7089  | -140.2298 | -527.4807 | 107.5064  | 199.6943 |
| 112   | 666.8503   | -99.2014  | -176.4503 | -453.0536 | 122.1412  | 236.1203 |
| 113   | 585.9343   | -115.0118 | -215.6177 | -349.5753 | 139.5292  | 278.8364 |
| 114   | 472.6124   | -133.5574 | -260.6829 | -177.1226 | 156.7801  | 320.8607 |
| 115   | 286.8768   | -151.9020 | -305.2920 | 53.4026   | 175.2174  | 365.7538 |
| 116   | 40.1473    | -171.4045 | -352.7583 | 335.4741  | 194.8678  | 413.2046 |
| 117   | -260.5128  | -192.0248 | -402.6951 | 699.1129  | 216.9762  | 467.6945 |
| 118   | -644.2426  | -215.0673 | -459.9536 | 1134.4065 | 238.5541  | 521.2390 |
| 119   | -1100.7130 | -237.4650 | -516.3287 | 1643.8888 | 260.9587  | 577.8060 |
| 120   | -1632.4283 | -260.6040 | -574.4913 | 2229.8804 | 259.1663  | 576.6990 |
| 121   | 324.9474   | -29.5255  | 3.0188    | -496.0584 | 31.0924   | -13.7726 |
| 122   | 509.3190   | -11.9468  | 61.6240   | -459.6592 | 32.1969   | -8.1782  |
| 123   | 496.1266   | -13.8859  | 53.8954   | -442.1081 | 34.1343   | -0.4533  |
| 124   | 500.8755   | -16.7444  | 43.3684   | -440.4232 | 36.9936   | 10.0800  |
| 125   | 519.8965   | -20.5985  | 30.4716   | -450.7475 | 40.8528   | 22.9816  |
| 126   | 548.6679   | -25.5234  | 15.2272   | -492.6006 | 46.7971   | 59.5664  |
| 127   | 606.0860   | -32.5893  | -24.2067  | -546.4926 | 54.6260   | 82.4989  |
| 128   | 672.4717   | -41.5701  | -49.2245  | -592.6608 | 63.8020   | 107.8837 |
| 129   | 727.4430   | -51.9350  | -77.4506  | -643.0844 | 75.4933   | 139.2356 |
| 130   | 782.9157   | -64.8372  | -111.1569 | -650.7413 | 87.4937   | 170.3679 |
| 131   | 791.8255   | -78.0464  | -144.5173 | -627.8010 | 100.8676  | 203.9883 |
| 132   | 765.9863   | -92.6367  | -181.0362 | -566.7786 | 115.5815  | 240.7235 |
| 133   | 698.5171   | -108.5153 | -220.1017 | -476.3907 | 133.0484  | 283.3141 |
| 134   | 598.0678   | -127.1208 | -265.1868 | -316.6710 | 150.3636  | 325.4315 |
| 135   | 424.9655   | -145.5670 | -309.8640 | -98.8340  | 168.8868  | 370.3025 |
| 136   | 191.0763   | -165.1270 | -357.2830 | 170.6555  | 188.6035  | 417.7115 |
| 137   | -97.0125   | -185.8300 | -407.2090 | 521.7654  | 210.7871  | 472.2142 |
| 138   | -468.0344  | -208.9085 | -464.4198 | 944.3539  | 232.3944  | 525.7098 |
| 139   | -911.6086  | -231.3277 | -520.3948 | 1440.6508 | 254.8102  | 581.8787 |
| 140   | -1429.3308 | -254.4699 | -579.0353 | 2012.6699 | 252.9484  | 581.7816 |
| 141   | 131.1790   | -12.8502  | -26.9131  | -352.1630 | 10.2977   | 4.8946   |
| 142   | 361.2753   | 5.2111    | 33.2527   | -356.0755 | 10.9911   | 9.5207   |
| 143   | 380.6972   | 3.9946    | 26.4737   | -373.3130 | 12.2021   | 16.2752  |
| 144   | 413.1972   | 2.2243    | 18.2285   | -402.6087 | 13.9842   | 24.5421  |
| 145   | 457.1042   | -0.1901   | 7.6676    | -442.1896 | 16.3853   | 35.0819  |
| 146   | 510.4138   | -3.2502   | -4.6074   | -489.9793 | 19.4499   | 47.3686  |
| 147   | 570.6223   | -7.0118   | -19.0167  | -549.4292 | 23.4725   | 85.1041  |
| 148   | 640.8887   | -11.8065  | -58.5024  | -643.0590 | 29.7582   | 106.7774 |
| 149   | 743.4995   | -18.8962  | -82.0203  | -733.9985 | 37.0728   | 130.9739 |
| 150   | 841.2123   | -26.9990  | -108.4156 | -797.2758 | 44.2651   | 154.3778 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 151   | 908.9703  | -35.0900  | -133.4334 | -868.4418 | 53.5951   | 182.8332 |
| 152   | 981.8687  | -45.3063  | -163.8240 | -921.9366 | 64.0156   | 213.4993 |
| 153   | 1034.2693 | -56.6081  | -196.7012 | -952.1261 | 75.5311   | 246.6820 |
| 154   | 1060.4198 | -69.1362  | -231.8596 | -953.0606 | 88.2784   | 282.0325 |
| 155   | 1054.3047 | -82.8125  | -268.4751 | -904.6066 | 100.5476  | 314.9653 |
| 156   | 995.2986  | -96.0265  | -303.6165 | -831.0772 | 115.4692  | 354.2467 |
| 157   | 907.5798  | -111.9567 | -345.4814 | -710.0026 | 131.5805  | 396.3932 |
| 158   | 769.3831  | -129.0467 | -389.0372 | -535.5040 | 148.8645  | 440.1793 |
| 159   | 573.8713  | -147.3390 | -434.8538 | -301.0088 | 167.3284  | 486.2730 |
| 160   | 314.8325  | -166.8097 | -482.9740 | 0.0446    | 184.9757  | 530.1846 |

ENVOLVENTE MINIMOS TORSORES TREN IPF-B, l=15 m, via 1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0036   | 16.3357   | 39.1468   | -17.6306  | -0.0325   | 4.2285   |
| 2     | 44.0458   | 14.7105   | 33.3644   | -69.0648  | 2.0093    | 11.2296  |
| 3     | 118.2748  | 11.6662   | 24.4491   | -146.6332 | 5.4737    | 20.9569  |
| 4     | 215.0323  | 7.1949    | 12.7800   | -242.7002 | 10.3483   | 33.4094  |
| 5     | 326.8038  | 1.3380    | -1.6701   | -331.2016 | 15.6835   | 46.4341  |
| 6     | 427.5588  | -4.9728   | -16.4858  | -439.9285 | 23.1263   | 63.8736  |
| 7     | 545.2736  | -13.3637  | -36.0002  | -546.0396 | 31.9175   | 84.1574  |
| 8     | 656.1018  | -23.2086  | -57.8288  | -641.3615 | 42.1497   | 106.7892 |
| 9     | 756.1064  | -34.1890  | -83.0036  | -721.7563 | 53.4279   | 132.0660 |
| 10    | 825.3533  | -47.0552  | -109.4376 | -745.0731 | 64.8171   | 155.4100 |
| 11    | 855.7617  | -58.6643  | -135.2782 | -769.9744 | 78.0213   | 184.7227 |
| 12    | 872.8413  | -72.8177  | -166.1835 | -758.3675 | 92.2483   | 215.8996 |
| 13    | 856.1019  | -87.7289  | -199.5614 | -711.7041 | 107.2191  | 249.5543 |
| 14    | 772.9004  | -104.6311 | -234.9019 | -595.0683 | 124.1700  | 285.1461 |
| 15    | 653.8505  | -121.8256 | -272.5157 | -430.8113 | 139.6908  | 319.1306 |
| 16    | 516.9987  | -136.5029 | -308.7529 | -274.8103 | 156.0723  | 359.4506 |
| 17    | 296.4181  | -155.3384 | -350.6517 | -18.3126  | 174.9025  | 401.5656 |
| 18    | 58.5956   | -173.5784 | -394.9425 | 254.1980  | 193.1325  | 446.2050 |
| 19    | -235.1894 | -192.5388 | -441.5290 | 583.0479  | 212.0614  | 493.0147 |
| 20    | -575.1799 | -211.8421 | -490.2362 | 965.5229  | 204.9408  | 486.3326 |
| 21    | -900.2211 | 20.8317   | -22.4367  | 796.6884  | -24.6158  | 25.8320  |
| 22    | -784.5050 | 43.8096   | 21.8137   | 687.2081  | -22.8578  | 33.1109  |
| 23    | -652.2200 | 41.2522   | 12.0086   | 556.9561  | -20.1162  | 43.4894  |
| 24    | -499.8454 | 37.5863   | -0.5359   | 409.6485  | -16.2591  | 56.6479  |
| 25    | -331.8978 | 32.7456   | -16.2337  | 232.6689  | -10.5130  | 74.8749  |
| 26    | -136.3817 | 25.9500   | -37.1021  | 65.6173   | -4.1344   | 94.7755  |
| 27    | 46.4654   | 18.4532   | -59.3774  | -101.2924 | 3.5534    | 117.6791 |
| 28    | 226.0713  | 9.6272    | -84.7356  | -261.2480 | 12.5664   | 143.4034 |
| 29    | 395.1874  | -0.5702   | -112.8811 | -426.2941 | 24.0823   | 174.6115 |
| 30    | 565.6081  | -13.3038  | -146.4077 | -549.3639 | 35.9364   | 205.6843 |
| 31    | 690.4853  | -26.3265  | -180.3648 | -643.0691 | 49.1160   | 239.8267 |
| 32    | 772.9893  | -41.3440  | -216.3055 | -689.3476 | 64.2691   | 275.9420 |
| 33    | 821.8184  | -57.0566  | -255.4031 | -715.8313 | 81.5602   | 318.6795 |
| 34    | 838.5205  | -75.5025  | -300.6606 | -673.6314 | 98.7197   | 360.8984 |
| 35    | 760.4958  | -94.8496  | -345.0369 | -548.7178 | 118.1581  | 405.4418 |
| 36    | 616.2268  | -115.3921 | -392.1114 | -354.7643 | 138.7764  | 452.7908 |
| 37    | 433.2156  | -135.7953 | -442.3479 | -132.6060 | 160.8585  | 507.1331 |
| 38    | 180.9976  | -159.1694 | -499.0373 | 183.3395  | 182.6580  | 560.2803 |
| 39    | -149.6620 | -181.5450 | -554.6297 | 567.1629  | 205.0513  | 616.1444 |
| 40    | -557.7433 | -204.7768 | -613.1199 | 1029.7167 | 203.3800  | 615.6275 |
| 41    | -963.8499 | 22.4861   | -36.2711  | 854.0162  | -26.3437  | 31.5876  |
| 42    | -840.9166 | 45.5033   | 16.0164   | 738.5625  | -24.5124  | 38.8733  |
| 43    | -702.2820 | 42.8535   | 6.3800    | 602.3455  | -21.6764  | 49.1179  |
| 44    | -543.7791 | 39.0980   | -6.3319   | 449.3143  | -17.7407  | 62.4327  |
| 45    | -370.0244 | 34.1711   | -22.0385  | 266.5777  | -11.8995  | 80.6587  |
| 46    | -168.7362 | 27.2642   | -42.9164  | 94.4926   | -5.4284   | 100.5894 |
| 47    | 19.1323   | 19.7044   | -65.2011  | -77.1940  | 2.3264    | 123.5209 |
| 48    | 203.3510  | 10.7867   | -90.5878  | -241.4535 | 11.4229   | 149.2321 |
| 49    | 376.7009  | 0.5175    | -118.7226 | -410.6007 | 23.0118   | 180.4913 |
| 50    | 551.0748  | -12.2795  | -152.5541 | -537.2932 | 34.9288   | 211.8102 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 51    | 678.9345  | -25.4321  | -186.0820 | -633.6041 | 48.2264   | 245.5388 |
| 52    | 772.9222  | -39.8999  | -222.5635 | -692.5694 | 62.8421   | 282.2410 |
| 53    | 815.8637  | -56.2722  | -261.3888 | -711.7025 | 80.7826   | 324.5647 |
| 54    | 832.8831  | -74.8884  | -306.3302 | -669.3255 | 98.1123   | 366.5648 |
| 55    | 754.3342  | -94.3818  | -350.8776 | -543.5933 | 117.6919  | 411.3449 |
| 56    | 637.2081  | -113.8711 | -398.3240 | -379.1814 | 137.2511  | 459.0084 |
| 57    | 431.8977  | -135.2729 | -448.2828 | -132.4265 | 160.3241  | 513.0403 |
| 58    | 187.2340  | -158.4086 | -505.0536 | 175.3691  | 181.8924  | 566.3322 |
| 59    | -145.0442 | -180.9139 | -560.7904 | 560.9882  | 204.4095  | 622.2987 |
| 60    | -551.3612 | -204.1274 | -619.2729 | 1021.7275 | 202.7359  | 621.4575 |
| 61    | -901.6130 | 20.6006   | -36.7433  | 795.9082  | -24.4318  | 31.7800  |
| 62    | -784.9225 | 43.6633   | 15.6639   | 686.6231  | -22.6714  | 39.2373  |
| 63    | -650.2344 | 41.0087   | 6.0316    | 554.3653  | -19.8319  | 49.4577  |
| 64    | -501.0707 | 37.4473   | -6.6540   | 410.2426  | -16.0898  | 62.7483  |
| 65    | -330.8119 | 32.5162   | -22.3468  | 230.9974  | -10.2430  | 80.9587  |
| 66    | -141.3585 | 25.9738   | -43.1334  | 69.9684   | -4.1288   | 100.8234 |
| 67    | 23.3333   | 19.3297   | -65.4601  | -80.5866  | 2.7036    | 123.7738 |
| 68    | 206.8675  | 10.4101   | -90.8449  | -244.1334 | 11.8088   | 149.5271 |
| 69    | 379.4122  | 0.1041    | -119.0661 | -412.4388 | 23.4199   | 180.8066 |
| 70    | 552.8931  | -12.7020  | -152.7563 | -538.1744 | 35.3469   | 211.9766 |
| 71    | 678.4708  | -25.9562  | -186.2187 | -631.9820 | 48.7532   | 245.6656 |
| 72    | 771.3105  | -40.4426  | -222.6668 | -689.7403 | 63.3800   | 282.3622 |
| 73    | 817.7328  | -56.5294  | -261.6668 | -712.9433 | 81.0368   | 324.8685 |
| 74    | 823.6473  | -75.6770  | -306.4706 | -658.2949 | 98.8981   | 366.6940 |
| 75    | 781.8997  | -93.3798  | -351.2005 | -573.4993 | 116.6826  | 411.6580 |
| 76    | 623.2112  | -114.6856 | -398.4408 | -363.1905 | 138.0778  | 459.1258 |
| 77    | 432.4699  | -135.4781 | -448.4347 | -132.7425 | 160.5198  | 513.1686 |
| 78    | 190.3201  | -158.5001 | -505.2026 | 172.5878  | 181.9873  | 566.5068 |
| 79    | -142.1149 | -181.0090 | -561.0032 | 558.2244  | 204.5026  | 622.5075 |
| 80    | -548.5519 | -204.2117 | -619.4777 | 1019.1138 | 202.8006  | 621.6646 |
| 81    | -879.0322 | 19.6570   | -36.9026  | 775.4258  | -23.5058  | 31.9219  |
| 82    | -764.3876 | 42.7278   | 15.7217   | 668.1715  | -21.7288  | 39.1761  |
| 83    | -631.7828 | 40.0540   | 6.1117    | 538.0771  | -18.8820  | 49.3746  |
| 84    | -490.3618 | 36.6889   | -6.7225   | 401.2469  | -15.3309  | 62.8185  |
| 85    | -314.5366 | 31.4832   | -22.3150  | 217.0434  | -9.2027   | 80.9399  |
| 86    | -166.4178 | 26.5433   | -43.2291  | 93.7551   | -4.7062   | 100.9004 |
| 87    | 20.1004   | 18.9591   | -65.4681  | -76.5160  | 3.0736    | 123.8006 |
| 88    | 196.4496  | 10.3613   | -90.8627  | -233.6275 | 11.8584   | 149.4880 |
| 89    | 367.0940  | 0.1802    | -118.9140 | -400.2653 | 23.3500   | 180.6462 |
| 90    | 540.7880  | -12.6232  | -152.6705 | -526.2194 | 35.2710   | 211.9661 |
| 91    | 668.0848  | -25.7641  | -186.5151 | -622.0059 | 48.5626   | 245.9515 |
| 92    | 761.4902  | -40.2271  | -222.4513 | -680.3694 | 63.1664   | 282.1237 |
| 93    | 813.2562  | -56.0166  | -261.8112 | -709.6628 | 80.5203   | 325.0684 |
| 94    | 832.7730  | -74.5318  | -306.7005 | -670.0860 | 97.7456   | 366.8910 |
| 95    | 760.0010  | -93.7643  | -351.1675 | -550.5865 | 117.0770  | 411.6220 |
| 96    | 635.3115  | -113.6243 | -398.4618 | -377.8707 | 137.0021  | 459.1389 |
| 97    | 450.5134  | -134.2666 | -448.5157 | -153.4300 | 159.3117  | 513.2698 |
| 98    | 205.8224  | -157.4733 | -505.2275 | 154.8957  | 180.9679  | 566.5194 |
| 99    | -121.4433 | -179.8892 | -560.9152 | 534.9232  | 203.3767  | 622.4211 |
| 100   | -525.0794 | -203.0955 | -619.5300 | 993.1157  | 201.6909  | 621.7279 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 101   | -875.5591 | 19.5688   | -36.9716  | 772.1643  | -23.4121  | 31.9648  |
| 102   | -758.9828 | 42.5645   | 15.8841   | 663.1592  | -21.5708  | 38.9998  |
| 103   | -626.7652 | 39.8954   | 6.1004    | 533.4124  | -18.7232  | 49.3918  |
| 104   | -477.7958 | 36.2552   | -6.6034   | 389.6448  | -14.8897  | 62.7182  |
| 105   | -310.1959 | 31.3195   | -22.3068  | 213.0742  | -9.0388   | 80.9377  |
| 106   | -162.6965 | 26.3945   | -43.1579  | 90.3591   | -4.5504   | 100.8436 |
| 107   | 23.2173   | 18.8101   | -65.4556  | -79.2979  | 3.2185    | 123.7559 |
| 108   | 196.5745  | 10.3517   | -90.8031  | -233.7121 | 11.8692   | 149.4784 |
| 109   | 368.2721  | 0.1054    | -119.0638 | -401.2575 | 23.4270   | 180.8190 |
| 110   | 538.9642  | -12.5240  | -152.6722 | -524.6503 | 35.1676   | 211.9181 |
| 111   | 666.5000  | -25.6449  | -186.4577 | -620.6947 | 48.4424   | 245.9257 |
| 112   | 759.9814  | -40.1291  | -222.6211 | -679.0863 | 63.0689   | 282.2882 |
| 113   | 811.9716  | -55.9386  | -261.7858 | -708.5168 | 80.4560   | 325.0029 |
| 114   | 831.5453  | -74.4831  | -306.6274 | -668.9625 | 97.7058   | 366.8034 |
| 115   | 778.7348  | -92.8246  | -351.0637 | -571.4002 | 116.1400  | 411.5249 |
| 116   | 664.9612  | -112.3249 | -398.3600 | -410.3971 | 135.7010  | 459.0505 |
| 117   | 485.3550  | -132.8536 | -448.5377 | -191.5215 | 157.8922  | 513.2928 |
| 118   | 246.4085  | -155.9828 | -505.2483 | 110.8068  | 179.4696  | 566.5339 |
| 119   | -77.0818  | -178.3776 | -560.9857 | 487.3048  | 201.8713  | 622.4631 |
| 120   | -475.8487 | -201.5192 | -619.1426 | 940.3597  | 200.0815  | 621.3507 |
| 121   | -876.6768 | 19.7281   | -37.0344  | 772.7448  | -23.5968  | 32.0668  |
| 122   | -759.4825 | 42.7428   | 15.7742   | 663.2108  | -21.7423  | 39.1106  |
| 123   | -629.9425 | 40.1592   | 5.9925    | 535.9705  | -18.9776  | 49.4892  |
| 124   | -477.2030 | 36.3688   | -6.5714   | 388.7974  | -14.9970  | 62.6733  |
| 125   | -313.0968 | 31.5383   | -22.3794  | 215.5074  | -9.2385   | 81.0127  |
| 126   | -162.5903 | 26.4618   | -43.2278  | 90.1618   | -4.6042   | 100.9226 |
| 127   | 23.3189   | 18.8038   | -65.5296  | -79.3003  | 3.2329    | 123.8216 |
| 128   | 192.7517  | 10.4700   | -90.8608  | -230.0464 | 11.7619   | 149.5195 |
| 129   | 364.6279  | 0.1222    | -119.0893 | -397.4070 | 23.4361   | 180.8749 |
| 130   | 535.9811  | -12.6904  | -152.8671 | -521.1154 | 35.3469   | 212.0761 |
| 131   | 661.9968  | -25.8767  | -186.3128 | -615.3936 | 48.6979   | 245.7857 |
| 132   | 753.6058  | -40.4680  | -222.8310 | -671.7431 | 63.4128   | 282.5191 |
| 133   | 803.4190  | -56.3382  | -261.8617 | -698.6934 | 80.8713   | 325.0747 |
| 134   | 820.3829  | -74.9438  | -306.8717 | -656.4184 | 98.1866   | 367.1153 |
| 135   | 764.7260  | -93.3927  | -351.4496 | -555.9827 | 116.7125  | 411.8873 |
| 136   | 648.2511  | -112.9495 | -398.5894 | -392.1126 | 136.3359  | 459.2638 |
| 137   | 465.7566  | -133.5662 | -448.7565 | -170.1750 | 158.6134  | 513.5144 |
| 138   | 223.9214  | -156.7318 | -505.4895 | 134.9802  | 180.2177  | 566.7808 |
| 139   | -102.2232 | -179.1494 | -561.2331 | 513.8819  | 202.6319  | 622.7178 |
| 140   | -502.5970 | -202.2994 | -619.5553 | 968.5377  | 200.7779  | 622.3020 |
| 141   | -898.6735 | 15.7527   | -52.9840  | 823.0431  | -24.0593  | 37.4892  |
| 142   | -817.4514 | 39.6693   | 0.2408    | 739.1475  | -22.8038  | 43.8593  |
| 143   | -711.1916 | 37.6865   | -7.4662   | 632.1327  | -20.6474  | 52.3052  |
| 144   | -599.7125 | 35.3228   | -18.5506  | 520.9133  | -18.0805  | 64.2030  |
| 145   | -466.4125 | 31.8784   | -31.9426  | 407.6437  | -15.0906  | 76.4138  |
| 146   | -364.5228 | 29.1524   | -46.2596  | 292.9539  | -11.6150  | 93.0275  |
| 147   | -212.3196 | 24.0251   | -64.6778  | 147.5031  | -6.2801   | 112.2195 |
| 148   | -79.2195  | 18.9323   | -85.8777  | 21.7397   | -0.9806   | 134.1526 |
| 149   | 68.3353   | 12.3353   | -109.6798 | -115.0531 | 5.8413    | 158.6306 |
| 150   | 222.2613  | 4.2165    | -136.0734 | -234.5099 | 13.0496   | 182.0378 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 341.0150 | -3.5632   | -161.3318 | -357.2504 | 22.0683   | 210.7331 |
| 152   | 470.6389 | -13.7678  | -191.9120 | -467.4748 | 32.4771   | 241.5856 |
| 153   | 579.8061 | -25.0913  | -224.7892 | -554.3900 | 44.0143   | 274.7699 |
| 154   | 662.6812 | -37.5847  | -259.9427 | -612.1143 | 56.7269   | 310.1168 |
| 155   | 713.2950 | -51.2413  | -296.8194 | -620.4158 | 68.9764   | 343.3085 |
| 156   | 711.1083 | -64.4533  | -332.0764 | -603.7304 | 83.8960   | 382.7075 |
| 157   | 680.2410 | -80.3815  | -373.8485 | -539.4849 | 100.0053  | 424.7606 |
| 158   | 598.8672 | -97.4734  | -417.4759 | -421.8287 | 117.2912  | 468.6187 |
| 159   | 460.2092 | -115.7686 | -463.3358 | -244.1601 | 135.7580  | 514.7545 |
| 160   | 257.9984 | -135.2416 | -511.4789 | 0.0468    | 153.4076  | 558.6890 |

ENVOLVENTE MAXIMOS FLECTORES TREN IPF-B, l=30 m, via 2

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0480    | 159.9464  | -623.8378 | -270.9364  | -140.7470 | 569.6028  |
| 2     | 334.7831  | 176.2217  | -543.8194 | -630.7805  | -154.0218 | 481.0757  |
| 3     | 630.9380  | 154.0248  | -480.8608 | -888.3124  | -131.8169 | 418.0645  |
| 4     | 888.4102  | 131.7939  | -417.8345 | -1107.1460 | -109.9200 | 356.9387  |
| 5     | 1107.1532 | 109.9223  | -356.9316 | -1287.4131 | -89.2305  | 298.3943  |
| 6     | 1287.5098 | 89.2438   | -297.9528 | -1428.5123 | -68.5477  | 239.4036  |
| 7     | 1428.5212 | 68.5538   | -239.4129 | -1530.9816 | -46.6740  | 178.3312  |
| 8     | 1531.0935 | 46.6165   | -177.4152 | -1595.0160 | -24.4067  | 114.6382  |
| 9     | 1594.9718 | 24.3781   | -115.1816 | -1620.0424 | -2.1707   | 52.4004   |
| 10    | 1620.0679 | 2.1260    | -51.3057  | -1606.6138 | 18.2301   | -5.6210   |
| 11    | 1606.6332 | -18.2179  | 5.5113    | -1554.1917 | 38.9108   | -64.0259  |
| 12    | 1554.1699 | -38.8842  | 64.5588   | -1462.9995 | 60.7104   | -125.6877 |
| 13    | 1462.9949 | -60.7237  | 125.7054  | -1333.7079 | 82.9258   | -188.4785 |
| 14    | 1333.6639 | -82.9610  | 188.9319  | -1165.4521 | 105.1675  | -251.7620 |
| 15    | 1165.3794 | -105.1527 | 252.0897  | -959.1489  | 125.4593  | -308.9534 |
| 16    | 959.2264  | -125.4608 | 308.6771  | -713.5930  | 146.1682  | -367.2024 |
| 17    | 713.4691  | -144.1420 | 358.9646  | -433.6151  | 165.9244  | -420.1559 |
| 18    | 485.5187  | -108.4477 | 276.3418  | -309.2365  | 81.8375   | -219.5050 |
| 19    | 351.3944  | -33.7181  | 101.6227  | -276.1459  | 49.9141   | -147.3766 |
| 20    | 310.6394  | -6.6934   | 37.2988   | -284.0097  | 22.8943   | -82.8593  |
| 21    | 309.3673  | -30.8920  | -23.6336  | -239.8715  | 30.8913   | 23.8427   |
| 22    | 263.2475  | -12.0437  | -71.6013  | -213.3608  | 32.2962   | 14.3878   |
| 23    | 269.7665  | 20.0469   | -152.6961 | -293.2371  | -41.6325  | 197.0123  |
| 24    | 341.4989  | 84.5808   | -311.4917 | -502.8174  | -59.7514  | 243.0919  |
| 25    | 568.1146  | 113.7588  | -399.5403 | -794.8173  | -87.7208  | 327.1963  |
| 26    | 868.7494  | 142.2061  | -364.1510 | -1160.9155 | -116.7501 | 292.8149  |
| 27    | 1161.0741 | 116.7617  | -292.2375 | -1395.3827 | -91.9928  | 223.6852  |
| 28    | 1395.3699 | 91.9883   | -223.6922 | -1571.2689 | -64.9386  | 147.9972  |
| 29    | 1571.3024 | 64.9396   | -147.5660 | -1687.6964 | -37.8536  | 71.6753   |
| 30    | 1687.7286 | 37.8584   | -70.8347  | -1745.1724 | -12.2571  | -0.7531   |
| 31    | 1745.1649 | 12.2700   | 0.2833    | -1743.5709 | 13.3509   | -71.9779  |
| 32    | 1743.5159 | -13.3842  | 73.3376   | -1682.6783 | 40.5220   | -149.4057 |
| 33    | 1682.6954 | -40.4851  | 149.4129  | -1562.0245 | 67.6165   | -225.3497 |
| 34    | 1562.0507 | -67.5684  | 225.3683  | -1382.2687 | 93.2066   | -297.2099 |
| 35    | 1382.1316 | -93.1952  | 297.8925  | -1143.1436 | 118.8447  | -369.8253 |
| 36    | 1142.9900 | -118.8336 | 370.4173  | -844.9321  | 145.9856  | -446.5101 |
| 37    | 866.0363  | -110.6685 | 405.6862  | -587.4566  | 137.2095  | -479.3903 |
| 38    | 632.4769  | -95.8917  | 356.3163  | -445.9230  | 69.0562   | -300.5796 |
| 39    | 512.2326  | -14.6132  | 153.2174  | -456.5566  | 34.8662   | -210.4431 |
| 40    | 511.9196  | 17.2244   | 72.2900   | -527.8932  | 7.3203    | -126.6908 |
| 41    | 568.2750  | -33.9361  | -20.3420  | -482.2830  | 38.2296   | 23.1569   |
| 42    | 506.7901  | -19.4165  | -70.8088  | -440.3227  | 39.6669   | 13.5812   |
| 43    | 501.2455  | 12.5279   | -151.8736 | -506.6466  | 7.7276    | 94.6331   |
| 44    | 561.5814  | 46.9682   | -241.7356 | -686.4873  | -65.7849  | 274.3745  |
| 45    | 733.2437  | 107.5251  | -397.9952 | -946.1432  | -81.4811  | 325.6548  |
| 46    | 1030.8430 | 135.4965  | -362.5140 | -1307.9738 | -110.0469 | 291.2158  |
| 47    | 1308.0482 | 110.0642  | -290.8650 | -1527.3931 | -85.2890  | 222.2993  |
| 48    | 1527.4285 | 85.3132   | -221.9651 | -1688.2891 | -58.2614  | 146.2308  |
| 49    | 1688.3370 | 58.2310   | -145.7587 | -1789.6227 | -31.1486  | 69.9883   |
| 50    | 1789.5984 | 31.1112   | -69.9901  | -1831.8195 | -5.4989   | -1.6611   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 51    | 1831.8309 | 5.4770    | 2.5610    | -1814.9253 | 20.1438   | -74.2662  |
| 52    | 1814.9304 | -20.1750  | 74.2785   | -1738.7903 | 47.3095   | -150.2795 |
| 53    | 1738.6981 | -47.3184  | 151.1349  | -1602.5951 | 74.4630   | -227.2389 |
| 54    | 1602.5106 | -74.4665  | 227.6801  | -1407.1378 | 100.1135  | -299.5214 |
| 55    | 1407.0818 | -100.1225 | 299.8248  | -1152.5889 | 125.7657  | -371.6384 |
| 56    | 1152.5908 | -125.7850 | 371.6466  | -838.8685  | 152.9311  | -447.7508 |
| 57    | 870.1476  | -104.2650 | 411.1549  | -605.9884  | 130.7856  | -484.9086 |
| 58    | 652.3274  | -89.1027  | 361.2791  | -487.2796  | 61.0824   | -305.5700 |
| 59    | 554.5137  | -6.4228   | 158.5062  | -517.2747  | 26.6740   | -215.7411 |
| 60    | 573.2511  | 25.5006   | 77.6397   | -607.8438  | -0.2390   | -131.6940 |
| 61    | 648.3455  | -35.3830  | -20.0679  | -557.4579  | 40.3947   | 23.2155   |
| 62    | 582.0875  | -21.5855  | -70.7022  | -510.7455  | 41.8341   | 13.4658   |
| 63    | 572.1172  | 10.3499   | -151.7013 | -572.6220  | 9.9045    | 94.4616   |
| 64    | 628.3409  | 44.7758   | -241.5312 | -741.2160  | -63.8689  | 274.1627  |
| 65    | 788.7225  | 105.5719  | -397.7780 | -997.2125  | -79.5189  | 325.4624  |
| 66    | 1082.4343 | 133.1191  | -362.4596 | -1354.2545 | -107.6511 | 291.1324  |
| 67    | 1354.4224 | 107.6503  | -290.4111 | -1568.3466 | -82.8706  | 221.8449  |
| 68    | 1568.3424 | 82.8512   | -221.8446 | -1723.6841 | -55.7990  | 146.1589  |
| 69    | 1723.7156 | 55.8247   | -145.7795 | -1819.5443 | -28.7568  | 69.9787   |
| 70    | 1819.5525 | 28.7413   | -69.4752  | -1856.4513 | -3.1330   | -2.2352   |
| 71    | 1856.4692 | 3.1394    | 3.1879    | -1834.3071 | 22.4748   | -74.8880  |
| 72    | 1834.3190 | -22.5040  | 74.8924   | -1752.9607 | 49.6388   | -150.8402 |
| 73    | 1752.9207 | -49.6401  | 151.3120  | -1611.5404 | 76.7781   | -227.4142 |
| 74    | 1611.4043 | -76.7540  | 228.2084  | -1410.8845 | 102.3984  | -300.0500 |
| 75    | 1410.9089 | -102.3881 | 299.9926  | -1151.3987 | 128.0245  | -371.7843 |
| 76    | 1151.2883 | -128.0246 | 372.1724  | -832.3288  | 155.1818  | -448.3414 |
| 77    | 866.9352  | -102.6521 | 411.3431  | -606.6171  | 129.1612  | -485.0400 |
| 78    | 653.1390  | -87.4540  | 361.2475  | -492.1091  | 59.3846   | -305.5203 |
| 79    | 559.4111  | -4.7231   | 158.5877  | -525.9965  | 24.9740   | -215.8276 |
| 80    | 582.0564  | 27.2069   | 77.7098   | -620.4877  | -1.9308   | -131.7570 |
| 81    | 661.0269  | -35.3075  | -19.9740  | -570.2795  | 40.3339   | 23.1367   |
| 82    | 594.9160  | -21.5203  | -70.7736  | -523.6914  | 41.7750   | 13.5315   |
| 83    | 585.0725  | 10.4004   | -151.8137 | -585.6971  | 9.8475    | 94.5844   |
| 84    | 641.4444  | 44.8173   | -241.4387 | -754.0605  | -63.9201  | 274.0663  |
| 85    | 801.4679  | 105.6327  | -397.8497 | -1010.1595 | -79.5746  | 325.4849  |
| 86    | 1093.9193 | 132.0840  | -361.9629 | -1363.3350 | -106.6301 | 290.7173  |
| 87    | 1363.2854 | 106.6526  | -291.0370 | -1574.9637 | -81.8845  | 222.4840  |
| 88    | 1575.1052 | 81.8868   | -221.6672 | -1728.2906 | -54.8232  | 145.8285  |
| 89    | 1728.3602 | 54.7844   | -144.9366 | -1821.8848 | -27.6984  | 69.1230   |
| 90    | 1821.8960 | 27.6742   | -69.1134  | -1856.3785 | -2.0649   | -2.4160   |
| 91    | 1856.3513 | 2.0092    | 2.4256    | -1831.6045 | 23.6110   | -74.1933  |
| 92    | 1831.5637 | -23.5617  | 75.6050   | -1747.8162 | 50.6889   | -151.6208 |
| 93    | 1747.8494 | -50.6440  | 151.1459  | -1604.2993 | 77.7717   | -227.1129 |
| 94    | 1604.1805 | -77.7714  | 227.9060  | -1401.4303 | 103.4090  | -299.7905 |
| 95    | 1401.3541 | -103.3844 | 300.1825  | -1139.4193 | 129.0296  | -372.0524 |
| 96    | 1139.3478 | -129.0301 | 372.3162  | -818.3742  | 156.1681  | -448.4125 |
| 97    | 853.9847  | -102.5495 | 411.1521  | -593.7645  | 129.0687  | -484.8696 |
| 98    | 640.1534  | -87.3690  | 361.4215  | -479.3221  | 59.3125   | -305.7028 |
| 99    | 546.8297  | -4.6549   | 158.3970  | -513.5889  | 24.8991   | -215.6160 |
| 100   | 569.5655  | 27.2781   | 77.6478   | -608.1564  | -1.9969   | -131.7097 |

HIPOTESIS 1 PESO PROPIO

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 51    | 1971.33  | -8.82     | 0.52    | -1890.29 | 63.24     | -0.51   |
| 52    | 1890.30  | -63.24    | 0.52    | -1686.76 | 117.65    | -0.51   |
| 53    | 1686.71  | -117.70   | 1.58    | -1360.72 | 172.12    | -1.57   |
| 54    | 1360.70  | -172.12   | 2.06    | -912.12  | 226.55    | -2.06   |
| 55    | 912.15   | -226.55   | 2.29    | -341.29  | 280.96    | -2.30   |
| 56    | 341.30   | -280.96   | 2.30    | 351.98   | 335.37    | -2.30   |
| 57    | -351.99  | -335.35   | 2.06    | 1168.11  | 389.79    | -2.06   |
| 58    | -1168.12 | -389.80   | 2.12    | 2106.18  | 444.20    | -2.12   |
| 59    | -2106.20 | -444.21   | 1.41    | 3175.21  | 505.95    | -1.41   |
| 60    | -3175.21 | -505.96   | -0.58   | 4383.06  | 567.69    | 0.58    |
| 61    | -4383.07 | 597.75    | 0.36    | 3107.59  | -536.01   | -0.36   |
| 62    | -3107.59 | 536.01    | -1.57   | 1971.09  | -474.28   | 1.57    |
| 63    | -1971.09 | 474.28    | -2.26   | 964.97   | -419.85   | 2.26    |
| 64    | -964.98  | 419.83    | -2.52   | 109.23   | -340.94   | 2.53    |
| 65    | -109.23  | 340.92    | -2.52   | -568.98  | -262.02   | 2.53    |
| 66    | 568.98   | 262.01    | -2.32   | -1097.31 | -207.58   | 2.32    |
| 67    | 1097.35  | 207.54    | -1.62   | -1503.15 | -153.12   | 1.62    |
| 68    | 1503.17  | 153.13    | -1.61   | -1786.48 | -98.71    | 1.61    |
| 69    | 1786.49  | 98.76     | -1.13   | -1947.45 | -44.36    | 1.14    |
| 70    | 1947.37  | 44.36     | -0.48   | -1985.96 | 10.05     | 0.47    |
| 71    | 1985.92  | -10.10    | 0.78    | -1902.01 | 64.51     | -0.79   |
| 72    | 1902.00  | -64.51    | 0.77    | -1695.66 | 118.93    | -0.78   |
| 73    | 1695.62  | -118.96   | 1.37    | -1366.65 | 173.39    | -1.39   |
| 74    | 1366.67  | -173.36   | 2.21    | -915.26  | 227.79    | -2.22   |
| 75    | 915.29   | -227.78   | 2.16    | -341.88  | 282.17    | -2.16   |
| 76    | 341.90   | -282.17   | 2.31    | 354.55   | 336.61    | -2.31   |
| 77    | -354.53  | -336.62   | 2.11    | 1172.92  | 391.02    | -2.10   |
| 78    | -1172.92 | -391.02   | 2.43    | 2114.02  | 445.44    | -2.43   |
| 79    | -2114.02 | -445.44   | 1.11    | 3185.74  | 507.18    | -1.11   |
| 80    | -3185.74 | -507.18   | -0.88   | 4396.30  | 568.91    | 0.88    |
| 81    | -4396.29 | 598.21    | -0.28   | 3119.81  | -536.48   | 0.27    |
| 82    | -3119.81 | 536.49    | -1.35   | 1981.93  | -474.73   | 1.35    |
| 83    | -1981.93 | 474.74    | -1.91   | 975.09   | -420.32   | 1.91    |
| 84    | -975.08  | 420.32    | -2.52   | 118.27   | -341.43   | 2.52    |
| 85    | -118.26  | 341.43    | -2.47   | -561.27  | -262.51   | 2.49    |
| 86    | 561.26   | 262.50    | -1.98   | -1090.56 | -208.10   | 1.97    |
| 87    | 1090.54  | 208.10    | -2.29   | -1497.59 | -153.68   | 2.28    |
| 88    | 1497.60  | 153.69    | -1.34   | -1782.19 | -99.27    | 1.33    |
| 89    | 1782.15  | 99.25     | -0.21   | -1944.24 | -44.83    | 0.22    |
| 90    | 1944.21  | 44.77     | -0.20   | -1983.74 | 9.65      | 0.20    |
| 91    | 1983.76  | -9.71     | -0.19   | -1900.67 | 64.13     | 0.18    |
| 92    | 1900.72  | -64.05    | 1.63    | -1695.33 | 118.48    | -1.64   |
| 93    | 1695.32  | -118.47   | 1.05    | -1367.63 | 172.88    | -1.04   |
| 94    | 1367.60  | -172.86   | 1.89    | -917.57  | 227.27    | -1.88   |
| 95    | 917.51   | -227.23   | 2.22    | -344.93  | 281.65    | -2.22   |
| 96    | 344.91   | -281.67   | 2.33    | 349.94   | 336.08    | -2.33   |
| 97    | -349.92  | -336.08   | 2.20    | 1167.40  | 390.50    | -2.19   |
| 98    | -1167.39 | -390.50   | 1.78    | 2107.59  | 444.93    | -1.78   |
| 99    | -2107.58 | -444.95   | 1.91    | 3177.87  | 506.67    | -1.91   |
| 100   | -3177.87 | -506.67   | -1.16   | 4387.26  | 568.40    | 1.16    |

HIPOTESIS 1 PESO PROPIO

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 101   | -4387.27 | 597.55    | -0.72   | 3112.28  | -535.82   | 0.72    |
| 102   | -3112.29 | 535.82    | -0.71   | 1976.18  | -474.09   | 0.71    |
| 103   | -1976.18 | 474.08    | -1.94   | 970.80   | -419.67   | 1.95    |
| 104   | -970.79  | 419.67    | -2.29   | 115.17   | -340.74   | 2.29    |
| 105   | -115.16  | 340.74    | -2.27   | -562.83  | -261.82   | 2.27    |
| 106   | 562.82   | 261.85    | -1.93   | -1090.84 | -207.43   | 1.92    |
| 107   | 1090.84  | 207.37    | -1.60   | -1496.12 | -152.97   | 1.61    |
| 108   | 1496.13  | 152.95    | -1.12   | -1779.09 | -98.53    | 1.11    |
| 109   | 1779.10  | 98.51     | -1.13   | -1939.56 | -44.09    | 1.12    |
| 110   | 1939.61  | 44.11     | 0.11    | -1977.65 | 10.31     | -0.09   |
| 111   | 1977.68  | -10.30    | 0.09    | -1893.33 | 64.71     | -0.12   |
| 112   | 1893.28  | -64.75    | 1.29    | -1686.41 | 119.16    | -1.31   |
| 113   | 1686.37  | -119.20   | 1.32    | -1356.96 | 173.61    | -1.32   |
| 114   | 1356.96  | -173.62   | 2.15    | -905.18  | 228.03    | -2.15   |
| 115   | 905.18   | -228.05   | 2.49    | -330.76  | 282.48    | -2.48   |
| 116   | 330.75   | -282.45   | 2.55    | 365.85   | 336.85    | -2.55   |
| 117   | -365.87  | -336.85   | 2.57    | 1184.86  | 391.26    | -2.57   |
| 118   | -1184.85 | -391.26   | 2.16    | 2126.51  | 445.68    | -2.16   |
| 119   | -2126.51 | -445.69   | 0.83    | 3198.82  | 507.43    | -0.83   |
| 120   | -3198.82 | -507.43   | 0.81    | 4410.04  | 569.17    | -0.81   |
| 121   | -4409.97 | 599.75    | -1.04   | 3130.00  | -538.01   | 1.04    |
| 122   | -3130.00 | 538.01    | -1.06   | 1988.93  | -476.27   | 1.07    |
| 123   | -1988.94 | 476.27    | -2.31   | 978.61   | -421.85   | 2.31    |
| 124   | -978.61  | 421.86    | -2.30   | 118.23   | -342.96   | 2.30    |
| 125   | -118.25  | 342.92    | -2.33   | -564.72  | -264.00   | 2.33    |
| 126   | 564.76   | 264.04    | -1.99   | -1097.71 | -209.62   | 1.99    |
| 127   | 1097.72  | 209.62    | -2.06   | -1508.00 | -155.23   | 2.06    |
| 128   | 1508.03  | 155.22    | -1.03   | -1796.12 | -100.80   | 1.05    |
| 129   | 1796.15  | 100.81    | -1.02   | -1961.75 | -46.38    | 1.01    |
| 130   | 1961.82  | 46.32     | -0.47   | -2004.87 | 8.08      | 0.48    |
| 131   | 2004.91  | -8.08     | 0.87    | -1925.50 | 62.52     | -0.87   |
| 132   | 1925.48  | -62.45    | 0.76    | -1723.82 | 116.85    | -0.74   |
| 133   | 1723.70  | -116.90   | 1.33    | -1399.46 | 171.32    | -1.34   |
| 134   | 1399.43  | -171.33   | 1.84    | -952.59  | 225.76    | -1.84   |
| 135   | 952.62   | -225.78   | 2.13    | -383.43  | 280.20    | -2.11   |
| 136   | 383.43   | -280.16   | 2.33    | 308.09   | 334.58    | -2.34   |
| 137   | -308.11  | -334.61   | 2.33    | 1122.11  | 389.02    | -2.33   |
| 138   | -1122.09 | -389.02   | 1.97    | 2058.79  | 443.45    | -1.97   |
| 139   | -2058.77 | -443.43   | 1.36    | 3125.75  | 505.15    | -1.36   |
| 140   | -3125.75 | -505.16   | 0.30    | 4331.99  | 566.91    | -0.30   |
| 141   | -4331.91 | 606.03    | -1.01   | 3285.73  | -556.65   | 1.01    |
| 142   | -3285.73 | 556.65    | -2.42   | 2328.09  | -507.25   | 2.42    |
| 143   | -2328.09 | 507.26    | -1.42   | 1454.40  | -463.73   | 1.42    |
| 144   | -1454.40 | 463.72    | -2.67   | 680.57   | -395.65   | 2.67    |
| 145   | -680.59  | 395.67    | -2.64   | 29.80    | -327.65   | 2.63    |
| 146   | -29.85   | 327.63    | -2.65   | -520.78  | -284.10   | 2.64    |
| 147   | 520.78   | 284.17    | -2.65   | -993.10  | -240.64   | 2.64    |
| 148   | 993.09   | 240.64    | -2.29   | -1386.91 | -197.12   | 2.29    |
| 149   | 1386.88  | 197.10    | -1.70   | -1702.48 | -153.57   | 1.71    |

HIPOTESIS 1 PESO PROPIO

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 150   | 1702.43  | 153.58    | -1.69   | -1939.69 | -110.05   | 1.71    |
| 151   | 1939.70  | 109.98    | -0.87   | -2098.58 | -66.43    | 0.87    |
| 152   | 2098.51  | 66.45     | -0.12   | -2178.90 | -22.92    | 0.11    |
| 153   | 2178.89  | 22.98     | -0.11   | -2181.00 | 20.55     | 0.09    |
| 154   | 2180.99  | -20.65    | -0.14   | -2104.64 | 64.18     | 0.16    |
| 155   | 2104.59  | -64.28    | 1.52    | -1949.77 | 107.81    | -1.54   |
| 156   | 1949.77  | -107.81   | 2.33    | -1716.47 | 151.35    | -2.34   |
| 157   | 1716.49  | -151.40   | 1.62    | -1404.90 | 194.93    | -1.62   |
| 158   | 1404.92  | -194.85   | 2.19    | -1014.93 | 238.39    | -2.20   |
| 159   | 1014.91  | -238.39   | 2.58    | -546.74  | 281.92    | -2.57   |
| 160   | 546.72   | -281.90   | 2.80    | -0.01    | 325.44    | -2.80   |
| 161   | 336.19   | -176.98   | 0.00    | 0.00     | 176.98    | 0.00    |
| 162   | 333.27   | -175.44   | 0.00    | 0.00     | 175.44    | 0.00    |
| 163   | 1131.88  | -595.73   | 0.00    | 0.00     | 595.73    | 0.00    |
| 164   | 1132.19  | -595.90   | 0.00    | 0.00     | 595.90    | 0.00    |
| 165   | 1142.68  | -601.45   | 0.00    | 0.00     | 601.45    | 0.00    |
| 166   | 1143.42  | -601.59   | 0.00    | 0.00     | 601.59    | 0.00    |
| 167   | 1137.10  | -598.47   | 0.00    | 0.00     | 598.47    | 0.00    |
| 168   | 1138.05  | -598.97   | 0.00    | 0.00     | 598.97    | 0.00    |
| 169   | 1139.00  | -599.40   | 0.00    | 0.00     | 599.40    | 0.00    |
| 170   | 1139.60  | -599.72   | 0.00    | 0.00     | 599.72    | 0.00    |
| 171   | 1137.66  | -598.86   | 0.00    | 0.00     | 598.86    | 0.00    |
| 172   | 1138.11  | -599.09   | 0.00    | 0.00     | 599.09    | 0.00    |
| 173   | 1140.43  | -600.45   | 0.00    | 0.00     | 600.45    | 0.00    |
| 174   | 1141.30  | -600.46   | 0.00    | 0.00     | 600.46    | 0.00    |
| 175   | 1144.64  | -602.53   | 0.00    | 0.00     | 602.53    | 0.00    |
| 176   | 1145.24  | -602.40   | 0.00    | 0.00     | 602.40    | 0.00    |
| 177   | 343.88   | -180.96   | 0.00    | 0.00     | 180.96    | 0.00    |
| 178   | 341.08   | -179.49   | 0.00    | 0.00     | 179.49    | 0.00    |



## HIPOTESIS 1 CARGA PERMANENTE

## ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 51    | 1336.92  | 0.36      | 0.22    | -1295.42 | 37.25     | -15.72  |
| 52    | 1295.40  | -37.27    | 15.74   | -1169.22 | 74.88     | -31.24  |
| 53    | 1169.17  | -74.90    | 31.97   | -958.35  | 112.51    | -47.49  |
| 54    | 958.34   | -112.52   | 47.82   | -662.80  | 150.14    | -63.33  |
| 55    | 662.81   | -150.14   | 63.50   | -282.75  | 187.74    | -79.00  |
| 56    | 282.77   | -187.74   | 79.01   | 181.88   | 225.34    | -94.52  |
| 57    | -181.95  | -225.33   | 94.39   | 731.50   | 262.96    | -109.91 |
| 58    | -731.50  | -262.96   | 109.95  | 1365.33  | 300.56    | -125.45 |
| 59    | -1365.38 | -300.57   | 124.99  | 2084.01  | 338.18    | -140.49 |
| 60    | -2084.10 | -338.18   | 139.19  | 2887.30  | 375.79    | -154.69 |
| 61    | -2887.31 | 376.01    | -154.76 | 2083.61  | -338.40   | 139.25  |
| 62    | -2083.52 | 338.40    | -140.54 | 1364.48  | -300.79   | 125.04  |
| 63    | -1364.43 | 300.80    | -125.52 | 729.83   | -263.18   | 110.01  |
| 64    | -729.81  | 263.17    | -110.21 | 180.06   | -225.56   | 94.70   |
| 65    | -180.06  | 225.55    | -94.70  | -285.06  | -187.95   | 79.20   |
| 66    | 285.08   | 187.94    | -79.09  | -665.67  | -150.33   | 63.59   |
| 67    | 665.71   | 150.31    | -63.15  | -961.63  | -112.70   | 47.65   |
| 68    | 961.61   | 112.71    | -47.67  | -1172.92 | -75.10    | 32.17   |
| 69    | 1172.90  | 75.10     | -31.84  | -1299.56 | -37.50    | 16.33   |
| 70    | 1299.54  | 37.50     | -15.89  | -1341.61 | 0.11      | 0.38    |
| 71    | 1341.58  | -0.08     | 0.46    | -1299.09 | 37.69     | -15.98  |
| 72    | 1299.06  | -37.75    | 15.99   | -1171.83 | 75.36     | -31.49  |
| 73    | 1171.82  | -75.35    | 31.88   | -959.94  | 112.96    | -47.39  |
| 74    | 959.88   | -112.94   | 47.98   | -663.42  | 150.55    | -63.49  |
| 75    | 663.39   | -150.55   | 63.47   | -282.54  | 188.14    | -78.97  |
| 76    | 282.50   | -188.15   | 79.08   | 183.36   | 225.77    | -94.60  |
| 77    | -183.41  | -225.78   | 94.49   | 733.58   | 263.38    | -110.00 |
| 78    | -733.55  | -263.38   | 110.20  | 1368.52  | 300.99    | -125.71 |
| 79    | -1368.60 | -300.99   | 124.85  | 2088.15  | 338.60    | -140.36 |
| 80    | -2088.24 | -338.60   | 139.05  | 2892.36  | 376.21    | -154.56 |
| 81    | -2892.26 | 376.21    | -155.18 | 2088.13  | -338.60   | 139.67  |
| 82    | -2088.08 | 338.61    | -140.39 | 1368.36  | -300.99   | 124.88  |
| 83    | -1368.33 | 300.99    | -125.27 | 733.47   | -263.39   | 109.76  |
| 84    | -733.40  | 263.38    | -110.22 | 183.18   | -225.78   | 94.71   |
| 85    | -183.20  | 225.78    | -94.66  | -282.57  | -188.17   | 79.15   |
| 86    | 282.63   | 188.16    | -78.90  | -663.59  | -150.56   | 63.39   |
| 87    | 663.57   | 150.56    | -63.58  | -960.07  | -112.95   | 48.07   |
| 88    | 960.13   | 112.94    | -47.45  | -1171.94 | -75.33    | 31.95   |
| 89    | 1171.97  | 75.33     | -31.22  | -1299.16 | -37.72    | 15.72   |
| 90    | 1299.15  | 37.65     | -15.70  | -1341.61 | -0.05     | 0.18    |
| 91    | 1341.65  | 0.04      | -0.19   | -1299.42 | 37.56     | -15.31  |
| 92    | 1299.42  | -37.54    | 16.57   | -1172.64 | 75.16     | -32.09  |
| 93    | 1172.66  | -75.08    | 31.67   | -961.39  | 112.68    | -47.16  |
| 94    | 961.33   | -112.71   | 47.78   | -665.45  | 150.31    | -63.29  |
| 95    | 665.42   | -150.30   | 63.51   | -284.85  | 187.92    | -79.02  |
| 96    | 284.82   | -187.92   | 79.10   | 180.19   | 225.52    | -94.61  |
| 97    | -180.23  | -225.52   | 94.54   | 730.00   | 263.13    | -110.05 |
| 98    | -730.06  | -263.13   | 109.79  | 1364.65  | 300.75    | -125.30 |
| 99    | -1364.65 | -300.76   | 125.39  | 2083.47  | 338.36    | -140.89 |
| 100   | -2083.61 | -338.36   | 138.88  | 2887.19  | 375.97    | -154.38 |

## HIPOTESIS 1 CARGA PERMANENTE

## ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 101   | -2887.11 | 375.78    | -155.41 | 2083.96  | -338.17   | 139.90  |
| 102   | -2083.96 | 338.17    | -139.89 | 1365.41  | -300.56   | 124.38  |
| 103   | -1365.33 | 300.57    | -125.24 | 731.42   | -262.96   | 109.73  |
| 104   | -731.39  | 262.96    | -109.99 | 181.95   | -225.35   | 94.48   |
| 105   | -181.95  | 225.33    | -94.47  | -282.82  | -187.72   | 78.96   |
| 106   | 282.86   | 187.73    | -78.79  | -663.00  | -150.12   | 63.28   |
| 107   | 663.00   | 150.11    | -63.10  | -958.40  | -112.51   | 47.60   |
| 108   | 958.39   | 112.50    | -47.28  | -1169.21 | -74.89    | 31.78   |
| 109   | 1169.20  | 74.86     | -31.76  | -1295.34 | -37.25    | 16.25   |
| 110   | 1295.37  | 37.28     | -15.45  | -1336.94 | 0.33      | -0.06   |
| 111   | 1336.96  | -0.36     | 0.08    | -1293.83 | 37.97     | -15.58  |
| 112   | 1293.86  | -38.01    | 16.39   | -1166.06 | 75.61     | -31.89  |
| 113   | 1166.07  | -75.60    | 31.90   | -953.69  | 113.21    | -47.40  |
| 114   | 953.66   | -113.23   | 48.01   | -656.63  | 150.83    | -63.51  |
| 115   | 656.61   | -150.82   | 63.76   | -274.88  | 188.44    | -79.26  |
| 116   | 274.85   | -188.44   | 79.33   | 191.36   | 226.04    | -94.84  |
| 117   | -191.36  | -226.03   | 94.83   | 742.13   | 263.63    | -110.34 |
| 118   | -742.17  | -263.63   | 110.08  | 1377.72  | 301.24    | -125.59 |
| 119   | -1377.80 | -301.24   | 124.73  | 2097.94  | 338.85    | -140.24 |
| 120   | -2097.95 | -338.85   | 140.23  | 2902.72  | 376.46    | -155.74 |
| 121   | -2902.70 | 377.31    | -154.07 | 2096.07  | -339.70   | 138.56  |
| 122   | -2096.06 | 339.70    | -138.58 | 1374.05  | -302.09   | 123.07  |
| 123   | -1373.98 | 302.09    | -123.93 | 736.62   | -264.49   | 108.42  |
| 124   | -736.62  | 264.49    | -108.42 | 183.86   | -226.88   | 92.91   |
| 125   | -183.85  | 226.88    | -92.98  | -284.44  | -189.26   | 77.47   |
| 126   | 284.48   | 189.28    | -77.30  | -668.09  | -151.66   | 61.79   |
| 127   | 668.08   | 151.67    | -61.83  | -966.93  | -114.08   | 46.32   |
| 128   | 966.95   | 114.08    | -45.68  | -1181.36 | -76.47    | 30.16   |
| 129   | 1181.35  | 76.46     | -30.15  | -1311.07 | -38.85    | 14.66   |
| 130   | 1311.11  | 38.84     | -14.28  | -1356.18 | -1.24     | -1.22   |
| 131   | 1356.18  | 1.22      | 2.15    | -1316.56 | 36.40     | -17.67  |
| 132   | 1316.59  | -36.41    | 17.59   | -1192.38 | 74.00     | -33.09  |
| 133   | 1192.37  | -74.03    | 33.49   | -983.51  | 111.64    | -48.99  |
| 134   | 983.50   | -111.62   | 49.34   | -689.94  | 149.24    | -64.85  |
| 135   | 689.95   | -149.25   | 65.05   | -311.85  | 186.86    | -80.56  |
| 136   | 311.82   | -186.86   | 80.74   | 150.87   | 224.47    | -96.24  |
| 137   | -150.86  | -224.47   | 96.25   | 698.16   | 262.07    | -111.75 |
| 138   | -698.19  | -262.07   | 111.52  | 1330.27  | 299.68    | -127.03 |
| 139   | -1330.30 | -299.67   | 126.64  | 2046.75  | 337.28    | -142.14 |
| 140   | -2046.80 | -337.28   | 141.44  | 2848.10  | 374.89    | -156.95 |
| 141   | -2848.02 | 380.00    | -117.64 | 2191.24  | -349.92   | 105.24  |
| 142   | -2191.20 | 349.92    | -106.17 | 1588.34  | -319.83   | 93.77   |
| 143   | -1588.38 | 319.83    | -93.09  | 1039.89  | -289.75   | 80.68   |
| 144   | -1039.82 | 289.75    | -81.57  | 545.12   | -259.65   | 69.16   |
| 145   | -545.14  | 259.64    | -69.12  | 104.97   | -229.57   | 56.72   |
| 146   | -104.97  | 229.56    | -56.77  | -281.19  | -199.48   | 44.37   |
| 147   | 281.20   | 199.53    | -44.37  | -613.28  | -169.44   | 31.97   |
| 148   | 613.26   | 169.44    | -31.72  | -891.07  | -139.36   | 19.34   |
| 149   | 891.07   | 139.33    | -18.95  | -1114.78 | -109.25   | 6.56    |

HIPOTESIS 1 CARGA PERMANENTE

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 150   | 1114.80  | 109.25    | -6.55   | -1284.36 | -79.16    | -5.87   |
| 151   | 1284.36  | 79.17     | 6.39    | -1399.83 | -49.07    | -18.81  |
| 152   | 1399.77  | 49.00     | 19.34   | -1460.93 | -18.92    | -31.73  |
| 153   | 1460.96  | 18.96     | 31.75   | -1468.02 | 11.12     | -44.14  |
| 154   | 1468.07  | -11.23    | 44.13   | -1420.82 | 41.32     | -56.54  |
| 155   | 1420.82  | -41.28    | 57.64   | -1319.44 | 71.37     | -70.04  |
| 156   | 1319.40  | -71.34    | 70.59   | -1163.86 | 101.44    | -82.98  |
| 157   | 1163.85  | -101.46   | 82.50   | -954.21  | 131.54    | -94.91  |
| 158   | 954.15   | -131.52   | 95.31   | -690.27  | 161.62    | -107.72 |
| 159   | 690.20   | -161.61   | 107.97  | -372.28  | 191.70    | -120.37 |
| 160   | 372.22   | -191.71   | 120.53  | -0.01    | 221.80    | -132.94 |
| 161   | 277.28   | -145.96   | 0.00    | 0.00     | 145.96    | 0.00    |
| 162   | 144.12   | -75.87    | 0.00    | 0.00     | 75.87     | 0.00    |
| 163   | 853.90   | -449.43   | 0.00    | 0.00     | 449.43    | 0.00    |
| 164   | 580.37   | -305.46   | 0.00    | 0.00     | 305.46    | 0.00    |
| 165   | 870.15   | -458.00   | 0.00    | 0.00     | 458.00    | 0.00    |
| 166   | 562.06   | -295.72   | 0.00    | 0.00     | 295.72    | 0.00    |
| 167   | 868.93   | -457.33   | 0.00    | 0.00     | 457.33    | 0.00    |
| 168   | 559.48   | -294.46   | 0.00    | 0.00     | 294.46    | 0.00    |
| 169   | 869.75   | -457.71   | 0.00    | 0.00     | 457.71    | 0.00    |
| 170   | 560.01   | -294.71   | 0.00    | 0.00     | 294.71    | 0.00    |
| 171   | 868.94   | -457.40   | 0.00    | 0.00     | 457.40    | 0.00    |
| 172   | 559.16   | -294.34   | 0.00    | 0.00     | 294.34    | 0.00    |
| 173   | 870.04   | -458.08   | 0.00    | 0.00     | 458.08    | 0.00    |
| 174   | 562.03   | -295.69   | 0.00    | 0.00     | 295.69    | 0.00    |
| 175   | 853.92   | -449.50   | 0.00    | 0.00     | 449.50    | 0.00    |
| 176   | 580.59   | -305.39   | 0.00    | 0.00     | 305.39    | 0.00    |
| 177   | 277.21   | -145.88   | 0.00    | 0.00     | 145.88    | 0.00    |
| 178   | 144.27   | -75.92    | 0.00    | 0.00     | 75.92     | 0.00    |



HIPOTESIS 1 GRADIENTE TERMICO, AT= 5.0

REACCIONES

=====

| Nudo  | Flector | Reac_vert | Torsor  |
|-------|---------|-----------|---------|
| ===== |         |           |         |
| 162   | 0.00000 | 11.36528  | 0.00000 |
| 163   | 0.00000 | 10.94546  | 0.00000 |
| 164   | 0.00000 | -12.54311 | 0.00000 |
| 165   | 0.00000 | -14.37306 | 0.00000 |
| 166   | 0.00000 | 3.97896   | 0.00000 |
| 167   | 0.00000 | 1.88599   | 0.00000 |
| 168   | 0.00000 | 0.18020   | 0.00000 |
| 169   | 0.00000 | -1.92733  | 0.00000 |
| 170   | 0.00000 | 1.50307   | 0.00000 |
| 171   | 0.00000 | -0.59828  | 0.00000 |
| 172   | 0.00000 | 0.17596   | 0.00000 |
| 173   | 0.00000 | -1.92493  | 0.00000 |
| 174   | 0.00000 | 3.97587   | 0.00000 |
| 175   | 0.00000 | 1.89153   | 0.00000 |
| 176   | 0.00000 | -12.54039 | 0.00000 |
| 177   | 0.00000 | -14.36313 | 0.00000 |
| 178   | 0.00000 | 11.38206  | 0.00000 |
| 179   | 0.00000 | 10.94152  | 0.00000 |

SUMA DE REACCIONES

=====

Suma Momentos Flectores = 0.000  
Suma Reacciones Vertic. = -0.044  
Suma Momentos Torsores = 0.000

HIPOTESIS 1 GRADIENTE TERMICO, AT= 5.0

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 1     | 0.00     | 22.31     | -0.80   | -40.16   | -22.31    | 0.80    |
| 2     | 40.16    | 22.31     | -0.80   | -80.33   | -22.31    | 0.80    |
| 3     | 80.33    | 22.31     | -0.76   | -120.50  | -22.31    | 0.77    |
| 4     | 120.50   | 22.32     | -0.72   | -160.68  | -22.32    | 0.73    |
| 5     | 160.68   | 22.31     | -0.72   | -200.83  | -22.31    | 0.73    |
| 6     | 200.84   | 22.31     | -0.64   | -241.01  | -22.31    | 0.65    |
| 7     | 241.01   | 22.32     | -0.64   | -281.18  | -22.32    | 0.64    |
| 8     | 281.18   | 22.33     | -0.42   | -321.37  | -22.33    | 0.42    |
| 9     | 321.38   | 22.34     | -0.56   | -361.58  | -22.34    | 0.56    |
| 10    | 361.58   | 22.36     | -0.25   | -401.83  | -22.36    | 0.24    |
| 11    | 401.82   | 22.34     | -0.28   | -442.02  | -22.34    | 0.28    |
| 12    | 442.01   | 22.35     | -0.09   | -482.23  | -22.35    | 0.09    |
| 13    | 482.23   | 22.34     | -0.10   | -522.44  | -22.34    | 0.09    |
| 14    | 522.44   | 22.35     | 0.13    | -562.68  | -22.35    | -0.14   |
| 15    | 562.68   | 22.35     | 0.33    | -602.89  | -22.35    | -0.33   |
| 16    | 602.90   | 22.35     | 0.12    | -643.13  | -22.35    | -0.12   |
| 17    | 643.13   | 22.35     | 0.84    | -683.35  | -22.35    | -0.84   |
| 18    | 683.35   | 22.35     | 0.61    | -723.57  | -22.35    | -0.61   |
| 19    | 723.57   | 22.34     | 0.85    | -763.78  | -22.34    | -0.85   |
| 20    | 763.78   | 22.34     | 1.19    | -804.00  | -22.34    | -1.19   |
| 21    | 804.00   | -4.57     | -2.25   | -793.72  | 4.57      | 2.25    |
| 22    | 793.72   | -4.57     | -1.97   | -783.43  | 4.57      | 1.97    |
| 23    | 783.43   | -4.57     | -1.48   | -773.15  | 4.57      | 1.48    |
| 24    | 773.14   | -4.57     | -1.48   | -762.86  | 4.57      | 1.48    |
| 25    | 762.86   | -4.57     | -1.48   | -752.56  | 4.57      | 1.48    |
| 26    | 752.57   | -4.57     | -1.01   | -742.28  | 4.57      | 1.01    |
| 27    | 742.28   | -4.57     | -0.55   | -731.99  | 4.57      | 0.55    |
| 28    | 731.99   | -4.57     | -0.55   | -721.71  | 4.57      | 0.55    |
| 29    | 721.70   | -4.58     | -0.30   | -711.41  | 4.58      | 0.30    |
| 30    | 711.41   | -4.57     | 0.15    | -701.13  | 4.57      | -0.15   |
| 31    | 701.12   | -4.57     | -0.10   | -690.84  | 4.57      | 0.10    |
| 32    | 690.84   | -4.57     | 0.58    | -680.55  | 4.57      | -0.58   |
| 33    | 680.55   | -4.57     | 0.58    | -670.26  | 4.57      | -0.58   |
| 34    | 670.26   | -4.57     | 0.58    | -659.99  | 4.57      | -0.58   |
| 35    | 659.99   | -4.57     | 0.99    | -649.71  | 4.57      | -0.99   |
| 36    | 649.71   | -4.56     | 1.40    | -639.44  | 4.56      | -1.40   |
| 37    | 639.43   | -4.57     | 1.22    | -629.16  | 4.57      | -1.22   |
| 38    | 629.15   | -4.57     | 1.79    | -618.88  | 4.57      | -1.79   |
| 39    | 618.88   | -4.57     | 1.62    | -608.60  | 4.57      | -1.62   |
| 40    | 608.60   | -4.57     | 2.00    | -598.32  | 4.57      | -2.00   |
| 41    | 598.31   | 1.30      | -1.82   | -601.23  | -1.30     | 1.82    |
| 42    | 601.23   | 1.30      | -1.60   | -604.15  | -1.30     | 1.60    |
| 43    | 604.15   | 1.30      | -1.39   | -607.07  | -1.30     | 1.39    |
| 44    | 607.07   | 1.30      | -1.23   | -609.98  | -1.30     | 1.23    |
| 45    | 609.98   | 1.30      | -1.23   | -612.90  | -1.30     | 1.23    |
| 46    | 612.90   | 1.30      | -0.84   | -615.82  | -1.30     | 0.84    |
| 47    | 615.82   | 1.30      | -0.63   | -618.73  | -1.30     | 0.63    |
| 48    | 618.73   | 1.30      | -0.46   | -621.65  | -1.30     | 0.46    |
| 49    | 621.65   | 1.30      | -0.24   | -624.57  | -1.30     | 0.24    |
| 50    | 624.57   | 1.30      | -0.24   | -627.48  | -1.30     | 0.24    |

HIPOTESIS 1 CARGA PERMANENTE

REACCIONES

=====

| Nudo | Flector | Reac_vert | Torsor  |
|------|---------|-----------|---------|
| 162  | 0.00000 | 145.96414 | 0.00000 |
| 163  | 0.00000 | 75.86522  | 0.00000 |
| 164  | 0.00000 | 449.42731 | 0.00000 |
| 165  | 0.00000 | 305.45984 | 0.00000 |
| 166  | 0.00000 | 458.00424 | 0.00000 |
| 167  | 0.00000 | 295.71765 | 0.00000 |
| 168  | 0.00000 | 457.33102 | 0.00000 |
| 169  | 0.00000 | 294.46176 | 0.00000 |
| 170  | 0.00000 | 457.70908 | 0.00000 |
| 171  | 0.00000 | 294.70660 | 0.00000 |
| 172  | 0.00000 | 457.40570 | 0.00000 |
| 173  | 0.00000 | 294.33911 | 0.00000 |
| 174  | 0.00000 | 458.08209 | 0.00000 |
| 175  | 0.00000 | 295.69278 | 0.00000 |
| 176  | 0.00000 | 449.50235 | 0.00000 |
| 177  | 0.00000 | 305.38965 | 0.00000 |
| 178  | 0.00000 | 145.87509 | 0.00000 |
| 179  | 0.00000 | 75.91679  | 0.00000 |

SUMA DE REACCIONES

=====

Suma Momentos Flectores = 0.000  
Suma Reacciones Vertic. = 5716.851  
Suma Momentos Torsores = 0.000

HIPOTESIS 1 CARGA PERMANENTE

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol | Cortantel | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 1     | 0.01     | 221.83    | -133.16 | -372.18  | -191.75   | 120.75  |
| 2     | 372.17   | 191.74    | -120.75 | -690.18  | -161.65   | 108.35  |
| 3     | 690.22   | 161.65    | -108.04 | -954.19  | -131.55   | 95.63   |
| 4     | 954.21   | 131.56    | -95.30  | -1163.86 | -101.48   | 82.90   |
| 5     | 1163.87  | 101.45    | -82.89  | -1319.38 | -71.37    | 70.49   |
| 6     | 1319.42  | 71.41     | -69.90  | -1420.88 | -41.32    | 57.51   |
| 7     | 1420.86  | 41.32     | -57.51  | -1468.18 | -11.23    | 45.11   |
| 8     | 1468.20  | 11.14     | -43.95  | -1461.20 | 18.94     | 31.55   |
| 9     | 1461.15  | -18.94    | -32.22  | -1400.03 | 49.01     | 19.80   |
| 10    | 1400.04  | -49.11    | -18.57  | -1284.54 | 79.21     | 6.16    |
| 11    | 1284.58  | -79.14    | -6.28   | -1115.09 | 109.22    | -6.12   |
| 12    | 1115.09  | -109.20   | 6.60    | -891.44  | 139.29    | -19.01  |
| 13    | 891.43   | -139.29   | 19.05   | -613.63  | 169.37    | -31.45  |
| 14    | 613.62   | -169.42   | 31.72   | -281.47  | 199.52    | -44.12  |
| 15    | 281.46   | -199.51   | 44.23   | 104.66   | 229.60    | -56.63  |
| 16    | -104.63  | -229.59   | 56.65   | 545.11   | 259.68    | -69.06  |
| 17    | -545.19  | -259.68   | 68.45   | 1039.56  | 289.76    | -80.86  |
| 18    | -1039.54 | -289.76   | 81.22   | 1588.30  | 319.86    | -93.62  |
| 19    | -1588.33 | -319.85   | 93.08   | 2190.98  | 349.93    | -105.49 |
| 20    | -2191.02 | -349.93   | 104.52  | 2848.04  | 380.02    | -116.93 |
| 21    | -2847.95 | 374.87    | -156.75 | 2046.92  | -337.26   | 141.24  |
| 22    | -2046.87 | 337.27    | -141.96 | 1330.24  | -299.66   | 126.45  |
| 23    | -1330.17 | 299.65    | -127.28 | 698.23   | -262.04   | 111.77  |
| 24    | -698.23  | 262.03    | -111.77 | 150.95   | -224.42   | 96.26   |
| 25    | -150.94  | 224.42    | -96.26  | -311.72  | -186.81   | 80.76   |
| 26    | 311.78   | 186.81    | -80.55  | -689.77  | -149.20   | 65.05   |
| 27    | 689.83   | 149.21    | -64.62  | -983.21  | -111.61   | 49.11   |
| 28    | 983.19   | 111.62    | -49.13  | -1191.99 | -74.01    | 33.62   |
| 29    | 1191.99  | 74.00     | -33.21  | -1316.21 | -36.38    | 17.71   |
| 30    | 1316.22  | 36.37     | -16.87  | -1355.77 | 1.24      | 1.37    |
| 31    | 1355.77  | -1.23     | -1.83   | -1310.72 | 38.83     | -13.68  |
| 32    | 1310.72  | -38.83    | 14.97   | -1181.01 | 76.44     | -30.48  |
| 33    | 1181.02  | -76.42    | 30.48   | -966.75  | 114.03    | -45.99  |
| 34    | 966.74   | -114.01   | 45.99   | -667.94  | 151.62    | -61.50  |
| 35    | 667.88   | -151.61   | 61.92   | -284.47  | 189.22    | -77.42  |
| 36    | 284.45   | -189.22   | 77.61   | 183.54   | 226.83    | -93.11  |
| 37    | -183.51  | -226.82   | 93.16   | 736.29   | 264.44    | -108.67 |
| 38    | -736.40  | -264.44   | 108.01  | 1373.56  | 302.04    | -123.51 |
| 39    | -1373.53 | -302.04   | 123.89  | 2095.55  | 339.65    | -139.40 |
| 40    | -2095.64 | -339.66   | 138.09  | 2902.26  | 377.27    | -153.60 |
| 41    | -2902.50 | 376.45    | -155.29 | 2098.00  | -338.85   | 139.79  |
| 42    | -2097.95 | 338.85    | -140.52 | 1377.85  | -301.24   | 125.01  |
| 43    | -1377.80 | 301.24    | -125.50 | 742.15   | -263.62   | 109.98  |
| 44    | -742.13  | 263.63    | -110.19 | 191.31   | -226.02   | 94.68   |
| 45    | -191.32  | 226.02    | -94.68  | -274.87  | -188.41   | 79.18   |
| 46    | 274.91   | 188.43    | -79.01  | -656.51  | -150.82   | 63.50   |
| 47    | 656.52   | 150.83    | -63.29  | -953.59  | -113.21   | 47.78   |
| 48    | 953.58   | 113.25    | -47.53  | -1166.01 | -75.65    | 32.02   |
| 49    | 1166.02  | 75.59     | -31.61  | -1293.79 | -37.98    | 16.11   |
| 50    | 1293.79  | 37.98     | -16.11  | -1336.95 | -0.37     | 0.59    |

HIPOTESIS 1 GRADIENTE TERMICO, AT= 5.0

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 51    | 627.48   | 1.30      | 0.15    | -630.40  | -1.30     | -0.15   |
| 52    | 630.40   | 1.30      | 0.15    | -633.32  | -1.30     | -0.15   |
| 53    | 633.32   | 1.30      | 0.55    | -636.24  | -1.30     | -0.55   |
| 54    | 636.24   | 1.30      | 0.77    | -639.15  | -1.30     | -0.77   |
| 55    | 639.15   | 1.30      | 0.94    | -642.07  | -1.30     | -0.94   |
| 56    | 642.07   | 1.30      | 0.94    | -644.99  | -1.30     | -0.94   |
| 57    | 644.99   | 1.30      | 1.39    | -647.90  | -1.30     | -1.39   |
| 58    | 647.90   | 1.30      | 1.35    | -650.82  | -1.30     | -1.35   |
| 59    | 650.82   | 1.30      | 1.57    | -653.74  | -1.30     | -1.57   |
| 60    | 653.74   | 1.30      | 1.98    | -656.65  | -1.30     | -1.98   |
| 61    | 656.65   | -0.45     | -2.02   | -655.64  | 0.45      | 2.02    |
| 62    | 655.64   | -0.45     | -1.62   | -654.63  | 0.45      | 1.62    |
| 63    | 654.63   | -0.45     | -1.39   | -653.61  | 0.45      | 1.39    |
| 64    | 653.61   | -0.45     | -1.21   | -652.60  | 0.45      | 1.21    |
| 65    | 652.60   | -0.45     | -1.20   | -651.58  | 0.45      | 1.20    |
| 66    | 651.58   | -0.45     | -0.98   | -650.57  | 0.45      | 0.98    |
| 67    | 650.57   | -0.45     | -0.57   | -649.55  | 0.45      | 0.57    |
| 68    | 649.55   | -0.45     | -0.57   | -648.53  | 0.45      | 0.57    |
| 69    | 648.53   | -0.45     | -0.39   | -647.52  | 0.45      | 0.39    |
| 70    | 647.52   | -0.45     | -0.17   | -646.50  | 0.45      | 0.17    |
| 71    | 646.50   | -0.45     | 0.24    | -645.49  | 0.45      | -0.24   |
| 72    | 645.49   | -0.45     | 0.24    | -644.47  | 0.45      | -0.24   |
| 73    | 644.47   | -0.45     | 0.46    | -643.45  | 0.45      | -0.46   |
| 74    | 643.45   | -0.45     | 0.86    | -642.43  | 0.45      | -0.86   |
| 75    | 642.43   | -0.45     | 0.82    | -641.42  | 0.45      | -0.82   |
| 76    | 641.41   | -0.45     | 1.08    | -640.40  | 0.45      | -1.08   |
| 77    | 640.40   | -0.45     | 1.44    | -639.38  | 0.45      | -1.44   |
| 78    | 639.38   | -0.45     | 1.26    | -638.36  | 0.45      | -1.26   |
| 79    | 638.36   | -0.45     | 1.66    | -637.35  | 0.45      | -1.66   |
| 80    | 637.35   | -0.45     | 2.06    | -636.33  | 0.45      | -2.06   |
| 81    | 636.33   | 0.45      | -1.93   | -637.35  | -0.45     | 1.93    |
| 82    | 637.35   | 0.45      | -1.71   | -638.36  | -0.45     | 1.71    |
| 83    | 638.37   | 0.45      | -1.53   | -639.38  | -0.45     | 1.53    |
| 84    | 639.38   | 0.45      | -1.13   | -640.40  | -0.45     | 1.13    |
| 85    | 640.40   | 0.45      | -1.31   | -641.42  | -0.45     | 1.31    |
| 86    | 641.42   | 0.45      | -0.73   | -642.43  | -0.45     | 0.73    |
| 87    | 642.43   | 0.45      | -0.91   | -643.45  | -0.45     | 0.91    |
| 88    | 643.45   | 0.45      | -0.51   | -644.47  | -0.45     | 0.51    |
| 89    | 644.47   | 0.45      | -0.11   | -645.48  | -0.45     | 0.11    |
| 90    | 645.48   | 0.45      | -0.11   | -646.50  | -0.45     | 0.11    |
| 91    | 646.50   | 0.45      | -0.11   | -647.51  | -0.45     | 0.11    |
| 92    | 647.51   | 0.45      | 0.52    | -648.53  | -0.45     | -0.52   |
| 93    | 648.53   | 0.45      | 0.30    | -649.54  | -0.45     | -0.30   |
| 94    | 649.54   | 0.45      | 0.70    | -650.56  | -0.45     | -0.70   |
| 95    | 650.56   | 0.45      | 0.93    | -651.58  | -0.45     | -0.93   |
| 96    | 651.58   | 0.45      | 1.11    | -652.59  | -0.45     | -1.11   |
| 97    | 652.59   | 0.45      | 1.33    | -653.61  | -0.45     | -1.33   |
| 98    | 653.61   | 0.45      | 1.56    | -654.63  | -0.45     | -1.56   |
| 99    | 654.63   | 0.45      | 1.52    | -655.64  | -0.45     | -1.52   |
| 100   | 655.64   | 0.45      | 2.15    | -656.66  | -0.45     | -2.15   |

HIPOTESIS 1 GRADIENTE TERMICO, AT= 5.0

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 101   | 656.66   | -1.30     | -1.84   | -653.74  | 1.30      | 1.83    |
| 102   | 653.74   | -1.30     | -1.84   | -650.83  | 1.30      | 1.84    |
| 103   | 650.83   | -1.30     | -1.43   | -647.91  | 1.30      | 1.43    |
| 104   | 647.91   | -1.30     | -1.20   | -644.99  | 1.30      | 1.20    |
| 105   | 644.99   | -1.30     | -1.21   | -642.07  | 1.30      | 1.21    |
| 106   | 642.07   | -1.30     | -0.81   | -639.15  | 1.30      | 0.81    |
| 107   | 639.15   | -1.30     | -0.62   | -636.24  | 1.30      | 0.62    |
| 108   | 636.24   | -1.30     | -0.41   | -633.32  | 1.30      | 0.41    |
| 109   | 633.32   | -1.30     | -0.41   | -630.40  | 1.30      | 0.41    |
| 110   | 630.40   | -1.30     | -0.01   | -627.48  | 1.30      | 0.01    |
| 111   | 627.48   | -1.30     | -0.01   | -624.56  | 1.30      | 0.01    |
| 112   | 624.56   | -1.30     | 0.38    | -621.64  | 1.30      | -0.38   |
| 113   | 621.64   | -1.30     | 0.38    | -618.73  | 1.30      | -0.38   |
| 114   | 618.73   | -1.30     | 0.76    | -615.81  | 1.30      | -0.76   |
| 115   | 615.81   | -1.30     | 0.98    | -612.89  | 1.30      | -0.98   |
| 116   | 612.89   | -1.30     | 1.15    | -609.98  | 1.30      | -1.15   |
| 117   | 609.98   | -1.30     | 1.15    | -607.06  | 1.30      | -1.15   |
| 118   | 607.06   | -1.30     | 1.36    | -604.14  | 1.30      | -1.36   |
| 119   | 604.14   | -1.30     | 1.74    | -601.22  | 1.30      | -1.74   |
| 120   | 601.22   | -1.30     | 1.74    | -598.30  | 1.30      | -1.74   |
| 121   | 598.30   | 4.57      | -1.85   | -608.58  | -4.57     | 1.85    |
| 122   | 608.58   | 4.57      | -1.84   | -618.87  | -4.57     | 1.84    |
| 123   | 618.87   | 4.57      | -1.46   | -629.15  | -4.57     | 1.46    |
| 124   | 629.15   | 4.57      | -1.46   | -639.43  | -4.57     | 1.46    |
| 125   | 639.43   | 4.57      | -1.24   | -649.72  | -4.57     | 1.24    |
| 126   | 649.72   | 4.57      | -0.83   | -660.01  | -4.57     | 0.83    |
| 127   | 660.01   | 4.57      | -0.87   | -670.29  | -4.57     | 0.87    |
| 128   | 670.29   | 4.57      | -0.42   | -680.58  | -4.57     | 0.42    |
| 129   | 680.58   | 4.57      | -0.42   | -690.87  | -4.57     | 0.41    |
| 130   | 690.88   | 4.57      | -0.22   | -701.16  | -4.57     | 0.22    |
| 131   | 701.16   | 4.57      | 0.26    | -711.44  | -4.57     | -0.26   |
| 132   | 711.44   | 4.57      | 0.22    | -721.72  | -4.57     | -0.22   |
| 133   | 721.72   | 4.56      | 0.46    | -731.99  | -4.56     | -0.46   |
| 134   | 731.99   | 4.57      | 0.72    | -742.28  | -4.57     | -0.72   |
| 135   | 742.28   | 4.57      | 0.93    | -752.55  | -4.57     | -0.93   |
| 136   | 752.55   | 4.57      | 1.39    | -762.83  | -4.57     | -1.39   |
| 137   | 762.83   | 4.57      | 1.40    | -773.10  | -4.57     | -1.40   |
| 138   | 773.10   | 4.57      | 1.66    | -783.38  | -4.57     | -1.66   |
| 139   | 783.38   | 4.57      | 1.88    | -793.66  | -4.57     | -1.88   |
| 140   | 793.66   | 4.57      | 2.16    | -803.94  | -4.57     | -2.16   |
| 141   | 803.93   | -22.34    | -0.97   | -763.74  | 22.34     | 0.97    |
| 142   | 763.74   | -22.33    | -0.65   | -723.54  | 22.33     | 0.65    |
| 143   | 723.53   | -22.34    | -0.95   | -683.34  | 22.34     | 0.96    |
| 144   | 683.34   | -22.33    | -0.37   | -643.11  | 22.33     | 0.37    |
| 145   | 643.11   | -22.33    | -0.42   | -602.94  | 22.33     | 0.42    |
| 146   | 602.93   | -22.34    | -0.16   | -562.73  | 22.34     | 0.16    |
| 147   | 562.73   | -22.35    | -0.16   | -522.50  | 22.35     | 0.16    |
| 148   | 522.50   | -22.34    | 0.03    | -482.30  | 22.34     | -0.03   |
| 149   | 482.29   | -22.33    | 0.23    | -442.10  | 22.33     | -0.23   |

HIPOTESIS 1 GRADIENTE TERMICO, AT= 5.0

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| ===== |          |           |         |          |           |         |
| 150   | 442.08   | -22.33    | 0.23    | -401.87  | 22.33     | -0.22   |
| 151   | 401.86   | -22.33    | 0.40    | -361.65  | 22.33     | -0.40   |
| 152   | 361.65   | -22.33    | 0.53    | -321.44  | 22.33     | -0.53   |
| 153   | 321.44   | -22.34    | 0.53    | -281.24  | 22.34     | -0.53   |
| 154   | 281.23   | -22.32    | 0.53    | -241.06  | 22.32     | -0.53   |
| 155   | 241.05   | -22.30    | 0.72    | -200.89  | 22.30     | -0.72   |
| 156   | 200.88   | -22.31    | 0.81    | -160.72  | 22.31     | -0.81   |
| 157   | 160.70   | -22.31    | 0.74    | -120.55  | 22.31     | -0.74   |
| 158   | 120.54   | -22.32    | 0.79    | -80.35   | 22.32     | -0.79   |
| 159   | 80.36    | -22.32    | 0.82    | -40.19   | 22.32     | -0.82   |
| 160   | 40.19    | -22.32    | 0.84    | 0.00     | 22.32     | -0.84   |
| 161   | 21.59    | -11.37    | 0.00    | 0.00     | 11.37     | 0.00    |
| 162   | 20.79    | -10.94    | 0.00    | 0.00     | 10.94     | 0.00    |
| 163   | -23.83   | 12.54     | 0.00    | 0.00     | -12.54    | 0.00    |
| 164   | -27.31   | 14.37     | 0.00    | 0.00     | -14.37    | 0.00    |
| 165   | 7.56     | -3.98     | 0.00    | 0.00     | 3.98      | 0.00    |
| 166   | 3.58     | -1.89     | 0.00    | 0.00     | 1.89      | 0.00    |
| 167   | 0.34     | -0.18     | 0.00    | 0.00     | 0.18      | 0.00    |
| 168   | -3.66    | 1.93      | 0.00    | 0.00     | -1.93     | 0.00    |
| 169   | 2.86     | -1.50     | 0.00    | 0.00     | 1.50      | 0.00    |
| 170   | -1.14    | 0.60      | 0.00    | 0.00     | -0.60     | 0.00    |
| 171   | 0.33     | -0.18     | 0.00    | 0.00     | 0.18      | 0.00    |
| 172   | -3.66    | 1.92      | 0.00    | 0.00     | -1.92     | 0.00    |
| 173   | 7.55     | -3.98     | 0.00    | 0.00     | 3.98      | 0.00    |
| 174   | 3.60     | -1.89     | 0.00    | 0.00     | 1.89      | 0.00    |
| 175   | -23.82   | 12.54     | 0.00    | 0.00     | -12.54    | 0.00    |
| 176   | -27.31   | 14.36     | 0.00    | 0.00     | -14.36    | 0.00    |
| 177   | 21.63    | -11.38    | 0.00    | 0.00     | 11.38     | 0.00    |
| 178   | 20.79    | -10.94    | 0.00    | 0.00     | 10.94     | 0.00    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 1     | 0.0001   | 2.3285    | 0.3417    | 142.2997 | 79.0733   | 204.0045  |
| 2     | 142.2997 | 79.0733   | 204.0045  | 262.3151 | 72.8892   | 191.9174  |
| 3     | 262.3151 | 72.8892   | 191.9174  | 364.9070 | 39.8148   | 106.7805  |
| 4     | 364.9070 | 39.8148   | 106.7805  | 452.7379 | 33.7301   | 94.7470   |
| 5     | 452.7379 | 33.7301   | 94.7470   | 519.5896 | 42.7527   | 122.3852  |
| 6     | 519.5896 | 42.7527   | 122.3852  | 567.7161 | 24.8110   | 76.8633   |
| 7     | 567.7161 | 24.8110   | 76.8633   | 602.6904 | -8.1136   | -8.1320   |
| 8     | 602.6904 | -8.1136   | -8.1320   | 622.6981 | 16.1604   | 59.1124   |
| 9     | 622.6981 | 16.1604   | 59.1124   | 621.9789 | 10.5889   | 47.2045   |
| 10    | 621.9789 | 10.5889   | 47.2045   | 607.3715 | -22.1154  | -37.7663  |
| 11    | 607.3715 | -22.1154  | -37.7663  | 583.6991 | -27.3505  | -49.7309  |
| 12    | 583.6991 | -27.3505  | -49.7309  | 546.0144 | -32.3625  | -61.6534  |
| 13    | 546.0144 | -32.3625  | -61.6534  | 493.1931 | -7.1370   | 5.5849    |
| 14    | 493.1931 | -7.1370   | 5.5849    | 431.8210 | -39.4226  | -79.4693  |
| 15    | 431.8210 | -39.4226  | -79.4693  | 363.4484 | -43.7657  | -91.5526  |
| 16    | 363.4484 | -43.7657  | -91.5526  | 288.4575 | -47.8050  | -103.5506 |
| 17    | 288.4575 | -47.8050  | -103.5506 | 209.0516 | -51.5015  | -115.5320 |
| 18    | 209.0516 | -51.5015  | -115.5320 | 124.7032 | -24.8533  | -48.1348  |
| 19    | 124.7032 | -24.8533  | -48.1348  | 96.8951  | 2.8318    | 0.4766    |
| 20    | 96.8951  | 2.8318    | 0.4766    | 101.9915 | -3.6715   | 3.3856    |
| 21    | 101.9915 | -3.6715   | 3.3856    | 79.1008  | -10.1749  | 6.2874    |
| 22    | 79.1008  | -10.1749  | 6.2874    | 155.7686 | 38.4730   | 88.7107   |
| 23    | 155.7686 | 38.4730   | 88.7107   | 246.0345 | 48.3034   | 113.5792  |
| 24    | 246.0345 | 48.3034   | 113.5792  | 338.6380 | 44.4905   | 103.5372  |
| 25    | 338.6380 | 44.4905   | 103.5372  | 422.3380 | 40.4308   | 93.6433   |
| 26    | 422.3380 | 40.4308   | 93.6433   | 495.0352 | 21.1578   | 44.3383   |
| 27    | 495.0352 | 21.1578   | 44.3383   | 547.5726 | 1.7056    | -5.0963   |
| 28    | 547.5726 | 1.7056    | -5.0963   | 590.7166 | 24.7975   | 59.2141   |
| 29    | 590.7166 | 24.7975   | 59.2141   | 619.2849 | 20.0721   | 49.5425   |
| 30    | 619.2849 | 20.0721   | 49.5425   | 631.9081 | 0.3119    | 0.0420    |
| 31    | 631.9081 | 0.3119    | 0.0420    | 621.0851 | -19.4637  | -49.3426  |
| 32    | 621.0851 | -19.4637  | -49.3426  | 594.1500 | -24.1962  | -59.0067  |
| 33    | 594.1500 | -24.1962  | -59.0067  | 552.5887 | -1.1447   | 5.1978    |
| 34    | 552.5887 | -1.1447   | 5.1978    | 501.2374 | -20.6197  | -44.2305  |
| 35    | 501.2374 | -20.6197  | -44.2305  | 429.3503 | -39.9473  | -93.5317  |
| 36    | 429.3503 | -39.9473  | -93.5317  | 345.9789 | -44.0646  | -103.4715 |
| 37    | 345.9789 | -44.0646  | -103.4715 | 253.2164 | -47.9527  | -113.4411 |
| 38    | 253.2164 | -47.9527  | -113.4411 | 161.0417 | -38.2465  | -88.5458  |
| 39    | 161.0417 | -38.2465  | -88.5458  | 92.6779  | 2.8335    | 0.3971    |
| 40    | 92.6779  | 2.8335    | 0.3971    | 99.0543  | -3.6320   | 3.3533    |
| 41    | 99.0543  | -3.6320   | 3.3533    | 80.7879  | -2.4510   | -0.3706   |
| 42    | 80.7879  | -2.4510   | -0.3706   | 160.2383 | 38.3286   | 88.5975   |
| 43    | 160.2383 | 38.3286   | 88.5975   | 252.2509 | 48.0947   | 113.4753  |
| 44    | 252.2509 | 48.0947   | 113.4753  | 345.2595 | 44.2497   | 103.4783  |
| 45    | 345.2595 | 44.2497   | 103.4783  | 429.0167 | 40.1712   | 93.5948   |
| 46    | 429.0167 | 40.1712   | 93.5948   | 501.4972 | 20.8825   | 44.2200   |
| 47    | 501.4972 | 20.8825   | 44.2200   | 553.6494 | 1.4332    | -5.2085   |
| 48    | 553.6494 | 1.4332    | -5.2085   | 596.2054 | 24.5218   | 59.2048   |
| 49    | 596.2054 | 24.5218   | 59.2048   | 624.0240 | 19.7938   | 49.3243   |
| 50    | 624.0240 | 19.7938   | 49.3243   | 635.9446 | 0.0331    | -0.0515   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 51    | 635.9446 | 0.0331    | -0.0515   | 624.1921 | -19.7350  | -49.4220  |
| 52    | 624.1921 | -19.7350  | -49.4220  | 596.5773 | -24.4515  | -59.2108  |
| 53    | 596.5773 | -24.4515  | -59.2108  | 554.1686 | -1.3780   | 5.3068    |
| 54    | 554.1686 | -1.3780   | 5.3068    | 502.1188 | -20.8330  | -44.1285  |
| 55    | 502.1188 | -20.8330  | -44.1285  | 429.6542 | -40.1314  | -93.6682  |
| 56    | 429.6542 | -40.1314  | -93.6682  | 345.9631 | -44.2190  | -103.5512 |
| 57    | 345.9631 | -44.2190  | -103.5512 | 252.8385 | -48.0652  | -113.4481 |
| 58    | 252.8385 | -48.0652  | -113.4481 | 160.7190 | -38.3120  | -88.6239  |
| 59    | 160.7190 | -38.3120  | -88.6239  | 92.4478  | 2.8049    | 0.4037    |
| 60    | 92.4478  | 2.8049    | 0.4037    | 98.7585  | -3.6421   | 3.3393    |
| 61    | 98.7585  | -3.6421   | 3.3393    | 91.7594  | -2.7814   | -0.4052   |
| 62    | 91.7594  | -2.7814   | -0.4052   | 160.6569 | 38.3212   | 88.6212   |
| 63    | 160.6569 | 38.3212   | 88.6212   | 252.8421 | 48.0798   | 113.5146  |
| 64    | 252.8421 | 48.0798   | 113.5146  | 345.9012 | 44.2310   | 103.5274  |
| 65    | 345.9012 | 44.2310   | 103.5274  | 429.6632 | 40.1348   | 93.5855   |
| 66    | 429.6632 | 40.1348   | 93.5855   | 502.1367 | 20.8377   | 44.2272   |
| 67    | 502.1367 | 20.8377   | 44.2272   | 554.1761 | 1.3749    | -5.1954   |
| 68    | 554.1761 | 1.3749    | -5.1954   | 596.6104 | 24.4536   | 59.1045   |
| 69    | 596.6104 | 24.4536   | 59.1045   | 624.3124 | 19.7574   | 49.3133   |
| 70    | 624.3124 | 19.7574   | 49.3133   | 636.1074 | 0.0003    | 0.0589    |
| 71    | 636.1074 | 0.0003    | 0.0589    | 624.2826 | -19.7516  | -49.3118  |
| 72    | 624.2826 | -19.7516  | -49.3118  | 596.5753 | -24.4653  | -59.1975  |
| 73    | 596.5753 | -24.4653  | -59.1975  | 554.1351 | -1.3878   | 5.3160    |
| 74    | 554.1351 | -1.3878   | 5.3160    | 502.0239 | -20.8429  | -44.1278  |
| 75    | 502.0239 | -20.8429  | -44.1278  | 429.6222 | -40.1325  | -93.6575  |
| 76    | 429.6222 | -40.1325  | -93.6575  | 345.8725 | -44.2192  | -103.4775 |
| 77    | 345.8725 | -44.2192  | -103.4775 | 252.8156 | -48.0665  | -113.4426 |
| 78    | 252.8156 | -48.0665  | -113.4426 | 160.7015 | -38.3125  | -88.6218  |
| 79    | 160.7015 | -38.3125  | -88.6218  | 92.3918  | 2.8036    | 0.4225    |
| 80    | 92.3918  | 2.8036    | 0.4225    | 98.7200  | 3.6388    | -3.3409   |
| 81    | 98.7200  | 3.6388    | -3.3409   | 92.4096  | -2.8039   | -0.4031   |
| 82    | 92.4096  | -2.8039   | -0.4031   | 160.6848 | 38.3147   | 88.5874   |
| 83    | 160.6848 | 38.3147   | 88.5874   | 252.8322 | 48.0748   | 113.5196  |
| 84    | 252.8322 | 48.0748   | 113.5196  | 345.8375 | 44.2262   | 103.5222  |
| 85    | 345.8375 | 44.2262   | 103.5222  | 429.6560 | 40.1378   | 93.6608   |
| 86    | 429.6560 | 40.1378   | 93.6608   | 502.0427 | 20.8443   | 44.1926   |
| 87    | 502.0427 | 20.8443   | 44.1926   | 554.1847 | 1.3889    | -5.3118   |
| 88    | 554.1847 | 1.3889    | -5.3118   | 596.6210 | 24.4638   | 59.2985   |
| 89    | 596.6210 | 24.4638   | 59.2985   | 624.2853 | 19.7336   | 49.5137   |
| 90    | 624.2853 | 19.7336   | 49.5137   | 636.0372 | -0.0203   | -0.0739   |
| 91    | 636.0372 | -0.0203   | -0.0739   | 624.2247 | -19.7726  | -49.3456  |
| 92    | 624.2247 | -19.7726  | -49.3456  | 596.3990 | -24.4734  | -59.1088  |
| 93    | 596.3990 | -24.4734  | -59.1088  | 554.0410 | -1.3858   | 5.1777    |
| 94    | 554.0410 | -1.3858   | 5.1777    | 501.9818 | -20.8375  | -44.1527  |
| 95    | 501.9818 | -20.8375  | -44.1527  | 429.5261 | -40.1253  | -93.6107  |
| 96    | 429.5261 | -40.1253  | -93.6107  | 345.8426 | -44.2170  | -103.5034 |
| 97    | 345.8426 | -44.2170  | -103.5034 | 252.8118 | -48.0643  | -113.4275 |
| 98    | 252.8118 | -48.0643  | -113.4275 | 160.6270 | -38.3100  | -88.5968  |
| 99    | 160.6270 | -38.3100  | -88.5968  | 91.8062  | 2.7868    | 0.4133    |
| 100   | 91.8062  | 2.7868    | 0.4133    | 98.7424  | 3.6387    | -3.3421   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 101   | 98.7424  | 3.6387    | -3.3421   | 92.4290  | -2.8053   | -0.4128   |
| 102   | 92.4290  | -2.8053   | -0.4128   | 160.7074 | 38.3131   | 88.5792   |
| 103   | 160.7074 | 38.3131   | 88.5792   | 252.8069 | 48.0688   | 113.4935  |
| 104   | 252.8069 | 48.0688   | 113.4935  | 345.8612 | 44.2203   | 103.5039  |
| 105   | 345.8612 | 44.2203   | 103.5039  | 429.6401 | 40.1323   | 93.6292   |
| 106   | 429.6401 | 40.1323   | 93.6292   | 502.0872 | 20.8351   | 44.2438   |
| 107   | 502.0872 | 20.8351   | 44.2438   | 554.1376 | 1.3740    | -5.1809   |
| 108   | 554.1376 | 1.3740    | -5.1809   | 596.4906 | 24.4464   | 59.1268   |
| 109   | 596.4906 | 24.4464   | 59.1268   | 624.1802 | 19.7359   | 49.3509   |
| 110   | 624.1802 | 19.7359   | 49.3509   | 635.9009 | -0.0171   | -0.0313   |
| 111   | 635.9009 | -0.0171   | -0.0313   | 624.0955 | -19.7792  | -49.4093  |
| 112   | 624.0955 | -19.7792  | -49.4093  | 596.2413 | -24.5028  | -59.1815  |
| 113   | 596.2413 | -24.5028  | -59.1815  | 553.7478 | -1.4274   | 5.2231    |
| 114   | 553.7478 | -1.4274   | 5.2231    | 501.5894 | -20.8885  | -44.1048  |
| 115   | 501.5894 | -20.8885  | -44.1048  | 429.0492 | -40.1740  | -93.5672  |
| 116   | 429.0492 | -40.1740  | -93.5672  | 345.2816 | -44.2532  | -103.5291 |
| 117   | 345.2816 | -44.2532  | -103.5291 | 252.2897 | -48.0919  | -113.5063 |
| 118   | 252.2897 | -48.0919  | -113.5063 | 160.3165 | -38.3261  | -88.5849  |
| 119   | 160.3165 | -38.3261  | -88.5849  | 80.7964  | 2.4513    | 0.3705    |
| 120   | 80.7964  | 2.4513    | 0.3705    | 99.0177  | 3.6312    | -3.3512   |
| 121   | 99.0177  | 3.6312    | -3.3512   | 92.6472  | -2.8321   | -0.4033   |
| 122   | 92.6472  | -2.8321   | -0.4033   | 161.0490 | 38.2495   | 88.5796   |
| 123   | 161.0490 | 38.2495   | 88.5796   | 253.1561 | 47.9589   | 113.4361  |
| 124   | 253.1561 | 47.9589   | 113.4361  | 345.9752 | 44.0758   | 103.4662  |
| 125   | 345.9752 | 44.0758   | 103.4662  | 429.3582 | 39.9593   | 93.6533   |
| 126   | 429.3582 | 39.9593   | 93.6533   | 501.3016 | 20.6513   | 44.1697   |
| 127   | 501.3016 | 20.6513   | 44.1697   | 552.7952 | 1.1653    | -5.2483   |
| 128   | 552.7952 | 1.1653    | -5.2483   | 594.3608 | 24.2094   | 59.1670   |
| 129   | 594.3608 | 24.2094   | 59.1670   | 621.2859 | 19.4643   | 49.2765   |
| 130   | 621.2859 | 19.4643   | 49.2765   | 632.1981 | -0.3137   | 0.0077    |
| 131   | 632.1981 | -0.3137   | 0.0077    | 619.4551 | -20.0749  | -49.3688  |
| 132   | 619.4551 | -20.0749  | -49.3688  | 590.8907 | -24.8109  | -59.2772  |
| 133   | 590.8907 | -24.8109  | -59.2772  | 547.7009 | -1.7222   | 5.1516    |
| 134   | 547.7009 | -1.7222   | 5.1516    | 495.0858 | -21.1728  | -44.2695  |
| 135   | 495.0858 | -21.1728  | -44.2695  | 422.3625 | -40.4441  | -93.6691  |
| 136   | 422.3625 | -40.4441  | -93.6691  | 338.6474 | -44.5006  | -103.5584 |
| 137   | 338.6474 | -44.5006  | -103.5584 | 246.0688 | -48.3119  | -113.5446 |
| 138   | 246.0688 | -48.3119  | -113.5446 | 155.7628 | -38.4740  | -88.6710  |
| 139   | 155.7628 | -38.4740  | -88.6710  | 79.1392  | 10.1804   | -6.2901   |
| 140   | 79.1392  | 10.1804   | -6.2901   | 102.0494 | 3.6729    | -3.3684   |
| 141   | 102.0494 | 3.6729    | -3.3684   | 96.9473  | -2.8349   | -0.4393   |
| 142   | 96.9473  | -2.8349   | -0.4393   | 124.6621 | 24.8524   | 48.1025   |
| 143   | 124.6621 | 24.8524   | 48.1025   | 209.0627 | 51.4963   | 115.5858  |
| 144   | 209.0627 | 51.4963   | 115.5858  | 288.4036 | 47.7890   | 103.5600  |
| 145   | 288.4036 | 47.7890   | 103.5600  | 363.4221 | 43.7496   | 91.5305   |
| 146   | 363.4221 | 43.7496   | 91.5305   | 431.7104 | 39.4128   | 79.5098   |
| 147   | 431.7104 | 39.4128   | 79.5098   | 493.0876 | 7.1411    | -5.6428   |
| 148   | 493.0876 | 7.1411    | -5.6428   | 545.9160 | 32.3664   | 61.7034   |
| 149   | 545.9160 | 32.3664   | 61.7034   | 583.5576 | 27.3629   | 49.7515   |
| 150   | 583.5576 | 27.3629   | 49.7515   | 607.2958 | 22.0993   | 37.8209   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 607.2958 | 22.0993   | 37.8209   | 621.8462 | -10.6152  | -47.1561  |
| 152   | 621.8462 | -10.6152  | -47.1561  | 622.5999 | -16.1522  | -59.0999  |
| 153   | 622.5999 | -16.1522  | -59.0999  | 602.5519 | 8.1344    | 8.0366    |
| 154   | 602.5519 | 8.1344    | 8.0366    | 567.6990 | -24.8110  | -76.9671  |
| 155   | 567.6990 | -24.8110  | -76.9671  | 519.6293 | -27.7539  | -82.6645  |
| 156   | 519.6293 | -27.7539  | -82.6645  | 452.6738 | -33.7390  | -94.7225  |
| 157   | 452.6738 | -33.7390  | -94.7225  | 364.8311 | -39.8172  | -106.8564 |
| 158   | 364.8311 | -39.8172  | -106.8564 | 262.2587 | -72.8844  | -191.9869 |
| 159   | 262.2587 | -72.8844  | -191.9869 | 142.2910 | -79.0717  | -204.0289 |
| 160   | 142.2910 | -79.0717  | -204.0289 | 0.0006   | 6.5967    | -4.2708   |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| 1     | -0.0159   | 55.2985   | 136.9941 | -18.3530  | -10.1977  | 7.6498  |
| 2     | -18.3530  | -10.1977  | 7.6498   | -36.7052  | -10.1962  | 7.6413  |
| 3     | -36.7052  | -10.1962  | 7.6413   | -55.0689  | -10.1953  | 7.6224  |
| 4     | -55.0689  | -10.1953  | 7.6224   | -73.4151  | -10.1941  | 7.6130  |
| 5     | -73.4151  | -10.1941  | 7.6130   | -91.7629  | -10.1969  | 7.5937  |
| 6     | -91.7629  | -10.1969  | 7.5937   | -110.1287 | -10.1978  | 7.5726  |
| 7     | -110.1287 | -10.1978  | 7.5726   | -128.4840 | -10.1899  | 7.5244  |
| 8     | -128.4840 | -10.1899  | 7.5244   | -146.8289 | -10.1826  | 7.5033  |
| 9     | -146.8289 | -10.1826  | 7.5033   | -165.1508 | -10.1791  | 7.4641  |
| 10    | -165.1508 | -10.1791  | 7.4641   | -183.4763 | -10.1794  | 7.4016  |
| 11    | -183.4763 | -10.1794  | 7.4016   | -201.7928 | -10.1828  | 7.3647  |
| 12    | -201.7928 | -10.1828  | 7.3647   | -220.1219 | -10.1824  | 7.3187  |
| 13    | -220.1219 | -10.1824  | 7.3187   | -238.4496 | -10.1752  | 7.2636  |
| 14    | -238.4496 | -10.1752  | 7.2636   | -256.7662 | -10.1752  | 7.1694  |
| 15    | -256.7662 | -10.1752  | 7.1694   | -275.0828 | -10.1800  | 7.1725  |
| 16    | -275.0828 | -10.1800  | 7.1725   | -293.4064 | -10.1789  | 7.0544  |
| 17    | -293.4064 | -10.1789  | 7.0544   | -311.7203 | -10.1768  | 6.9446  |
| 18    | -311.7203 | -10.1768  | 6.9446   | -330.0418 | -10.1777  | 6.9402  |
| 19    | -330.0418 | -10.1777  | 6.9402   | -348.3656 | -10.1795  | 6.8077  |
| 20    | -348.3656 | -10.1795  | 6.8077   | -366.7200 | 23.4737   | 74.8836 |
| 21    | -366.7200 | 23.4737   | 74.8836  | -290.8150 | 8.8211    | -5.2850 |
| 22    | -290.8150 | 8.8211    | -5.2850  | -270.9615 | 8.8228    | -5.4208 |
| 23    | -270.9615 | 8.8228    | -5.4208  | -251.1070 | 8.8222    | -5.5062 |
| 24    | -251.1070 | 8.8222    | -5.5062  | -231.2553 | 8.8232    | -5.5050 |
| 25    | -231.2553 | 8.8232    | -5.5050  | -211.3972 | 8.8258    | -5.5704 |
| 26    | -211.3972 | 8.8258    | -5.5704  | -191.5405 | 8.8229    | -5.6972 |
| 27    | -191.5405 | 8.8229    | -5.6972  | -171.6926 | 8.8227    | -5.7576 |
| 28    | -171.6926 | 8.8227    | -5.7576  | -151.8370 | 8.8243    | -5.7829 |
| 29    | -151.8370 | 8.8243    | -5.7829  | -131.9820 | 8.8251    | -5.8497 |
| 30    | -131.9820 | 8.8251    | -5.8497  | -126.9397 | -10.1751  | 6.2364  |
| 31    | -126.9397 | -10.1751  | 6.2364   | -149.8340 | -10.1712  | 6.1851  |
| 32    | -149.8340 | -10.1712  | 6.1851   | -172.7204 | -10.1752  | 6.1070  |
| 33    | -172.7204 | -10.1752  | 6.1070   | -195.6237 | -10.1838  | 6.1087  |
| 34    | -195.6237 | -10.1838  | 6.1087   | -218.5430 | -10.1868  | 6.0391  |
| 35    | -218.5430 | -10.1868  | 6.0391   | -241.4680 | -10.1874  | 5.8946  |
| 36    | -241.4680 | -10.1874  | 5.8946   | -264.3839 | -10.1856  | 5.8526  |
| 37    | -264.3839 | -10.1856  | 5.8526   | -287.3080 | -10.1843  | 5.7599  |
| 38    | -287.3080 | -10.1843  | 5.7599   | -310.2150 | -10.1837  | 5.6738  |
| 39    | -310.2150 | -10.1837  | 5.6738   | -333.1287 | -10.1821  | 5.6144  |
| 40    | -333.1287 | -10.1821  | 5.6144   | -356.0552 | 23.3274   | 74.2266 |
| 41    | -356.0552 | 23.3274   | 74.2266  | -329.8272 | 10.0032   | -5.5914 |
| 42    | -329.8272 | 10.0032   | -5.5914  | -307.3145 | 10.0018   | -5.7009 |
| 43    | -307.3145 | 10.0018   | -5.7009  | -284.8043 | 10.0007   | -5.7931 |
| 44    | -284.8043 | 10.0007   | -5.7931  | -262.2935 | 10.0019   | -5.8324 |
| 45    | -262.2935 | 10.0019   | -5.8324  | -239.7859 | 10.0031   | -5.9061 |
| 46    | -239.7859 | 10.0031   | -5.9061  | -217.2793 | 10.0025   | -6.0177 |
| 47    | -217.2793 | 10.0025   | -6.0177  | -194.7783 | 9.9972    | -6.0792 |
| 48    | -194.7783 | 9.9972    | -6.0792  | -172.2885 | 9.9951    | -6.1361 |
| 49    | -172.2885 | 9.9951    | -6.1361  | -149.7899 | 10.0028   | -6.1659 |
| 50    | -149.7899 | 10.0028   | -6.1659  | -128.1538 | -10.0933  | 6.2319  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|---------|-----------|-----------|----------|
| 51    | -128.1538 | -10.0933  | 6.2319  | -150.8698 | -10.0915  | 6.1925   |
| 52    | -150.8698 | -10.0915  | 6.1925  | -173.5676 | -10.0859  | 6.1382   |
| 53    | -173.5676 | -10.0859  | 6.1382  | -196.2608 | -10.0816  | 6.0483   |
| 54    | -196.2608 | -10.0816  | 6.0483  | -218.9632 | -10.0819  | 5.9845   |
| 55    | -218.9632 | -10.0819  | 5.9845  | -241.6528 | -10.0847  | 5.9550   |
| 56    | -241.6528 | -10.0847  | 5.9550  | -264.3410 | -10.0861  | 5.8634   |
| 57    | -264.3410 | -10.0861  | 5.8634  | -287.0449 | -10.0855  | 5.7809   |
| 58    | -287.0449 | -10.0855  | 5.7809  | -309.7299 | -10.0838  | 5.7398   |
| 59    | -309.7299 | -10.0838  | 5.7398  | -332.4202 | -10.0820  | 5.5816   |
| 60    | -332.4202 | -10.0820  | 5.5816  | -355.1057 | 23.3684   | 74.2476  |
| 61    | -355.1057 | 23.3684   | 74.2476 | -332.2048 | 10.0666   | -5.5748  |
| 62    | -332.2048 | 10.0666   | -5.5748 | -309.5564 | 10.0674   | -5.7333  |
| 63    | -309.5564 | 10.0674   | -5.7333 | -286.8995 | 10.0696   | -5.8257  |
| 64    | -286.8995 | 10.0696   | -5.8257 | -264.2444 | 10.0739   | -5.8667  |
| 65    | -264.2444 | 10.0739   | -5.8667 | -241.5710 | 10.0765   | -5.9081  |
| 66    | -241.5710 | 10.0765   | -5.9081 | -218.8920 | 10.0788   | -6.0217  |
| 67    | -218.8920 | 10.0788   | -6.0217 | -196.2022 | 10.0830   | -6.0910  |
| 68    | -196.2022 | 10.0830   | -6.0910 | -173.5116 | 10.0810   | -6.1149  |
| 69    | -173.5116 | 10.0810   | -6.1149 | -150.8358 | 10.0782   | -6.1620  |
| 70    | -150.8358 | 10.0782   | -6.1620 | -128.1634 | -10.0828  | 6.1903   |
| 71    | -128.1634 | -10.0828  | 6.1903  | -150.8495 | -10.0801  | 6.1466   |
| 72    | -150.8495 | -10.0801  | 6.1466  | -173.5217 | -10.0760  | 6.1167   |
| 73    | -173.5217 | -10.0760  | 6.1167  | -196.2046 | -10.0767  | 6.0267   |
| 74    | -196.2046 | -10.0767  | 6.0267  | -218.8887 | -10.0814  | 5.9769   |
| 75    | -218.8887 | -10.0814  | 5.9769  | -241.5735 | -10.0830  | 5.9320   |
| 76    | -241.5735 | -10.0830  | 5.9320  | -264.2661 | -10.0807  | 5.8066   |
| 77    | -264.2661 | -10.0807  | 5.8066  | -286.9447 | -10.0825  | 5.7751   |
| 78    | -286.9447 | -10.0825  | 5.7751  | -309.6324 | -10.0830  | 5.7164   |
| 79    | -309.6324 | -10.0830  | 5.7164  | -332.3173 | -10.0819  | 5.5162   |
| 80    | -332.3173 | -10.0819  | 5.5162  | -355.0204 | 23.3598   | 74.1761  |
| 81    | -355.0204 | 23.3598   | 74.1761 | -332.3351 | 10.0801   | -5.5854  |
| 82    | -332.3351 | 10.0801   | -5.5854 | -309.6479 | 10.0796   | -5.6867  |
| 83    | -309.6479 | 10.0796   | -5.6867 | -286.9716 | 10.0800   | -5.8201  |
| 84    | -286.9716 | 10.0800   | -5.8201 | -264.2968 | 10.0770   | -5.8730  |
| 85    | -264.2968 | 10.0770   | -5.8730 | -241.6172 | 10.0764   | -5.9445  |
| 86    | -241.6172 | 10.0764   | -5.9445 | -218.9334 | 10.0810   | -6.0221  |
| 87    | -218.9334 | 10.0810   | -6.0221 | -196.2526 | 10.0813   | -6.0536  |
| 88    | -196.2526 | 10.0813   | -6.0536 | -173.5687 | 10.0848   | -6.1739  |
| 89    | -173.5687 | 10.0848   | -6.1739 | -150.8752 | 10.0882   | -6.2301  |
| 90    | -150.8752 | 10.0882   | -6.2301 | -128.1815 | 10.0897   | -6.2280  |
| 91    | -128.1815 | 10.0897   | -6.2280 | -150.7677 | -10.0678  | 6.1507   |
| 92    | -150.7677 | -10.0678  | 6.1507  | -173.4343 | -10.0735  | 6.1099   |
| 93    | -173.4343 | -10.0735  | 6.1099  | -196.1133 | -10.0806  | 6.0796   |
| 94    | -196.1133 | -10.0806  | 6.0796  | -218.7908 | -10.0849  | 5.9818   |
| 95    | -218.7908 | -10.0849  | 5.9818  | -241.4850 | -10.0854  | 5.9078   |
| 96    | -241.4850 | -10.0854  | 5.9078  | -264.1692 | -10.0846  | 5.8287   |
| 97    | -264.1692 | -10.0846  | 5.8287  | -286.8620 | -10.0850  | 5.7372   |
| 98    | -286.8620 | -10.0850  | 5.7372  | -309.5602 | -10.0840  | 5.6981   |
| 99    | -309.5602 | -10.0840  | 5.6981  | -332.2421 | -10.0816  | 5.5464   |
| 100   | -332.2421 | -10.0816  | 5.5464  | -354.9757 | -23.3556  | -74.2850 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -354.9757 | -23.3556  | -74.2850 | -332.3086 | 10.0810   | -5.5519  |
| 102   | -332.3086 | 10.0810   | -5.5519  | -309.6302 | 10.0793   | -5.6487  |
| 103   | -309.6302 | 10.0793   | -5.6487  | -286.9540 | 10.0810   | -5.7955  |
| 104   | -286.9540 | 10.0810   | -5.7955  | -264.2626 | 10.0826   | -5.8474  |
| 105   | -264.2626 | 10.0826   | -5.8474  | -241.5765 | 10.0805   | -5.9212  |
| 106   | -241.5765 | 10.0805   | -5.9212  | -218.8920 | 10.0823   | -6.0294  |
| 107   | -218.8920 | 10.0823   | -6.0294  | -196.2036 | 10.0868   | -6.0926  |
| 108   | -196.2036 | 10.0868   | -6.0926  | -173.5107 | 10.0875   | -6.1221  |
| 109   | -173.5107 | 10.0875   | -6.1221  | -150.8058 | 10.0863   | -6.1706  |
| 110   | -150.8058 | 10.0863   | -6.1706  | -128.1162 | 10.0856   | -6.2192  |
| 111   | -128.1162 | 10.0856   | -6.2192  | -149.8524 | -10.0081  | 6.1909   |
| 112   | -149.8524 | -10.0081  | 6.1909   | -172.3604 | -10.0036  | 6.1425   |
| 113   | -172.3604 | -10.0036  | 6.1425   | -194.8705 | -10.0006  | 6.0798   |
| 114   | -194.8705 | -10.0006  | 6.0798   | -217.3719 | -9.9999   | 5.9821   |
| 115   | -217.3719 | -9.9999   | 5.9821   | -239.8835 | -10.0023  | 5.9109   |
| 116   | -239.8835 | -10.0023  | 5.9109   | -262.3813 | -10.0030  | 5.8773   |
| 117   | -262.3813 | -10.0030  | 5.8773   | -284.8939 | -10.0051  | 5.8273   |
| 118   | -284.8939 | -10.0051  | 5.8273   | -307.4127 | -10.0058  | 5.6837   |
| 119   | -307.4127 | -10.0058  | 5.6837   | -329.9294 | -10.0064  | 5.5871   |
| 120   | -329.9294 | -10.0064  | 5.5871   | -356.0280 | -23.3278  | -74.2288 |
| 121   | -356.0280 | -23.3278  | -74.2288 | -333.1010 | 10.1793   | -5.5899  |
| 122   | -333.1010 | 10.1793   | -5.5899  | -310.1970 | 10.1797   | -5.6885  |
| 123   | -310.1970 | 10.1797   | -5.6885  | -287.2969 | 10.1798   | -5.7866  |
| 124   | -287.2969 | 10.1798   | -5.7866  | -264.3884 | 10.1807   | -5.8320  |
| 125   | -264.3884 | 10.1807   | -5.8320  | -241.4772 | 10.1765   | -5.9515  |
| 126   | -241.4772 | 10.1765   | -5.9515  | -218.5789 | 10.1741   | -6.0212  |
| 127   | -218.5789 | 10.1741   | -6.0212  | -195.6971 | 10.1727   | -6.0805  |
| 128   | -195.6971 | 10.1727   | -6.0805  | -172.8091 | 10.1731   | -6.1458  |
| 129   | -172.8091 | 10.1731   | -6.1458  | -149.9205 | 10.1744   | -6.1642  |
| 130   | -149.9205 | 10.1744   | -6.1642  | -127.0309 | 10.1747   | -6.2281  |
| 131   | -127.0309 | 10.1747   | -6.2281  | -132.0098 | -8.8147   | 5.8000   |
| 132   | -132.0098 | -8.8147   | 5.8000   | -151.8391 | -8.8161   | 5.7793   |
| 133   | -151.8391 | -8.8161   | 5.7793   | -171.6761 | -8.8196   | 5.7243   |
| 134   | -171.6761 | -8.8196   | 5.7243   | -191.5201 | -8.8172   | 5.6674   |
| 135   | -191.5201 | -8.8172   | 5.6674   | -211.3537 | -8.8134   | 5.5752   |
| 136   | -211.3537 | -8.8134   | 5.5752   | -231.1867 | -8.8125   | 5.5088   |
| 137   | -231.1867 | -8.8125   | 5.5088   | -251.0123 | -8.8127   | 5.4663   |
| 138   | -251.0123 | -8.8127   | 5.4663   | -270.8492 | -8.8137   | 5.3860   |
| 139   | -270.8492 | -8.8137   | 5.3860   | -290.6844 | -8.8142   | 5.2983   |
| 140   | -290.6844 | -8.8142   | 5.2983   | -366.8821 | -23.4747  | -74.9346 |
| 141   | -366.8821 | -23.4747  | -74.9346 | -348.5312 | 10.1891   | -6.9419  |
| 142   | -348.5312 | 10.1891   | -6.9419  | -330.1887 | 10.1875   | -6.9465  |
| 143   | -330.1887 | 10.1875   | -6.9465  | -311.8550 | 10.1901   | -7.0085  |
| 144   | -311.8550 | 10.1901   | -7.0085  | -293.4948 | 10.1903   | -7.1322  |
| 145   | -293.4948 | 10.1903   | -7.1322  | -275.1549 | 10.1895   | -7.1786  |
| 146   | -275.1549 | 10.1895   | -7.1786  | -256.8052 | 10.1859   | -7.2359  |
| 147   | -256.8052 | 10.1859   | -7.2359  | -238.4799 | 10.1831   | -7.2835  |
| 148   | -238.4799 | 10.1831   | -7.2835  | -220.1563 | 10.1855   | -7.3693  |
| 149   | -220.1563 | 10.1855   | -7.3693  | -201.8254 | 10.1830   | -7.4156  |
| 150   | -201.8254 | 10.1830   | -7.4156  | -183.5019 | 10.1802   | -7.4543  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|---------|-----------|-----------|-----------|
| 151   | -183.5019 | 10.1802   | -7.4543 | -165.1602 | 10.1837   | -7.5256   |
| 152   | -165.1602 | 10.1837   | -7.5256 | -146.8199 | 10.1864   | -7.5590   |
| 153   | -146.8199 | 10.1864   | -7.5590 | -128.4922 | 10.1890   | -7.5581   |
| 154   | -128.4922 | 10.1890   | -7.5581 | -110.1396 | 10.1936   | -7.5967   |
| 155   | -110.1396 | 10.1936   | -7.5967 | -91.7869  | 10.1978   | -7.6579   |
| 156   | -91.7869  | 10.1978   | -7.6579 | -73.4251  | 10.2017   | -7.6624   |
| 157   | -73.4251  | 10.2017   | -7.6624 | -55.0687  | 10.1978   | -7.6581   |
| 158   | -55.0687  | 10.1978   | -7.6581 | -36.7116  | 10.1958   | -7.6768   |
| 159   | -36.7116  | 10.1958   | -7.6768 | -18.3567  | 10.1968   | -7.6875   |
| 160   | -18.3567  | 10.1968   | -7.6875 | -0.0180   | -75.9732  | -197.9371 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0158   | 82.1833   | 210.0965 | 142.2997  | 79.0733   | 204.0045 |
| 2     | 142.2997  | 79.0733   | 204.0045 | 262.3151  | 72.8892   | 191.9174 |
| 3     | 262.3151  | 72.8892   | 191.9174 | 360.4328  | 66.7686   | 179.9279 |
| 4     | 360.4328  | 66.7686   | 179.9279 | 437.1144  | 60.7306   | 167.9035 |
| 5     | 437.1144  | 60.7306   | 167.9035 | 493.0745  | 54.8062   | 155.9526 |
| 6     | 493.0745  | 54.8062   | 155.9526 | 560.2541  | 51.8985   | 150.0305 |
| 7     | 560.2541  | 51.8985   | 150.0305 | 581.6548  | 46.1750   | 138.2240 |
| 8     | 581.6548  | 46.1750   | 138.2240 | 584.8989  | 40.6124   | 126.2629 |
| 9     | 584.8989  | 40.6124   | 126.2629 | 571.2536  | 35.2450   | 114.3799 |
| 10    | 571.2536  | 35.2450   | 114.3799 | 542.2186  | 30.0979   | 102.5502 |
| 11    | 542.2186  | 30.0979   | 102.5502 | 547.2919  | 27.6369   | 96.6229  |
| 12    | 547.2919  | 27.6369   | 96.6229  | 494.0353  | 22.8695   | 84.6810  |
| 13    | 494.0353  | 22.8695   | 84.6810  | 430.0379  | 18.3687   | 72.7226  |
| 14    | 430.0379  | 18.3687   | 72.7226  | 357.3804  | 14.1747   | 60.7934  |
| 15    | 357.3804  | 14.1747   | 60.7934  | 278.3080  | 10.3078   | 48.7034  |
| 16    | 278.3080  | 10.3078   | 48.7034  | 244.7914  | 8.4987    | 42.7646  |
| 17    | 244.7914  | 8.4987    | 42.7646  | 157.4340  | 5.1440    | 31.0699  |
| 18    | 157.4340  | 5.1440    | 31.0699  | 91.7983   | 2.8314    | 0.4399   |
| 19    | 91.7983   | 2.8314    | 0.4399   | 96.8951   | 2.8318    | 0.4766   |
| 20    | 96.8951   | 2.8318    | 0.4766   | -102.8671 | 41.8362   | 113.8420 |
| 21    | -102.8671 | 41.8362   | 113.8420 | 13.0111   | 83.4733   | 207.4595 |
| 22    | 13.0111   | 83.4733   | 207.4595 | 125.8140  | 80.1033   | 197.7559 |
| 23    | 125.8140  | 80.1033   | 197.7559 | 233.5715  | 76.4315   | 187.7601 |
| 24    | 233.5715  | 76.4315   | 187.7601 | 301.3928  | 70.4301   | 172.7135 |
| 25    | 301.3928  | 70.4301   | 172.7135 | 391.2596  | 66.1572   | 162.8578 |
| 26    | 391.2596  | 66.1572   | 162.8578 | 468.7806  | 61.7017   | 153.1608 |
| 27    | 468.7806  | 61.7017   | 153.1608 | 532.6423  | 57.1217   | 143.3073 |
| 28    | 532.6423  | 57.1217   | 143.3073 | 544.1393  | 50.0648   | 128.4537 |
| 29    | 544.1393  | 50.0648   | 128.4537 | 574.9948  | 45.3050   | 118.7681 |
| 30    | 574.9948  | 45.3050   | 118.7681 | 589.8346  | 40.5411   | 108.8508 |
| 31    | 589.8346  | 40.5411   | 108.8508 | 588.6417  | 35.8033   | 99.1051  |
| 32    | 588.6417  | 35.8033   | 99.1051  | 525.1681  | 28.8452   | 84.3954  |
| 33    | 525.1681  | 28.8452   | 84.3954  | 491.3890  | 24.3741   | 74.4117  |
| 34    | 491.3890  | 24.3741   | 74.4117  | 444.2181  | 20.0528   | 64.5928  |
| 35    | 444.2181  | 20.0528   | 64.5928  | 385.1515  | 15.9380   | 54.8549  |
| 36    | 385.1515  | 15.9380   | 54.8549  | 266.9908  | 10.2113   | 39.8785  |
| 37    | 266.9908  | 10.2113   | 39.8785  | 26.7776   | 8.8169    | -5.9665  |
| 38    | 26.7776   | 8.8169    | -5.9665  | 46.6130   | 8.8165    | -5.9609  |
| 39    | 46.6130   | 8.8165    | -5.9609  | 66.4544   | 8.8168    | -5.9462  |
| 40    | 66.4544   | 8.8168    | -5.9462  | -99.8239  | 41.7984   | 112.8389 |
| 41    | -99.8239  | 41.7984   | 112.8389 | 17.8054   | 83.3288   | 207.3668 |
| 42    | 17.8054   | 83.3288   | 207.3668 | 131.8083  | 79.9121   | 197.6295 |
| 43    | 131.8083  | 79.9121   | 197.6295 | 240.3177  | 76.2014   | 187.6647 |
| 44    | 240.3177  | 76.2014   | 187.6647 | 308.6909  | 70.1624   | 172.6649 |
| 45    | 308.6909  | 70.1624   | 172.6649 | 398.3379  | 65.8779   | 162.8143 |
| 46    | 398.3379  | 65.8779   | 162.8143 | 475.4561  | 61.4286   | 153.0384 |
| 47    | 475.4561  | 61.4286   | 153.0384 | 538.7744  | 56.8463   | 143.2211 |
| 48    | 538.7744  | 56.8463   | 143.2211 | 549.4958  | 49.8044   | 128.4261 |
| 49    | 549.4958  | 49.8044   | 128.4261 | 579.6196  | 45.0416   | 118.5537 |
| 50    | 579.6196  | 45.0416   | 118.5537 | 593.6162  | 40.2738   | 108.7916 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 593.6162 | 40.2738   | 108.7916 | 591.5624 | 35.5597   | 99.0001  |
| 52    | 591.5624 | 35.5597   | 99.0001  | 527.2981 | 28.6233   | 84.2447  |
| 53    | 527.2981 | 28.6233   | 84.2447  | 492.7533 | 24.1664   | 74.5188  |
| 54    | 492.7533 | 24.1664   | 74.5188  | 444.9532 | 19.8734   | 64.6735  |
| 55    | 444.9532 | 19.8734   | 64.6735  | 385.4193 | 15.7828   | 54.7281  |
| 56    | 385.4193 | 15.7828   | 54.7281  | 266.9111 | 10.1111   | 39.8445  |
| 57    | 266.9111 | 10.1111   | 39.8445  | 30.4228  | 10.0116   | -6.3212  |
| 58    | 30.4228  | 10.0116   | -6.3212  | 52.9486  | 10.0125   | -6.3129  |
| 59    | 52.9486  | 10.0125   | -6.3129  | 75.4844  | 10.0139   | -6.2803  |
| 60    | 75.4844  | 10.0139   | -6.2803  | -99.5722 | 41.8087   | 112.8303 |
| 61    | -99.5722 | 41.8087   | 112.8303 | 18.2786  | 83.3216   | 207.3875 |
| 62    | 18.2786  | 83.3216   | 207.3875 | 132.3693 | 79.9039   | 197.6619 |
| 63    | 132.3693 | 79.9039   | 197.6619 | 240.9650 | 76.1912   | 187.7059 |
| 64    | 240.9650 | 76.1912   | 187.7059 | 309.3844 | 70.1450   | 172.7115 |
| 65    | 309.3844 | 70.1450   | 172.7115 | 399.0348 | 65.8453   | 162.7977 |
| 66    | 399.0348 | 65.8453   | 162.7977 | 476.1105 | 61.3797   | 153.0509 |
| 67    | 476.1105 | 61.3797   | 153.0509 | 539.2881 | 56.7859   | 143.2124 |
| 68    | 539.2881 | 56.7859   | 143.2124 | 549.9206 | 49.7463   | 128.3337 |
| 69    | 549.9206 | 49.7463   | 128.3337 | 579.8938 | 45.0002   | 118.5524 |
| 70    | 579.8938 | 45.0002   | 118.5524 | 593.7610 | 40.2505   | 108.8987 |
| 71    | 593.7610 | 40.2505   | 108.8987 | 591.6171 | 35.5379   | 99.1037  |
| 72    | 591.6171 | 35.5379   | 99.1037  | 527.2815 | 28.6083   | 84.2524  |
| 73    | 527.2815 | 28.6083   | 84.2524  | 492.6995 | 24.1497   | 74.5348  |
| 74    | 492.6995 | 24.1497   | 74.5348  | 444.8810 | 19.8625   | 64.6686  |
| 75    | 444.8810 | 19.8625   | 64.6686  | 385.3699 | 15.7836   | 54.7450  |
| 76    | 385.3699 | 15.7836   | 54.7450  | 266.8791 | 10.1067   | 39.8955  |
| 77    | 266.8791 | 10.1067   | 39.8955  | 30.6591  | 10.0819   | -6.3394  |
| 78    | 30.6591  | 10.0819   | -6.3394  | 53.3463  | 10.0817   | -6.3266  |
| 79    | 53.3463  | 10.0817   | -6.3266  | 76.0348  | 10.0817   | -6.2864  |
| 80    | 76.0348  | 10.0817   | -6.2864  | -99.5712 | 41.8066   | 112.8221 |
| 81    | -99.5712 | 41.8066   | 112.8221 | 18.2495  | 83.3132   | 207.3613 |
| 82    | 18.2495  | 83.3132   | 207.3613 | 132.4327 | 79.8923   | 197.6214 |
| 83    | 132.4327 | 79.8923   | 197.6214 | 240.9406 | 76.1811   | 187.7131 |
| 84    | 240.9406 | 76.1811   | 187.7131 | 309.3428 | 70.1386   | 172.7103 |
| 85    | 309.3428 | 70.1386   | 172.7103 | 398.9852 | 65.8435   | 162.8798 |
| 86    | 398.9852 | 65.8435   | 162.8798 | 476.0300 | 61.3829   | 152.9803 |
| 87    | 476.0300 | 61.3829   | 152.9803 | 539.3097 | 56.7981   | 143.1277 |
| 88    | 539.3097 | 56.7981   | 143.1277 | 549.8947 | 49.7519   | 128.5336 |
| 89    | 549.8947 | 49.7519   | 128.5336 | 579.8229 | 44.9898   | 118.7314 |
| 90    | 579.8229 | 44.9898   | 118.7314 | 593.7087 | 40.2310   | 108.7560 |
| 91    | 593.7087 | 40.2310   | 108.7560 | 591.5358 | 35.5121   | 99.1077  |
| 92    | 591.5358 | 35.5121   | 99.1077  | 527.1494 | 28.6060   | 84.2960  |
| 93    | 527.1494 | 28.6060   | 84.2960  | 492.6390 | 24.1602   | 74.4065  |
| 94    | 492.6390 | 24.1602   | 74.4065  | 444.8124 | 19.8735   | 64.6523  |
| 95    | 444.8124 | 19.8735   | 64.6523  | 385.3098 | 15.7819   | 54.7838  |
| 96    | 385.3098 | 15.7819   | 54.7838  | 266.8595 | 10.1166   | 39.8675  |
| 97    | 266.8595 | 10.1166   | 39.8675  | 30.6792  | 10.0810   | -6.3476  |
| 98    | 30.6792  | 10.0810   | -6.3476  | 53.3711  | 10.0813   | -6.3430  |
| 99    | 53.3711  | 10.0813   | -6.3430  | 76.0531  | 10.0824   | -6.3077  |
| 100   | 76.0531  | 10.0824   | -6.3077  | -99.5828 | 41.8055   | 112.8138 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 101   | -99.5828 | 41.8055   | 112.8138 | 18.2974  | 83.3122   | 207.3286 |
| 102   | 18.2974  | 83.3122   | 207.3286 | 132.4352 | 79.8913   | 197.6176 |
| 103   | 132.4352 | 79.8913   | 197.6176 | 240.9179 | 76.1768   | 187.6811 |
| 104   | 240.9179 | 76.1768   | 187.6811 | 309.3514 | 70.1299   | 172.6927 |
| 105   | 309.3514 | 70.1299   | 172.6927 | 398.9976 | 65.8381   | 162.8424 |
| 106   | 398.9976 | 65.8381   | 162.8424 | 476.0785 | 61.3811   | 153.0577 |
| 107   | 476.0785 | 61.3811   | 153.0577 | 539.2255 | 56.7858   | 143.2377 |
| 108   | 539.2255 | 56.7858   | 143.2377 | 549.7917 | 49.7287   | 128.3535 |
| 109   | 549.7917 | 49.7287   | 128.3535 | 579.7125 | 44.9876   | 118.5823 |
| 110   | 579.7125 | 44.9876   | 118.5823 | 593.5443 | 40.2353   | 108.7961 |
| 111   | 593.5443 | 40.2353   | 108.7961 | 591.4050 | 35.5104   | 99.0321  |
| 112   | 591.4050 | 35.5104   | 99.0321  | 526.9552 | 28.5803   | 84.2504  |
| 113   | 526.9552 | 28.5803   | 84.2504  | 492.3489 | 24.1156   | 74.4529  |
| 114   | 492.3489 | 24.1156   | 74.4529  | 444.4386 | 19.8235   | 64.6962  |
| 115   | 444.4386 | 19.8235   | 64.6962  | 384.8579 | 15.7429   | 54.8168  |
| 116   | 384.8579 | 15.7429   | 54.8168  | 8.1609   | 10.0943   | -6.3431  |
| 117   | 8.1609   | 10.0943   | -6.3431  | 30.8697  | 10.0949   | -6.3378  |
| 118   | 30.8697  | 10.0949   | -6.3378  | 53.5872  | 10.0949   | -6.3156  |
| 119   | 53.5872  | 10.0949   | -6.3156  | 76.3031  | 10.0943   | -6.2984  |
| 120   | 76.3031  | 10.0943   | -6.2984  | -99.2514 | 41.7943   | 112.8418 |
| 121   | -99.2514 | 41.7943   | 112.8418 | 18.7779  | 83.2497   | 207.3294 |
| 122   | 18.7779  | 83.2497   | 207.3294 | 132.9244 | 79.7970   | 197.6139 |
| 123   | 132.9244 | 79.7970   | 197.6139 | 241.3159 | 76.0516   | 187.6215 |
| 124   | 241.3159 | 76.0516   | 187.6215 | 309.4807 | 69.9575   | 172.6653 |
| 125   | 309.4807 | 69.9575   | 172.6653 | 398.6454 | 65.6379   | 162.8661 |
| 126   | 398.6454 | 65.6379   | 162.8661 | 475.2134 | 61.1553   | 152.9839 |
| 127   | 475.2134 | 61.1553   | 152.9839 | 537.7156 | 56.5538   | 143.1814 |
| 128   | 537.7156 | 56.5538   | 143.1814 | 547.4720 | 49.4747   | 128.3891 |
| 129   | 547.4720 | 49.4747   | 128.3891 | 576.6874 | 44.6909   | 118.5100 |
| 130   | 576.6874 | 44.6909   | 118.5100 | 589.6683 | 39.9230   | 108.8479 |
| 131   | 589.6683 | 39.9230   | 108.8479 | 586.6960 | 35.1886   | 99.0455  |
| 132   | 586.6960 | 35.1886   | 99.0455  | 521.6001 | 28.2754   | 84.1696  |
| 133   | 521.6001 | 28.2754   | 84.1696  | 486.4739 | 23.8337   | 74.3716  |
| 134   | 486.4739 | 23.8337   | 74.3716  | 438.3391 | 19.5600   | 64.5395  |
| 135   | 438.3391 | 19.5600   | 64.5395  | 378.7870 | 15.4988   | 54.7290  |
| 136   | 378.7870 | 15.4988   | 54.7290  | 10.4131  | 10.1805   | -6.3310  |
| 137   | 10.4131  | 10.1805   | -6.3310  | 33.3217  | 10.1823   | -6.3264  |
| 138   | 33.3217  | 10.1823   | -6.3264  | 56.2366  | 10.1812   | -6.3120  |
| 139   | 56.2366  | 10.1812   | -6.3120  | 79.1392  | 10.1804   | -6.2901  |
| 140   | 79.1392  | 10.1804   | -6.2901  | -95.3842 | 41.8506   | 110.5259 |
| 141   | -95.3842 | 41.8506   | 110.5259 | 22.9478  | 84.8521   | 206.5246 |
| 142   | 22.9478  | 84.8521   | 206.5246 | 104.3992 | 81.4976   | 194.7192 |
| 143   | 104.3992 | 81.4976   | 194.7192 | 184.4012 | 77.7919   | 182.6887 |
| 144   | 184.4012 | 77.7919   | 182.6887 | 260.7108 | 73.7542   | 170.6597 |
| 145   | 260.7108 | 73.7542   | 170.6597 | 361.0878 | 71.6173   | 164.6826 |
| 146   | 361.0878 | 71.6173   | 164.6826 | 423.2310 | 67.1274   | 152.6645 |
| 147   | 423.2310 | 67.1274   | 152.6645 | 475.7103 | 62.3749   | 140.6966 |
| 148   | 475.7103 | 62.3749   | 140.6966 | 516.3515 | 57.3568   | 128.8427 |
| 149   | 516.3515 | 57.3568   | 128.8427 | 543.4924 | 52.1060   | 116.8967 |
| 150   | 543.4924 | 52.1060   | 116.8967 | 595.9303 | 49.4029   | 111.0056 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortantel | Torsor1  | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|----------|----------|-----------|---------|
| 151   | 595.9303 | 49.4029   | 111.0056 | 594.6980 | 43.8486   | 99.1873 |
| 152   | 594.6980 | 43.8486   | 99.1873  | 575.8886 | 38.1402   | 87.2406 |
| 153   | 575.8886 | 38.1402   | 87.2406  | 538.4803 | 32.2683   | 75.1992 |
| 154   | 538.4803 | 32.2683   | 75.1992  | 481.1646 | 26.2693   | 63.3702 |
| 155   | 481.1646 | 26.2693   | 63.3702  | 465.6904 | 23.2347   | 57.6143 |
| 156   | 465.6904 | 23.2347   | 57.6143  | 371.5674 | 17.1087   | 45.4960 |
| 157   | 371.5674 | 17.1087   | 45.4960  | 255.8656 | 10.9254   | 33.4010 |
| 158   | 255.8656 | 10.9254   | 33.4010  | -36.7116 | 10.1958   | -7.6768 |
| 159   | -36.7116 | 10.1958   | -7.6768  | -18.3567 | 10.1968   | -7.6875 |
| 160   | -18.3567 | 10.1968   | -7.6875  | -0.0003  | 10.1955   | -7.6911 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 1     | -0.0006  | -10.1983  | 7.6494    | -18.3530 | -10.1977  | 7.6498    |
| 2     | -18.3530 | -10.1977  | 7.6498    | -36.7052 | -10.1962  | 7.6413    |
| 3     | -36.7052 | -10.1962  | 7.6413    | 255.9399 | -10.9303  | -33.4489  |
| 4     | 255.9399 | -10.9303  | -33.4489  | 371.6439 | -17.1166  | -45.5031  |
| 5     | 371.6439 | -17.1166  | -45.5031  | 403.2231 | -20.1842  | -51.4648  |
| 6     | 403.2231 | -20.1842  | -51.4648  | 481.1738 | -26.2590  | -63.4351  |
| 7     | 481.1738 | -26.2590  | -63.4351  | 538.5216 | -32.2504  | -75.2935  |
| 8     | 538.5216 | -32.2504  | -75.2935  | 576.0413 | -38.1313  | -87.2274  |
| 9     | 576.0413 | -38.1313  | -87.2274  | 594.8337 | -43.8517  | -99.1597  |
| 10    | 594.8337 | -43.8517  | -99.1597  | 555.5391 | -46.6592  | -104.9332 |
| 11    | 555.5391 | -46.6592  | -104.9332 | 543.6315 | -52.0950  | -116.8815 |
| 12    | 543.6315 | -52.0950  | -116.8815 | 516.4952 | -57.3479  | -128.7979 |
| 13    | 516.4952 | -57.3479  | -128.7979 | 475.7914 | -62.3756  | -140.7485 |
| 14    | 475.7914 | -62.3756  | -140.7485 | 423.3415 | -67.1453  | -152.6331 |
| 15    | 423.3415 | -67.1453  | -152.6331 | 330.8608 | -69.4178  | -158.6507 |
| 16    | 330.8608 | -69.4178  | -158.6507 | 260.7133 | -73.7656  | -170.6684 |
| 17    | 260.7133 | -73.7656  | -170.6684 | 184.4632 | -77.8024  | -182.6188 |
| 18    | 184.4632 | -77.8024  | -182.6188 | 104.3418 | -81.5002  | -194.7504 |
| 19    | 104.3418 | -81.5002  | -194.7504 | 23.0465  | -84.8535  | -206.5089 |
| 20    | 23.0465  | -84.8535  | -206.5089 | -95.3958 | -41.8498  | -110.5096 |
| 21    | -95.3958 | -41.8498  | -110.5096 | 79.1008  | -10.1749  | 6.2874    |
| 22    | 79.1008  | -10.1749  | 6.2874    | 56.2018  | -10.1743  | 6.3187    |
| 23    | 56.2018  | -10.1743  | 6.3187    | 33.3073  | -10.1733  | 6.3359    |
| 24    | 33.3073  | -10.1733  | 6.3359    | 10.4165  | -10.1733  | 6.3362    |
| 25    | 10.4165  | -10.1733  | 6.3362    | 378.7589 | -15.5088  | -54.7443  |
| 26    | 378.7589 | -15.5088  | -54.7443  | 438.2991 | -19.5676  | -64.4861  |
| 27    | 438.2991 | -19.5676  | -64.4861  | 486.3680 | -23.8423  | -74.3108  |
| 28    | 486.3680 | -23.8423  | -74.3108  | 521.4382 | -28.2857  | -84.2083  |
| 29    | 521.4382 | -28.2857  | -84.2083  | 586.5136 | -35.2014  | -98.8971  |
| 30    | 586.5136 | -35.2014  | -98.8971  | 589.3950 | -39.9197  | -108.7693 |
| 31    | 589.3950 | -39.9197  | -108.7693 | 576.4237 | -44.6936  | -118.5928 |
| 32    | 576.4237 | -44.6936  | -118.5928 | 547.3022 | -49.4677  | -128.2389 |
| 33    | 547.3022 | -49.4677  | -128.2389 | 537.5220 | -56.5166  | -143.2042 |
| 34    | 537.5220 | -56.5166  | -143.2042 | 475.0745 | -61.1368  | -153.0501 |
| 35    | 475.0745 | -61.1368  | -153.0501 | 398.6434 | -65.6197  | -162.7473 |
| 36    | 398.6434 | -65.6197  | -162.7473 | 309.4995 | -69.9471  | -172.6375 |
| 37    | 309.4995 | -69.9471  | -172.6375 | 241.3605 | -76.0444  | -187.6319 |
| 38    | 241.3605 | -76.0444  | -187.6319 | 132.9664 | -79.7918  | -197.5497 |
| 39    | 132.9664 | -79.7918  | -197.5497 | 18.7741  | -83.2466  | -207.3634 |
| 40    | 18.7741  | -83.2466  | -207.3634 | -99.2050 | -41.7938  | -112.8382 |
| 41    | -99.2050 | -41.7938  | -112.8382 | 76.3425  | -10.0973  | 6.2945    |
| 42    | 76.3425  | -10.0973  | 6.2945    | 53.6221  | -10.0975  | 6.3178    |
| 43    | 53.6221  | -10.0975  | 6.3178    | 30.8945  | -10.0974  | 6.3314    |
| 44    | 30.8945  | -10.0974  | 6.3314    | 8.1786   | -10.0968  | 6.3352    |
| 45    | 8.1786   | -10.0968  | 6.3352    | 384.8282 | -15.7493  | -54.8039  |
| 46    | 384.8282 | -15.7493  | -54.8039  | 444.3864 | -19.8259  | -64.5936  |
| 47    | 444.3864 | -19.8259  | -64.5936  | 492.2264 | -24.1077  | -74.4277  |
| 48    | 492.2264 | -24.1077  | -74.4277  | 526.9084 | -28.5679  | -84.2401  |
| 49    | 526.9084 | -28.5679  | -84.2401  | 591.3442 | -35.4944  | -99.0941  |
| 50    | 591.3442 | -35.4944  | -99.0941  | 593.5643 | -40.2132  | -108.8934 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 51    | 593.5643 | -40.2132  | -108.8934 | 579.7414 | -44.9799  | -118.6494 |
| 52    | 579.7414 | -44.9799  | -118.6494 | 549.8376 | -49.7344  | -128.4536 |
| 53    | 549.8376 | -49.7344  | -128.4536 | 539.2968 | -56.7852  | -143.1208 |
| 54    | 539.2968 | -56.7852  | -143.1208 | 476.0836 | -61.3746  | -152.9341 |
| 55    | 476.0836 | -61.3746  | -152.9341 | 399.0093 | -65.8372  | -162.8589 |
| 56    | 399.0093 | -65.8372  | -162.8589 | 309.4360 | -70.1281  | -172.7571 |
| 57    | 309.4360 | -70.1281  | -172.7571 | 240.9739 | -76.1749  | -187.6403 |
| 58    | 240.9739 | -76.1749  | -187.6403 | 132.4532 | -79.8893  | -197.6570 |
| 59    | 132.4532 | -79.8893  | -197.6570 | 18.3292  | -83.3130  | -207.3904 |
| 60    | 18.3292  | -83.3130  | -207.3904 | -99.5280 | -41.8085  | -112.8303 |
| 61    | -99.5280 | -41.8085  | -112.8303 | 76.0564  | -10.0890  | 6.2696    |
| 62    | 76.0564  | -10.0890  | 6.2696    | 53.3543  | -10.0891  | 6.3027    |
| 63    | 53.3543  | -10.0891  | 6.3027    | 30.6452  | -10.0877  | 6.3161    |
| 64    | 30.6452  | -10.0877  | 6.3161    | 266.9030 | -10.1039  | -39.8449  |
| 65    | 266.9030 | -10.1039  | -39.8449  | 385.4206 | -15.7756  | -54.8072  |
| 66    | 385.4206 | -15.7756  | -54.8072  | 444.9675 | -19.8678  | -64.5975  |
| 67    | 444.9675 | -19.8678  | -64.5975  | 492.7435 | -24.1617  | -74.4146  |
| 68    | 492.7435 | -24.1617  | -74.4146  | 527.2812 | -28.6262  | -84.3275  |
| 69    | 527.2812 | -28.6262  | -84.3275  | 591.6616 | -35.5382  | -99.1145  |
| 70    | 591.6616 | -35.5382  | -99.1145  | 593.7715 | -40.2384  | -108.7916 |
| 71    | 593.7715 | -40.2384  | -108.7916 | 579.8615 | -45.0074  | -118.5404 |
| 72    | 579.8615 | -45.0074  | -118.5404 | 549.8566 | -49.7558  | -128.4175 |
| 73    | 549.8566 | -49.7558  | -128.4175 | 539.2454 | -56.7959  | -143.1161 |
| 74    | 539.2454 | -56.7959  | -143.1161 | 475.9983 | -61.3792  | -152.9305 |
| 75    | 475.9983 | -61.3792  | -152.9305 | 398.9722 | -65.8362  | -162.8639 |
| 76    | 398.9722 | -65.8362  | -162.8639 | 309.3328 | -70.1338  | -172.6830 |
| 77    | 309.3328 | -70.1338  | -172.6830 | 240.9467 | -76.1714  | -187.6267 |
| 78    | 240.9467 | -76.1714  | -187.6267 | 132.4014 | -79.8932  | -197.6602 |
| 79    | 132.4014 | -79.8932  | -197.6602 | 18.3241  | -83.3127  | -207.3663 |
| 80    | 18.3241  | -83.3127  | -207.3663 | -99.5439 | -41.8055  | -112.8282 |
| 81    | -99.5439 | -41.8055  | -112.8282 | 76.0179  | -10.0805  | 6.2768    |
| 82    | 76.0179  | -10.0805  | 6.2768    | 53.3290  | -10.0817  | 6.2976    |
| 83    | 53.3290  | -10.0817  | 6.2976    | 30.6435  | -10.0807  | 6.3151    |
| 84    | 30.6435  | -10.0807  | 6.3151    | 266.8845 | -10.1070  | -39.8409  |
| 85    | 266.8845 | -10.1070  | -39.8409  | 385.3870 | -15.7788  | -54.7513  |
| 86    | 385.3870 | -15.7788  | -54.7513  | 444.9089 | -19.8637  | -64.6076  |
| 87    | 444.9089 | -19.8637  | -64.6076  | 492.7316 | -24.1566  | -74.5230  |
| 88    | 492.7316 | -24.1566  | -74.5230  | 527.3456 | -28.6148  | -84.1678  |
| 89    | 527.3456 | -28.6148  | -84.1678  | 591.6420 | -35.5463  | -98.9097  |
| 90    | 591.6420 | -35.5463  | -98.9097  | 593.6854 | -40.2779  | -108.8854 |
| 91    | 593.6854 | -40.2779  | -108.8854 | 579.7786 | -45.0202  | -118.5934 |
| 92    | 579.7786 | -45.0202  | -118.5934 | 549.7495 | -49.7642  | -128.3314 |
| 93    | 549.7495 | -49.7642  | -128.3314 | 539.1200 | -56.7960  | -143.2516 |
| 94    | 539.1200 | -56.7960  | -143.2516 | 475.9586 | -61.3770  | -152.9718 |
| 95    | 475.9586 | -61.3770  | -152.9718 | 398.8527 | -65.8384  | -162.8071 |
| 96    | 398.8527 | -65.8384  | -162.8071 | 309.3141 | -70.1271  | -172.6973 |
| 97    | 309.3141 | -70.1271  | -172.6973 | 240.9341 | -76.1714  | -187.6191 |
| 98    | 240.9341 | -76.1714  | -187.6191 | 132.3306 | -79.8846  | -197.6086 |
| 99    | 132.3306 | -79.8846  | -197.6086 | 18.3109  | -83.3122  | -207.3926 |
| 100   | 18.3109  | -83.3122  | -207.3926 | -99.5177 | -41.8062  | -112.8380 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | -99.5177  | -41.8062  | -112.8380 | 75.5354   | -10.0171  | 6.2997    |
| 102   | 75.5354   | -10.0171  | 6.2997    | 52.9945   | -10.0185  | 6.3158    |
| 103   | 52.9945   | -10.0185  | 6.3158    | 30.4508   | -10.0176  | 6.3377    |
| 104   | 30.4508   | -10.0176  | 6.3377    | 266.8641  | -10.1093  | -39.8522  |
| 105   | 266.8641  | -10.1093  | -39.8522  | 385.3774  | -15.7791  | -54.7737  |
| 106   | 385.3774  | -15.7791  | -54.7737  | 444.9210  | -19.8656  | -64.5745  |
| 107   | 444.9210  | -19.8656  | -64.5745  | 492.7195  | -24.1695  | -74.4036  |
| 108   | 492.7195  | -24.1695  | -74.4036  | 527.2121  | -28.6348  | -84.2912  |
| 109   | 527.2121  | -28.6348  | -84.2912  | 591.5203  | -35.5588  | -99.0845  |
| 110   | 591.5203  | -35.5588  | -99.0845  | 593.5768  | -40.2583  | -108.8560 |
| 111   | 593.5768  | -40.2583  | -108.8560 | 579.6410  | -45.0323  | -118.6449 |
| 112   | 579.6410  | -45.0323  | -118.6449 | 549.5680  | -49.7907  | -128.4105 |
| 113   | 549.5680  | -49.7907  | -128.4105 | 538.8524  | -56.8397  | -143.2049 |
| 114   | 538.8524  | -56.8397  | -143.2049 | 475.5750  | -61.4267  | -152.9203 |
| 115   | 475.5750  | -61.4267  | -152.9203 | 398.3585  | -65.8860  | -162.7649 |
| 116   | 398.3585  | -65.8860  | -162.7649 | 308.6924  | -70.1624  | -172.7102 |
| 117   | 308.6924  | -70.1624  | -172.7102 | 240.3600  | -76.2016  | -187.7006 |
| 118   | 240.3600  | -76.2016  | -187.7006 | 131.8987  | -79.9114  | -197.6286 |
| 119   | 131.8987  | -79.9114  | -197.6286 | 17.8391   | -83.3260  | -207.3351 |
| 120   | 17.8391   | -83.3260  | -207.3351 | -99.8577  | -41.7971  | -112.8467 |
| 121   | -99.8577  | -41.7971  | -112.8467 | 66.4659   | -8.8188   | 5.9085    |
| 122   | 66.4659   | -8.8188   | 5.9085    | 46.6219   | -8.8188   | 5.9233    |
| 123   | 46.6219   | -8.8188   | 5.9233    | 26.7787   | -8.8191   | 5.9378    |
| 124   | 26.7787   | -8.8191   | 5.9378    | 266.9476  | -10.2041  | -39.8982  |
| 125   | 266.9476  | -10.2041  | -39.8982  | 385.1620  | -15.9199  | -54.7535  |
| 126   | 385.1620  | -15.9199  | -54.7535  | 444.2459  | -20.0333  | -64.6224  |
| 127   | 444.2459  | -20.0333  | -64.6224  | 491.5651  | -24.3420  | -74.4774  |
| 128   | 491.5651  | -24.3420  | -74.4774  | 525.4220  | -28.8339  | -84.2632  |
| 129   | 525.4220  | -28.8339  | -84.2632  | 588.8301  | -35.7979  | -99.1451  |
| 130   | 588.8301  | -35.7979  | -99.1451  | 590.1068  | -40.5462  | -108.8332 |
| 131   | 590.1068  | -40.5462  | -108.8332 | 575.2153  | -45.3074  | -118.5952 |
| 132   | 575.2153  | -45.3074  | -118.5952 | 544.3121  | -50.0769  | -128.4958 |
| 133   | 544.3121  | -50.0769  | -128.4958 | 532.7822  | -57.1353  | -143.2693 |
| 134   | 532.7822  | -57.1353  | -143.2693 | 468.8390  | -61.7257  | -153.0843 |
| 135   | 468.8390  | -61.7257  | -153.0843 | 391.2496  | -66.1737  | -162.8815 |
| 136   | 391.2496  | -66.1737  | -162.8815 | 301.4070  | -70.4476  | -172.7386 |
| 137   | 301.4070  | -70.4476  | -172.7386 | 233.6037  | -76.4410  | -187.7336 |
| 138   | 233.6037  | -76.4410  | -187.7336 | 125.7959  | -80.1067  | -197.6994 |
| 139   | 125.7959  | -80.1067  | -197.6994 | 13.0140   | -83.4741  | -207.4465 |
| 140   | 13.0140   | -83.4741  | -207.4465 | -102.9044 | -41.8345  | -113.8626 |
| 141   | -102.9044 | -41.8345  | -113.8626 | 96.9473   | -2.8349   | -0.4393   |
| 142   | 96.9473   | -2.8349   | -0.4393   | 91.8440   | -2.8344   | -0.4385   |
| 143   | 91.8440   | -2.8344   | -0.4385   | 157.4135  | -5.1487   | -31.0569  |
| 144   | 157.4135  | -5.1487   | -31.0569  | 244.7223  | -8.5032   | -42.7323  |
| 145   | 244.7223  | -8.5032   | -42.7323  | 278.2722  | -10.3139  | -48.7342  |
| 146   | 278.2722  | -10.3139  | -48.7342  | 357.2936  | -14.1739  | -60.7546  |
| 147   | 357.2936  | -14.1739  | -60.7546  | 429.9252  | -18.3700  | -72.7661  |
| 148   | 429.9252  | -18.3700  | -72.7661  | 493.9583  | -22.8592  | -84.6524  |
| 149   | 493.9583  | -22.8592  | -84.6524  | 547.1754  | -27.6352  | -96.5910  |
| 150   | 547.1754  | -27.6352  | -96.5910  | 542.1218  | -30.1029  | -102.5058 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 542.1218 | -30.1029  | -102.5058 | 571.1340 | -35.2598  | -114.3184 |
| 152   | 571.1340 | -35.2598  | -114.3184 | 584.7485 | -40.6062  | -126.2421 |
| 153   | 584.7485 | -40.6062  | -126.2421 | 581.5538 | -46.1571  | -138.2968 |
| 154   | 581.5538 | -46.1571  | -138.2968 | 560.2311 | -51.8877  | -150.1494 |
| 155   | 560.2311 | -51.8877  | -150.1494 | 493.1165 | -54.8095  | -155.8419 |
| 156   | 493.1165 | -54.8095  | -155.8419 | 437.0757 | -60.7278  | -167.8774 |
| 157   | 437.0757 | -60.7278  | -167.8774 | 360.3420 | -66.7652  | -180.0027 |
| 158   | 360.3420 | -66.7652  | -180.0027 | 262.2587 | -72.8844  | -191.9869 |
| 159   | 262.2587 | -72.8844  | -191.9869 | 142.2910 | -79.0717  | -204.0289 |
| 160   | 142.2910 | -79.0717  | -204.0289 | -0.0176  | -82.1809  | -210.0844 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0158   | 82.1833   | 210.0965 | 142.2997  | 79.0733   | 204.0045 |
| 2     | 142.2997  | 79.0733   | 204.0045 | 262.3151  | 72.8892   | 191.9174 |
| 3     | 262.3151  | 72.8892   | 191.9174 | 360.4328  | 66.7686   | 179.9279 |
| 4     | 360.4328  | 66.7686   | 179.9279 | 437.1144  | 60.7306   | 167.9035 |
| 5     | 437.1144  | 60.7306   | 167.9035 | 493.0745  | 54.8062   | 155.9526 |
| 6     | 493.0745  | 54.8062   | 155.9526 | 560.2541  | 51.8985   | 150.0305 |
| 7     | 560.2541  | 51.8985   | 150.0305 | 581.6548  | 46.1750   | 138.2240 |
| 8     | 581.6548  | 46.1750   | 138.2240 | 584.8989  | 40.6124   | 126.2629 |
| 9     | 584.8989  | 40.6124   | 126.2629 | 571.2536  | 35.2450   | 114.3799 |
| 10    | 571.2536  | 35.2450   | 114.3799 | 542.2186  | 30.0979   | 102.5502 |
| 11    | 542.2186  | 30.0979   | 102.5502 | 547.2919  | 27.6369   | 96.6229  |
| 12    | 547.2919  | 27.6369   | 96.6229  | 494.0353  | 22.8695   | 84.6810  |
| 13    | 494.0353  | 22.8695   | 84.6810  | 430.0379  | 18.3687   | 72.7226  |
| 14    | 430.0379  | 18.3687   | 72.7226  | 357.3804  | 14.1747   | 60.7934  |
| 15    | 357.3804  | 14.1747   | 60.7934  | 278.3080  | 10.3078   | 48.7034  |
| 16    | 278.3080  | 10.3078   | 48.7034  | 244.7914  | 8.4987    | 42.7646  |
| 17    | 244.7914  | 8.4987    | 42.7646  | 157.4340  | 5.1440    | 31.0699  |
| 18    | 157.4340  | 5.1440    | 31.0699  | 69.2927   | 2.1400    | 19.8946  |
| 19    | 69.2927   | 2.1400    | 19.8946  | -18.0751  | -0.5264   | 13.3047  |
| 20    | -18.0751  | -0.5264   | 13.3047  | -102.8671 | 41.8362   | 113.8420 |
| 21    | -102.8671 | 41.8362   | 113.8420 | 13.0111   | 83.4733   | 207.4595 |
| 22    | 13.0111   | 83.4733   | 207.4595 | 125.8140  | 80.1033   | 197.7559 |
| 23    | 125.8140  | 80.1033   | 197.7559 | 233.5715  | 76.4315   | 187.7601 |
| 24    | 233.5715  | 76.4315   | 187.7601 | 301.3928  | 70.4301   | 172.7135 |
| 25    | 301.3928  | 70.4301   | 172.7135 | 391.2596  | 66.1572   | 162.8578 |
| 26    | 391.2596  | 66.1572   | 162.8578 | 468.7806  | 61.7017   | 153.1608 |
| 27    | 468.7806  | 61.7017   | 153.1608 | 532.6423  | 57.1217   | 143.3073 |
| 28    | 532.6423  | 57.1217   | 143.3073 | 544.1393  | 50.0648   | 128.4537 |
| 29    | 544.1393  | 50.0648   | 128.4537 | 574.9948  | 45.3050   | 118.7681 |
| 30    | 574.9948  | 45.3050   | 118.7681 | 589.8346  | 40.5411   | 108.8508 |
| 31    | 589.8346  | 40.5411   | 108.8508 | 588.6417  | 35.8033   | 99.1051  |
| 32    | 588.6417  | 35.8033   | 99.1051  | 525.1681  | 28.8452   | 84.3954  |
| 33    | 525.1681  | 28.8452   | 84.3954  | 491.3890  | 24.3741   | 74.4117  |
| 34    | 491.3890  | 24.3741   | 74.4117  | 444.2181  | 20.0528   | 64.5928  |
| 35    | 444.2181  | 20.0528   | 64.5928  | 385.1515  | 15.9380   | 54.8549  |
| 36    | 385.1515  | 15.9380   | 54.8549  | 266.9908  | 10.2113   | 39.8785  |
| 37    | 266.9908  | 10.2113   | 39.8785  | 190.8593  | 6.7547    | 30.1896  |
| 38    | 190.8593  | 6.7547    | 30.1896  | 109.5005  | 3.6044    | 20.9641  |
| 39    | 109.5005  | 3.6044    | 20.9641  | 24.9107   | 0.7746    | 13.3744  |
| 40    | 24.9107   | 0.7746    | 13.3744  | -99.8239  | 41.7984   | 112.8389 |
| 41    | -99.8239  | 41.7984   | 112.8389 | 17.8054   | 83.3288   | 207.3668 |
| 42    | 17.8054   | 83.3288   | 207.3668 | 131.8083  | 79.9121   | 197.6295 |
| 43    | 131.8083  | 79.9121   | 197.6295 | 240.3177  | 76.2014   | 187.6647 |
| 44    | 240.3177  | 76.2014   | 187.6647 | 308.6909  | 70.1624   | 172.6649 |
| 45    | 308.6909  | 70.1624   | 172.6649 | 398.3379  | 65.8779   | 162.8143 |
| 46    | 398.3379  | 65.8779   | 162.8143 | 475.4561  | 61.4286   | 153.0384 |
| 47    | 475.4561  | 61.4286   | 153.0384 | 538.7744  | 56.8463   | 143.2211 |
| 48    | 538.7744  | 56.8463   | 143.2211 | 549.4958  | 49.8044   | 128.4261 |
| 49    | 549.4958  | 49.8044   | 128.4261 | 579.6196  | 45.0416   | 118.5537 |
| 50    | 579.6196  | 45.0416   | 118.5537 | 593.6162  | 40.2738   | 108.7916 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 593.6162 | 40.2738   | 108.7916 | 591.5624 | 35.5597   | 99.0001  |
| 52    | 591.5624 | 35.5597   | 99.0001  | 527.2981 | 28.6233   | 84.2447  |
| 53    | 527.2981 | 28.6233   | 84.2447  | 492.7533 | 24.1664   | 74.5188  |
| 54    | 492.7533 | 24.1664   | 74.5188  | 444.9532 | 19.8734   | 64.6735  |
| 55    | 444.9532 | 19.8734   | 64.6735  | 385.4193 | 15.7828   | 54.7281  |
| 56    | 385.4193 | 15.7828   | 54.7281  | 266.9111 | 10.1111   | 39.8445  |
| 57    | 266.9111 | 10.1111   | 39.8445  | 190.6573 | 6.6888    | 30.1552  |
| 58    | 190.6573 | 6.6888    | 30.1552  | 109.3304 | 3.5703    | 20.9243  |
| 59    | 109.3304 | 3.5703    | 20.9243  | 24.8391  | 0.7661    | 13.3662  |
| 60    | 24.8391  | 0.7661    | 13.3662  | -99.5722 | 41.8087   | 112.8303 |
| 61    | -99.5722 | 41.8087   | 112.8303 | 18.2786  | 83.3216   | 207.3875 |
| 62    | 18.2786  | 83.3216   | 207.3875 | 132.3693 | 79.9039   | 197.6619 |
| 63    | 132.3693 | 79.9039   | 197.6619 | 240.9650 | 76.1912   | 187.7059 |
| 64    | 240.9650 | 76.1912   | 187.7059 | 309.3844 | 70.1450   | 172.7115 |
| 65    | 309.3844 | 70.1450   | 172.7115 | 399.0348 | 65.8453   | 162.7977 |
| 66    | 399.0348 | 65.8453   | 162.7977 | 476.1105 | 61.3797   | 153.0509 |
| 67    | 476.1105 | 61.3797   | 153.0509 | 539.2881 | 56.7859   | 143.2124 |
| 68    | 539.2881 | 56.7859   | 143.2124 | 549.9206 | 49.7463   | 128.3337 |
| 69    | 549.9206 | 49.7463   | 128.3337 | 579.8938 | 45.0002   | 118.5524 |
| 70    | 579.8938 | 45.0002   | 118.5524 | 593.7610 | 40.2505   | 108.8987 |
| 71    | 593.7610 | 40.2505   | 108.8987 | 591.6171 | 35.5379   | 99.1037  |
| 72    | 591.6171 | 35.5379   | 99.1037  | 527.2815 | 28.6083   | 84.2524  |
| 73    | 527.2815 | 28.6083   | 84.2524  | 492.6995 | 24.1497   | 74.5348  |
| 74    | 492.6995 | 24.1497   | 74.5348  | 444.8810 | 19.8625   | 64.6686  |
| 75    | 444.8810 | 19.8625   | 64.6686  | 385.3699 | 15.7836   | 54.7450  |
| 76    | 385.3699 | 15.7836   | 54.7450  | 266.8791 | 10.1067   | 39.8955  |
| 77    | 266.8791 | 10.1067   | 39.8955  | 190.6364 | 6.6883    | 30.1532  |
| 78    | 190.6364 | 6.6883    | 30.1532  | 109.3390 | 3.5696    | 20.9289  |
| 79    | 109.3390 | 3.5696    | 20.9289  | 24.8670  | 0.7672    | 13.3713  |
| 80    | 24.8670  | 0.7672    | 13.3713  | -99.5712 | 41.8066   | 112.8221 |
| 81    | -99.5712 | 41.8066   | 112.8221 | 18.2495  | 83.3132   | 207.3613 |
| 82    | 18.2495  | 83.3132   | 207.3613 | 132.4327 | 79.8923   | 197.6214 |
| 83    | 132.4327 | 79.8923   | 197.6214 | 240.9406 | 76.1811   | 187.7131 |
| 84    | 240.9406 | 76.1811   | 187.7131 | 309.3428 | 70.1386   | 172.7103 |
| 85    | 309.3428 | 70.1386   | 172.7103 | 398.9852 | 65.8435   | 162.8798 |
| 86    | 398.9852 | 65.8435   | 162.8798 | 476.0300 | 61.3829   | 152.9803 |
| 87    | 476.0300 | 61.3829   | 152.9803 | 539.3097 | 56.7981   | 143.1277 |
| 88    | 539.3097 | 56.7981   | 143.1277 | 549.8947 | 49.7519   | 128.5336 |
| 89    | 549.8947 | 49.7519   | 128.5336 | 579.8229 | 44.9898   | 118.7314 |
| 90    | 579.8229 | 44.9898   | 118.7314 | 593.7087 | 40.2310   | 108.7560 |
| 91    | 593.7087 | 40.2310   | 108.7560 | 591.5358 | 35.5121   | 99.1077  |
| 92    | 591.5358 | 35.5121   | 99.1077  | 527.1494 | 28.6060   | 84.2960  |
| 93    | 527.1494 | 28.6060   | 84.2960  | 492.6390 | 24.1602   | 74.4065  |
| 94    | 492.6390 | 24.1602   | 74.4065  | 444.8124 | 19.8735   | 64.6523  |
| 95    | 444.8124 | 19.8735   | 64.6523  | 385.3098 | 15.7819   | 54.7838  |
| 96    | 385.3098 | 15.7819   | 54.7838  | 266.8595 | 10.1166   | 39.8675  |
| 97    | 266.8595 | 10.1166   | 39.8675  | 190.5900 | 6.6900    | 30.1761  |
| 98    | 190.5900 | 6.6900    | 30.1761  | 109.2966 | 3.5704    | 20.9328  |
| 99    | 109.2966 | 3.5704    | 20.9328  | 24.8672  | 0.7674    | 13.3662  |
| 100   | 24.8672  | 0.7674    | 13.3662  | -99.5828 | 41.8055   | 112.8138 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 101   | -99.5828 | 41.8055   | 112.8138 | 18.2974  | 83.3122   | 207.3286 |
| 102   | 18.2974  | 83.3122   | 207.3286 | 132.4352 | 79.8913   | 197.6176 |
| 103   | 132.4352 | 79.8913   | 197.6176 | 240.9179 | 76.1768   | 187.6811 |
| 104   | 240.9179 | 76.1768   | 187.6811 | 309.3514 | 70.1299   | 172.6927 |
| 105   | 309.3514 | 70.1299   | 172.6927 | 398.9976 | 65.8381   | 162.8424 |
| 106   | 398.9976 | 65.8381   | 162.8424 | 476.0785 | 61.3811   | 153.0577 |
| 107   | 476.0785 | 61.3811   | 153.0577 | 539.2255 | 56.7858   | 143.2377 |
| 108   | 539.2255 | 56.7858   | 143.2377 | 549.7917 | 49.7287   | 128.3535 |
| 109   | 549.7917 | 49.7287   | 128.3535 | 579.7125 | 44.9876   | 118.5823 |
| 110   | 579.7125 | 44.9876   | 118.5823 | 593.5443 | 40.2353   | 108.7961 |
| 111   | 593.5443 | 40.2353   | 108.7961 | 591.4050 | 35.5104   | 99.0321  |
| 112   | 591.4050 | 35.5104   | 99.0321  | 526.9552 | 28.5803   | 84.2504  |
| 113   | 526.9552 | 28.5803   | 84.2504  | 492.3489 | 24.1156   | 74.4529  |
| 114   | 492.3489 | 24.1156   | 74.4529  | 444.4386 | 19.8235   | 64.6962  |
| 115   | 444.4386 | 19.8235   | 64.6962  | 384.8579 | 15.7429   | 54.8168  |
| 116   | 384.8579 | 15.7429   | 54.8168  | 266.4325 | 10.0868   | 39.8429  |
| 117   | 266.4325 | 10.0868   | 39.8429  | 190.2934 | 6.6741    | 30.1328  |
| 118   | 190.2934 | 6.6741    | 30.1328  | 109.0888 | 3.5608    | 20.9524  |
| 119   | 109.0888 | 3.5608    | 20.9524  | 24.7731  | 0.7641    | 13.3731  |
| 120   | 24.7731  | 0.7641    | 13.3731  | -99.2514 | 41.7943   | 112.8418 |
| 121   | -99.2514 | 41.7943   | 112.8418 | 18.7779  | 83.2497   | 207.3294 |
| 122   | 18.7779  | 83.2497   | 207.3294 | 132.9244 | 79.7970   | 197.6139 |
| 123   | 132.9244 | 79.7970   | 197.6139 | 241.3159 | 76.0516   | 187.6215 |
| 124   | 241.3159 | 76.0516   | 187.6215 | 309.4807 | 69.9575   | 172.6653 |
| 125   | 309.4807 | 69.9575   | 172.6653 | 398.6454 | 65.6379   | 162.8661 |
| 126   | 398.6454 | 65.6379   | 162.8661 | 475.2134 | 61.1553   | 152.9839 |
| 127   | 475.2134 | 61.1553   | 152.9839 | 537.7156 | 56.5538   | 143.1814 |
| 128   | 537.7156 | 56.5538   | 143.1814 | 547.4720 | 49.4747   | 128.3891 |
| 129   | 547.4720 | 49.4747   | 128.3891 | 576.6874 | 44.6909   | 118.5100 |
| 130   | 576.6874 | 44.6909   | 118.5100 | 589.6683 | 39.9230   | 108.8479 |
| 131   | 589.6683 | 39.9230   | 108.8479 | 586.6960 | 35.1886   | 99.0455  |
| 132   | 586.6960 | 35.1886   | 99.0455  | 521.6001 | 28.2754   | 84.1696  |
| 133   | 521.6001 | 28.2754   | 84.1696  | 486.4739 | 23.8337   | 74.3716  |
| 134   | 486.4739 | 23.8337   | 74.3716  | 438.3391 | 19.5600   | 64.5395  |
| 135   | 438.3391 | 19.5600   | 64.5395  | 378.7870 | 15.4988   | 54.7290  |
| 136   | 378.7870 | 15.4988   | 54.7290  | 261.2708 | 9.8927    | 39.8001  |
| 137   | 261.2708 | 9.8927    | 39.8001  | 186.0858 | 6.5253    | 30.0763  |
| 138   | 186.0858 | 6.5253    | 30.0763  | 106.4165 | 3.4745    | 20.8625  |
| 139   | 106.4165 | 3.4745    | 20.8625  | 24.2582  | 0.7485    | 13.2745  |
| 140   | 24.2582  | 0.7485    | 13.2745  | -95.3842 | 41.8506   | 110.5259 |
| 141   | -95.3842 | 41.8506   | 110.5259 | 22.9478  | 84.8521   | 206.5246 |
| 142   | 22.9478  | 84.8521   | 206.5246 | 104.3992 | 81.4976   | 194.7192 |
| 143   | 104.3992 | 81.4976   | 194.7192 | 184.4012 | 77.7919   | 182.6887 |
| 144   | 184.4012 | 77.7919   | 182.6887 | 260.7108 | 73.7542   | 170.6597 |
| 145   | 260.7108 | 73.7542   | 170.6597 | 361.0878 | 71.6173   | 164.6826 |
| 146   | 361.0878 | 71.6173   | 164.6826 | 423.2310 | 67.1274   | 152.6645 |
| 147   | 423.2310 | 67.1274   | 152.6645 | 475.7103 | 62.3749   | 140.6966 |
| 148   | 475.7103 | 62.3749   | 140.6966 | 516.3515 | 57.3568   | 128.8427 |
| 149   | 516.3515 | 57.3568   | 128.8427 | 543.4924 | 52.1060   | 116.8967 |
| 150   | 543.4924 | 52.1060   | 116.8967 | 595.9303 | 49.4029   | 111.0056 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsorl  | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|----------|----------|-----------|---------|
| 151   | 595.9303 | 49.4029   | 111.0056 | 594.6980 | 43.8486   | 99.1873 |
| 152   | 594.6980 | 43.8486   | 99.1873  | 575.8886 | 38.1402   | 87.2406 |
| 153   | 575.8886 | 38.1402   | 87.2406  | 538.4803 | 32.2683   | 75.1992 |
| 154   | 538.4803 | 32.2683   | 75.1992  | 481.1646 | 26.2693   | 63.3702 |
| 155   | 481.1646 | 26.2693   | 63.3702  | 465.6904 | 23.2347   | 57.6143 |
| 156   | 465.6904 | 23.2347   | 57.6143  | 371.5674 | 17.1087   | 45.4960 |
| 157   | 371.5674 | 17.1087   | 45.4960  | 255.8656 | 10.9254   | 33.4010 |
| 158   | 255.8656 | 10.9254   | 33.4010  | 0.7811   | -0.2170   | 0.0055  |
| 159   | 0.7811   | -0.2170   | 0.0055   | 0.3942   | -0.2190   | 0.0058  |
| 160   | 0.3942   | -0.2190   | 0.0058   | 0.0000   | -0.2190   | 0.0059  |



ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| ===== | =====    | =====     | =====     | =====    | =====     | =====     |
| 1     | -0.0056  | -0.0064   | -4.0838   | 28.1054  | -1.0478   | -6.1181   |
| 2     | 28.1054  | -1.0478   | -6.1181   | 118.0488 | -4.7016   | -21.3801  |
| 3     | 118.0488 | -4.7016   | -21.3801  | 255.9399 | -10.9303  | -33.4489  |
| 4     | 255.9399 | -10.9303  | -33.4489  | 371.6439 | -17.1166  | -45.5031  |
| 5     | 371.6439 | -17.1166  | -45.5031  | 403.2231 | -20.1842  | -51.4648  |
| 6     | 403.2231 | -20.1842  | -51.4648  | 481.1738 | -26.2590  | -63.4351  |
| 7     | 481.1738 | -26.2590  | -63.4351  | 538.5216 | -32.2504  | -75.2935  |
| 8     | 538.5216 | -32.2504  | -75.2935  | 576.0413 | -38.1313  | -87.2274  |
| 9     | 576.0413 | -38.1313  | -87.2274  | 594.8337 | -43.8517  | -99.1597  |
| 10    | 594.8337 | -43.8517  | -99.1597  | 555.5391 | -46.6592  | -104.9332 |
| 11    | 555.5391 | -46.6592  | -104.9332 | 543.6315 | -52.0950  | -116.8815 |
| 12    | 543.6315 | -52.0950  | -116.8815 | 516.4952 | -57.3479  | -128.7979 |
| 13    | 516.4952 | -57.3479  | -128.7979 | 475.7914 | -62.3756  | -140.7485 |
| 14    | 475.7914 | -62.3756  | -140.7485 | 423.3415 | -67.1453  | -152.6331 |
| 15    | 423.3415 | -67.1453  | -152.6331 | 330.8608 | -69.4178  | -158.6507 |
| 16    | 330.8608 | -69.4178  | -158.6507 | 260.7133 | -73.7656  | -170.6684 |
| 17    | 260.7133 | -73.7656  | -170.6684 | 184.4632 | -77.8024  | -182.6188 |
| 18    | 184.4632 | -77.8024  | -182.6188 | 104.3418 | -81.5002  | -194.7504 |
| 19    | 104.3418 | -81.5002  | -194.7504 | 23.0465  | -84.8535  | -206.5089 |
| 20    | 23.0465  | -84.8535  | -206.5089 | -95.3958 | -41.8498  | -110.5096 |
| 21    | -95.3958 | -41.8498  | -110.5096 | 24.2061  | -0.7472   | -13.2666  |
| 22    | 24.2061  | -0.7472   | -13.2666  | 106.3989 | -3.4746   | -20.8397  |
| 23    | 106.3989 | -3.4746   | -20.8397  | 186.0425 | -6.5271   | -30.0404  |
| 24    | 186.0425 | -6.5271   | -30.0404  | 261.2266 | -9.8970   | -39.8051  |
| 25    | 261.2266 | -9.8970   | -39.8051  | 378.7589 | -15.5088  | -54.7443  |
| 26    | 378.7589 | -15.5088  | -54.7443  | 438.2991 | -19.5676  | -64.4861  |
| 27    | 438.2991 | -19.5676  | -64.4861  | 486.3680 | -23.8423  | -74.3108  |
| 28    | 486.3680 | -23.8423  | -74.3108  | 521.4382 | -28.2857  | -84.2083  |
| 29    | 521.4382 | -28.2857  | -84.2083  | 586.5136 | -35.2014  | -98.8971  |
| 30    | 586.5136 | -35.2014  | -98.8971  | 589.3950 | -39.9197  | -108.7693 |
| 31    | 589.3950 | -39.9197  | -108.7693 | 576.4237 | -44.6936  | -118.5928 |
| 32    | 576.4237 | -44.6936  | -118.5928 | 547.3022 | -49.4677  | -128.2389 |
| 33    | 547.3022 | -49.4677  | -128.2389 | 537.5220 | -56.5166  | -143.2042 |
| 34    | 537.5220 | -56.5166  | -143.2042 | 475.0745 | -61.1368  | -153.0501 |
| 35    | 475.0745 | -61.1368  | -153.0501 | 398.6434 | -65.6197  | -162.7473 |
| 36    | 398.6434 | -65.6197  | -162.7473 | 309.4995 | -69.9471  | -172.6375 |
| 37    | 309.4995 | -69.9471  | -172.6375 | 241.3605 | -76.0444  | -187.6319 |
| 38    | 241.3605 | -76.0444  | -187.6319 | 132.9664 | -79.7918  | -197.5497 |
| 39    | 132.9664 | -79.7918  | -197.5497 | 18.7741  | -83.2466  | -207.3634 |
| 40    | 18.7741  | -83.2466  | -207.3634 | -99.2050 | -41.7938  | -112.8382 |
| 41    | -99.2050 | -41.7938  | -112.8382 | 24.7662  | -0.7638   | -13.3694  |
| 42    | 24.7662  | -0.7638   | -13.3694  | 109.0450 | -3.5601   | -20.9404  |
| 43    | 109.0450 | -3.5601   | -20.9404  | 190.2201 | -6.6709   | -30.1483  |
| 44    | 190.2201 | -6.6709   | -30.1483  | 266.3984 | -10.0886  | -39.8776  |
| 45    | 266.3984 | -10.0886  | -39.8776  | 384.8282 | -15.7493  | -54.8039  |
| 46    | 384.8282 | -15.7493  | -54.8039  | 444.3864 | -19.8259  | -64.5936  |
| 47    | 444.3864 | -19.8259  | -64.5936  | 492.2264 | -24.1077  | -74.4277  |
| 48    | 492.2264 | -24.1077  | -74.4277  | 526.9084 | -28.5679  | -84.2401  |
| 49    | 526.9084 | -28.5679  | -84.2401  | 591.3442 | -35.4944  | -99.0941  |
| 50    | 591.3442 | -35.4944  | -99.0941  | 593.5643 | -40.2132  | -108.8934 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| ===== | =====    | =====     | =====     | =====    | =====     | =====     |
| 51    | 593.5643 | -40.2132  | -108.8934 | 579.7414 | -44.9799  | -118.6494 |
| 52    | 579.7414 | -44.9799  | -118.6494 | 549.8376 | -49.7344  | -128.4536 |
| 53    | 549.8376 | -49.7344  | -128.4536 | 539.2968 | -56.7852  | -143.1208 |
| 54    | 539.2968 | -56.7852  | -143.1208 | 476.0836 | -61.3746  | -152.9341 |
| 55    | 476.0836 | -61.3746  | -152.9341 | 399.0093 | -65.8372  | -162.8589 |
| 56    | 399.0093 | -65.8372  | -162.8589 | 309.4360 | -70.1281  | -172.7571 |
| 57    | 309.4360 | -70.1281  | -172.7571 | 240.9739 | -76.1749  | -187.6403 |
| 58    | 240.9739 | -76.1749  | -187.6403 | 132.4532 | -79.8893  | -197.6570 |
| 59    | 132.4532 | -79.8893  | -197.6570 | 18.3292  | -83.3130  | -207.3904 |
| 60    | 18.3292  | -83.3130  | -207.3904 | -99.5280 | -41.8085  | -112.8303 |
| 61    | -99.5280 | -41.8085  | -112.8303 | 24.8337  | -0.7650   | -13.3665  |
| 62    | 24.8337  | -0.7650   | -13.3665  | 109.3033 | -3.5647   | -20.9250  |
| 63    | 109.3033 | -3.5647   | -20.9250  | 190.6186 | -6.6802   | -30.1240  |
| 64    | 190.6186 | -6.6802   | -30.1240  | 266.9030 | -10.1039  | -39.8449  |
| 65    | 266.9030 | -10.1039  | -39.8449  | 385.4206 | -15.7756  | -54.8072  |
| 66    | 385.4206 | -15.7756  | -54.8072  | 444.9675 | -19.8678  | -64.5975  |
| 67    | 444.9675 | -19.8678  | -64.5975  | 492.7435 | -24.1617  | -74.4146  |
| 68    | 492.7435 | -24.1617  | -74.4146  | 527.2812 | -28.6262  | -84.3275  |
| 69    | 527.2812 | -28.6262  | -84.3275  | 591.6616 | -35.5382  | -99.1145  |
| 70    | 591.6616 | -35.5382  | -99.1145  | 593.7715 | -40.2384  | -108.7916 |
| 71    | 593.7715 | -40.2384  | -108.7916 | 579.8615 | -45.0074  | -118.5404 |
| 72    | 579.8615 | -45.0074  | -118.5404 | 549.8566 | -49.7558  | -128.4175 |
| 73    | 549.8566 | -49.7558  | -128.4175 | 539.2454 | -56.7959  | -143.1161 |
| 74    | 539.2454 | -56.7959  | -143.1161 | 475.9983 | -61.3792  | -152.9305 |
| 75    | 475.9983 | -61.3792  | -152.9305 | 398.9722 | -65.8362  | -162.8639 |
| 76    | 398.9722 | -65.8362  | -162.8639 | 309.3328 | -70.1338  | -172.6830 |
| 77    | 309.3328 | -70.1338  | -172.6830 | 240.9467 | -76.1714  | -187.6267 |
| 78    | 240.9467 | -76.1714  | -187.6267 | 132.4014 | -79.8932  | -197.6602 |
| 79    | 132.4014 | -79.8932  | -197.6602 | 18.3241  | -83.3127  | -207.3663 |
| 80    | 18.3241  | -83.3127  | -207.3663 | -99.5439 | -41.8055  | -112.8282 |
| 81    | -99.5439 | -41.8055  | -112.8282 | 24.8022  | -0.7651   | -13.3671  |
| 82    | 24.8022  | -0.7651   | -13.3671  | 109.2982 | -3.5664   | -20.9447  |
| 83    | 109.2982 | -3.5664   | -20.9447  | 190.6363 | -6.6853   | -30.1318  |
| 84    | 190.6363 | -6.6853   | -30.1318  | 266.8845 | -10.1070  | -39.8409  |
| 85    | 266.8845 | -10.1070  | -39.8409  | 385.3870 | -15.7788  | -54.7513  |
| 86    | 385.3870 | -15.7788  | -54.7513  | 444.9089 | -19.8637  | -64.6076  |
| 87    | 444.9089 | -19.8637  | -64.6076  | 492.7316 | -24.1566  | -74.5230  |
| 88    | 492.7316 | -24.1566  | -74.5230  | 527.3456 | -28.6148  | -84.1678  |
| 89    | 527.3456 | -28.6148  | -84.1678  | 591.6420 | -35.5463  | -98.9097  |
| 90    | 591.6420 | -35.5463  | -98.9097  | 593.6854 | -40.2779  | -108.8854 |
| 91    | 593.6854 | -40.2779  | -108.8854 | 579.7786 | -45.0202  | -118.5934 |
| 92    | 579.7786 | -45.0202  | -118.5934 | 549.7495 | -49.7642  | -128.3314 |
| 93    | 549.7495 | -49.7642  | -128.3314 | 539.1200 | -56.7960  | -143.2516 |
| 94    | 539.1200 | -56.7960  | -143.2516 | 475.9586 | -61.3770  | -152.9718 |
| 95    | 475.9586 | -61.3770  | -152.9718 | 398.8527 | -65.8384  | -162.8071 |
| 96    | 398.8527 | -65.8384  | -162.8071 | 309.3141 | -70.1271  | -172.6973 |
| 97    | 309.3141 | -70.1271  | -172.6973 | 240.9341 | -76.1714  | -187.6191 |
| 98    | 240.9341 | -76.1714  | -187.6191 | 132.3306 | -79.8846  | -197.6086 |
| 99    | 132.3306 | -79.8846  | -197.6086 | 18.3109  | -83.3122  | -207.3926 |
| 100   | 18.3109  | -83.3122  | -207.3926 | -99.5177 | -41.8062  | -112.8380 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | -99.5177  | -41.8062  | -112.8380 | 24.8014   | -0.7655   | -13.3677  |
| 102   | 24.8014   | -0.7655   | -13.3677  | 109.3189  | -3.5698   | -20.9533  |
| 103   | 109.3189  | -3.5698   | -20.9533  | 190.6268  | -6.6870   | -30.1378  |
| 104   | 190.6268  | -6.6870   | -30.1378  | 266.8641  | -10.1093  | -39.8522  |
| 105   | 266.8641  | -10.1093  | -39.8522  | 385.3774  | -15.7791  | -54.7737  |
| 106   | 385.3774  | -15.7791  | -54.7737  | 444.9210  | -19.8656  | -64.5745  |
| 107   | 444.9210  | -19.8656  | -64.5745  | 492.7195  | -24.1695  | -74.4036  |
| 108   | 492.7195  | -24.1695  | -74.4036  | 527.2121  | -28.6348  | -84.2912  |
| 109   | 527.2121  | -28.6348  | -84.2912  | 591.5203  | -35.5588  | -99.0845  |
| 110   | 591.5203  | -35.5588  | -99.0845  | 593.5768  | -40.2583  | -108.8560 |
| 111   | 593.5768  | -40.2583  | -108.8560 | 579.6410  | -45.0323  | -118.6449 |
| 112   | 579.6410  | -45.0323  | -118.6449 | 549.5680  | -49.7907  | -128.4105 |
| 113   | 549.5680  | -49.7907  | -128.4105 | 538.8524  | -56.8397  | -143.2049 |
| 114   | 538.8524  | -56.8397  | -143.2049 | 475.5750  | -61.4267  | -152.9203 |
| 115   | 475.5750  | -61.4267  | -152.9203 | 398.3585  | -65.8860  | -162.7649 |
| 116   | 398.3585  | -65.8860  | -162.7649 | 308.6924  | -70.1624  | -172.7102 |
| 117   | 308.6924  | -70.1624  | -172.7102 | 240.3600  | -76.2016  | -187.7006 |
| 118   | 240.3600  | -76.2016  | -187.7006 | 131.8987  | -79.9114  | -197.6286 |
| 119   | 131.8987  | -79.9114  | -197.6286 | 17.8391   | -83.3260  | -207.3351 |
| 120   | 17.8391   | -83.3260  | -207.3351 | -99.8577  | -41.7971  | -112.8467 |
| 121   | -99.8577  | -41.7971  | -112.8467 | 24.8901   | -0.7736   | -13.3778  |
| 122   | 24.8901   | -0.7736   | -13.3778  | 109.5108  | -3.6045   | -20.9577  |
| 123   | 109.5108  | -3.6045   | -20.9577  | 190.8187  | -6.7504   | -30.1702  |
| 124   | 190.8187  | -6.7504   | -30.1702  | 266.9476  | -10.2041  | -39.8982  |
| 125   | 266.9476  | -10.2041  | -39.8982  | 385.1620  | -15.9199  | -54.7535  |
| 126   | 385.1620  | -15.9199  | -54.7535  | 444.2459  | -20.0333  | -64.6224  |
| 127   | 444.2459  | -20.0333  | -64.6224  | 491.5651  | -24.3420  | -74.4774  |
| 128   | 491.5651  | -24.3420  | -74.4774  | 525.4220  | -28.8339  | -84.2632  |
| 129   | 525.4220  | -28.8339  | -84.2632  | 588.8301  | -35.7979  | -99.1451  |
| 130   | 588.8301  | -35.7979  | -99.1451  | 590.1068  | -40.5462  | -108.8332 |
| 131   | 590.1068  | -40.5462  | -108.8332 | 575.2153  | -45.3074  | -118.5952 |
| 132   | 575.2153  | -45.3074  | -118.5952 | 544.3121  | -50.0769  | -128.4958 |
| 133   | 544.3121  | -50.0769  | -128.4958 | 532.7822  | -57.1353  | -143.2693 |
| 134   | 532.7822  | -57.1353  | -143.2693 | 468.8390  | -61.7257  | -153.0843 |
| 135   | 468.8390  | -61.7257  | -153.0843 | 391.2496  | -66.1737  | -162.8815 |
| 136   | 391.2496  | -66.1737  | -162.8815 | 301.4070  | -70.4476  | -172.7386 |
| 137   | 301.4070  | -70.4476  | -172.7386 | 233.6037  | -76.4410  | -187.7336 |
| 138   | 233.6037  | -76.4410  | -187.7336 | 125.7959  | -80.1067  | -197.6994 |
| 139   | 125.7959  | -80.1067  | -197.6994 | 13.0140   | -83.4741  | -207.4465 |
| 140   | 13.0140   | -83.4741  | -207.4465 | -102.9044 | -41.8345  | -113.8626 |
| 141   | -102.9044 | -41.8345  | -113.8626 | -18.1319  | 0.5283    | -13.3202  |
| 142   | -18.1319  | 0.5283    | -13.3202  | 69.2214   | -2.1392   | -19.9061  |
| 143   | 69.2214   | -2.1392   | -19.9061  | 157.4135  | -5.1487   | -31.0569  |
| 144   | 157.4135  | -5.1487   | -31.0569  | 244.7223  | -8.5032   | -42.7323  |
| 145   | 244.7223  | -8.5032   | -42.7323  | 278.2722  | -10.3139  | -48.7342  |
| 146   | 278.2722  | -10.3139  | -48.7342  | 357.2936  | -14.1739  | -60.7546  |
| 147   | 357.2936  | -14.1739  | -60.7546  | 429.9252  | -18.3700  | -72.7661  |
| 148   | 429.9252  | -18.3700  | -72.7661  | 493.9583  | -22.8592  | -84.6524  |
| 149   | 493.9583  | -22.8592  | -84.6524  | 547.1754  | -27.6352  | -96.5910  |
| 150   | 547.1754  | -27.6352  | -96.5910  | 542.1218  | -30.1029  | -102.5058 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol | Cortantel | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 542.1218 | -30.1029  | -102.5058 | 571.1340 | -35.2598  | -114.3184 |
| 152   | 571.1340 | -35.2598  | -114.3184 | 584.7485 | -40.6062  | -126.2421 |
| 153   | 584.7485 | -40.6062  | -126.2421 | 581.5538 | -46.1571  | -138.2968 |
| 154   | 581.5538 | -46.1571  | -138.2968 | 560.2311 | -51.8877  | -150.1494 |
| 155   | 560.2311 | -51.8877  | -150.1494 | 493.1165 | -54.8095  | -155.8419 |
| 156   | 493.1165 | -54.8095  | -155.8419 | 437.0757 | -60.7278  | -167.8774 |
| 157   | 437.0757 | -60.7278  | -167.8774 | 360.3420 | -66.7652  | -180.0027 |
| 158   | 360.3420 | -66.7652  | -180.0027 | 262.2587 | -72.8844  | -191.9869 |
| 159   | 262.2587 | -72.8844  | -191.9869 | 142.2910 | -79.0717  | -204.0289 |
| 160   | 142.2910 | -79.0717  | -204.0289 | -0.0176  | -82.1809  | -210.0844 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0003    | 7.9447    | 1.5118    | 300.3856  | 149.1962  | 470.1651  |
| 2     | 300.3856  | 149.1962  | 470.1651  | 556.8221  | 135.8942  | 433.4585  |
| 3     | 556.8221  | 135.8942  | 433.4585  | 773.2330  | 111.7162  | 369.3562  |
| 4     | 773.2330  | 111.7162  | 369.3562  | 947.5748  | 85.1058   | 295.8377  |
| 5     | 947.5748  | 85.1058   | 295.8377  | 1080.8350 | 61.1630   | 232.6158  |
| 6     | 1080.8350 | 61.1630   | 232.6158  | 1174.9746 | 34.5853   | 159.1899  |
| 7     | 1174.9746 | 34.5853   | 159.1899  | 1226.0823 | 24.2034   | 133.9171  |
| 8     | 1226.0823 | 24.2034   | 133.9171  | 1237.6094 | -2.4289   | 60.4598   |
| 9     | 1237.6094 | -2.4289   | 60.4598   | 1238.3315 | 3.1463    | 55.4885   |
| 10    | 1238.3315 | 3.1463    | 55.4885   | 1238.4341 | -8.5324   | 27.4434   |
| 11    | 1238.4341 | -8.5324   | 27.4434   | 1202.8304 | -24.7910  | -15.6234  |
| 12    | 1202.8304 | -24.7910  | -15.6234  | 1131.6665 | -48.0140  | -77.9534  |
| 13    | 1131.6665 | -48.0140  | -77.9534  | 1023.6965 | -71.4852  | -141.2777 |
| 14    | 1023.6965 | -71.4852  | -141.2777 | 877.5973  | -95.2628  | -205.3018 |
| 15    | 877.5973  | -95.2628  | -205.3018 | 692.8535  | -115.2108 | -260.5045 |
| 16    | 692.8535  | -115.2108 | -260.5045 | 467.0048  | -132.5778 | -307.2007 |
| 17    | 467.0048  | -132.5778 | -307.2007 | 273.3384  | 8.9239    | 1.6767    |
| 18    | 273.3384  | 8.9239    | 1.6767    | 289.4097  | 8.9280    | 1.6795    |
| 19    | 289.4097  | 8.9280    | 1.6795    | 305.4774  | 8.9273    | 1.7952    |
| 20    | 305.4774  | 8.9273    | 1.7952    | 321.5443  | -11.5813  | 13.6638   |
| 21    | 321.5443  | -11.5813  | 13.6638   | 249.3466  | -32.0904  | 25.5098   |
| 22    | 249.3466  | -32.0904  | 25.5098   | 177.1218  | -32.0886  | 25.6077   |
| 23    | 177.1218  | -32.0886  | 25.6077   | 220.5380  | 152.7265  | 409.1221  |
| 24    | 220.5380  | 152.7265  | 409.1221  | 547.5623  | 130.1953  | 349.4546  |
| 25    | 547.5623  | 130.1953  | 349.4546  | 819.4957  | 107.6283  | 289.9679  |
| 26    | 819.4957  | 107.6283  | 289.9679  | 1037.5695 | 88.9998   | 244.5167  |
| 27    | 1037.5695 | 88.9998   | 244.5167  | 1199.0930 | 53.0979   | 148.1913  |
| 28    | 1199.0930 | 53.0979   | 148.1913  | 1301.9318 | 30.5016   | 88.6689   |
| 29    | 1301.9318 | 30.5016   | 88.6689   | 1348.7859 | 7.9297    | 29.6565   |
| 30    | 1348.7859 | 7.9297    | 29.6565   | 1399.9285 | 15.5756   | 28.8671   |
| 31    | 1399.9285 | 15.5756   | 28.8671   | 1407.7905 | -6.8544   | -30.2479  |
| 32    | 1407.7905 | -6.8544   | -30.2479  | 1359.9539 | -36.0342  | -107.6089 |
| 33    | 1359.9539 | -36.0342  | -107.6089 | 1254.3885 | -61.2224  | -171.8872 |
| 34    | 1254.3885 | -61.2224  | -171.8872 | 1093.0208 | -83.8233  | -231.3998 |
| 35    | 1093.0208 | -83.8233  | -231.3998 | 875.8309  | -106.4209 | -290.6312 |
| 36    | 875.8309  | -106.4209 | -290.6312 | 602.9443  | -135.6657 | -368.6130 |
| 37    | 602.9443  | -135.6657 | -368.6130 | 273.5569  | -160.7704 | -432.6490 |
| 38    | 273.5569  | -160.7704 | -432.6490 | 272.0708  | 8.9339    | 1.4402    |
| 39    | 272.0708  | 8.9339    | 1.4402    | 292.1723  | 8.9319    | 1.4926    |
| 40    | 292.1723  | 8.9319    | 1.4926    | 312.2737  | -11.4565  | 13.5340   |
| 41    | 312.2737  | -11.4565  | 13.5340   | 240.6450  | -31.8449  | 25.5282   |
| 42    | 240.6450  | -31.8449  | 25.5282   | 204.8273  | -6.6686   | -1.2291   |
| 43    | 204.8273  | -6.6686   | -1.2291   | 247.7959  | 151.8224  | 408.8170  |
| 44    | 247.7959  | 151.8224  | 408.8170  | 572.9137  | 129.3061  | 349.1894  |
| 45    | 572.9137  | 129.3061  | 349.1894  | 842.8138  | 106.7241  | 289.7241  |
| 46    | 842.8138  | 106.7241  | 289.7241  | 1058.6259 | 88.1179   | 244.1626  |
| 47    | 1058.6259 | 88.1179   | 244.1626  | 1217.9739 | 52.2467   | 147.8716  |
| 48    | 1217.9739 | 52.2467   | 147.8716  | 1318.5719 | 29.6820   | 88.5134   |
| 49    | 1318.5719 | 29.6820   | 88.5134   | 1363.1735 | 7.1205    | 29.0804   |
| 50    | 1363.1735 | 7.1205    | 29.0804   | 1412.9456 | 14.6562   | 28.4766   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 51    | 1412.9456 | 14.6562   | 28.4766   | 1418.8429 | -7.8066   | -30.6317  |
| 52    | 1418.8429 | -7.8066   | -30.6317  | 1369.0120 | -37.0080  | -108.2542 |
| 53    | 1369.0120 | -37.0080  | -108.2542 | 1261.2035 | -62.2455  | -171.8868 |
| 54    | 1261.2035 | -62.2455  | -171.8868 | 1097.3361 | -84.8710  | -231.3936 |
| 55    | 1097.3361 | -84.8710  | -231.3936 | 877.6406  | -107.4877 | -291.0727 |
| 56    | 877.6406  | -107.4877 | -291.0727 | 602.4125  | -136.6974 | -369.0328 |
| 57    | 602.4125  | -136.6974 | -369.0328 | 270.7858  | -161.7361 | -432.8964 |
| 58    | 270.7858  | -161.7361 | -432.8964 | 271.5419  | 8.8452    | 1.3768    |
| 59    | 271.5419  | 8.8452    | 1.3768    | 291.4378  | 8.8429    | 1.5154    |
| 60    | 291.4378  | 8.8429    | 1.5154    | 311.3329  | -11.4880  | 13.4913   |
| 61    | 311.3329  | -11.4880  | 13.4913   | 291.2724  | -8.8284   | -1.5230   |
| 62    | 291.2724  | -8.8284   | -1.5230   | 271.4120  | -8.8284   | -1.3852   |
| 63    | 271.4120  | -8.8284   | -1.3852   | 251.5433  | -8.8313   | -1.3024   |
| 64    | 251.5433  | -8.8313   | -1.3024   | 575.3673  | 129.2232  | 349.2847  |
| 65    | 575.3673  | 129.2232  | 349.2847  | 845.0619  | 106.6147  | 289.7036  |
| 66    | 845.0619  | 106.6147  | 289.7036  | 1060.6035 | 87.9725   | 244.1946  |
| 67    | 1060.6035 | 87.9725   | 244.1946  | 1219.5533 | 52.0609   | 147.8969  |
| 68    | 1219.5533 | 52.0609   | 147.8969  | 1319.7703 | 29.4975   | 88.3352   |
| 69    | 1319.7703 | 29.4975   | 88.3352   | 1364.0001 | 6.9727    | 29.0765   |
| 70    | 1364.0001 | 6.9727    | 29.0765   | 1413.5457 | 14.5411   | 28.7378   |
| 71    | 1413.5457 | 14.5411   | 28.7378   | 1419.2424 | -7.9107   | -30.3808  |
| 72    | 1419.2424 | -7.9107   | -30.3808  | 1369.2229 | -37.1168  | -108.1958 |
| 73    | 1369.2229 | -37.1168  | -108.1958 | 1261.2017 | -62.3372  | -171.8572 |
| 74    | 1261.2017 | -62.3372  | -171.8572 | 1097.1959 | -84.9237  | -231.3633 |
| 75    | 1097.1959 | -84.9237  | -231.3633 | 877.4906  | -107.5219 | -291.0243 |
| 76    | 877.4906  | -107.5219 | -291.0243 | 602.0877  | -136.7632 | -368.8417 |
| 77    | 602.0877  | -136.7632 | -368.8417 | 270.5102  | -161.7695 | -432.7839 |
| 78    | 270.5102  | -161.7695 | -432.7839 | 271.3477  | 8.8373    | 1.3969    |
| 79    | 271.3477  | 8.8373    | 1.3969    | 291.2299  | 8.8365    | 1.5737    |
| 80    | 291.2299  | 8.8365    | 1.5737    | 313.8781  | 11.5760   | -13.5288  |
| 81    | 313.8781  | 11.5760   | -13.5288  | 293.8160  | -8.9147   | -1.5198   |
| 82    | 293.8160  | -8.9147   | -1.5198   | 273.7522  | -8.9142   | -1.4305   |
| 83    | 273.7522  | -8.9142   | -1.4305   | 253.7033  | -8.9143   | -1.3120   |
| 84    | 253.7033  | -8.9143   | -1.3120   | 575.1829  | 129.1778  | 349.2897  |
| 85    | 575.1829  | 129.1778  | 349.2897  | 844.9392  | 106.5811  | 289.8666  |
| 86    | 844.9392  | 106.5811  | 289.8666  | 1060.3959 | 87.9675   | 244.0884  |
| 87    | 1060.3959 | 87.9675   | 244.0884  | 1219.4890 | 52.0953   | 147.6884  |
| 88    | 1219.4890 | 52.0953   | 147.6884  | 1319.7023 | 29.5454   | 88.7426   |
| 89    | 1319.7023 | 29.5454   | 88.7426   | 1363.9634 | 6.9478    | 29.5104   |
| 90    | 1363.9634 | 6.9478    | 29.5104   | 1413.4519 | 14.4974   | 28.4537   |
| 91    | 1413.4519 | 14.4974   | 28.4537   | 1418.9463 | -7.9735   | -30.4025  |
| 92    | 1418.9463 | -7.9735   | -30.4025  | 1368.7996 | -37.1385  | -107.9881 |
| 93    | 1368.7996 | -37.1385  | -107.9881 | 1260.8240 | -62.3432  | -172.1021 |
| 94    | 1260.8240 | -62.3432  | -172.1021 | 1096.9412 | -84.9149  | -231.3937 |
| 95    | 1096.9412 | -84.9149  | -231.3937 | 877.1664  | -107.5022 | -290.9165 |
| 96    | 877.1664  | -107.5022 | -290.9165 | 601.9508  | -136.7039 | -368.8696 |
| 97    | 601.9508  | -136.7039 | -368.8696 | 270.4044  | -161.7501 | -432.7941 |
| 98    | 270.4044  | -161.7501 | -432.7941 | 269.1379  | 8.7687    | 1.4123    |
| 99    | 269.1379  | 8.7687    | 1.4123    | 288.8578  | 8.7674    | 1.5441    |
| 100   | 288.8578  | 8.7674    | 1.5441    | 314.0070  | 11.5779   | -13.5325  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | 314.0070  | 11.5779   | -13.5325  | 293.9315  | -8.9196   | -1.5508   |
| 102   | 293.9315  | -8.9196   | -1.5508   | 273.8661  | -8.9170   | -1.4662   |
| 103   | 273.8661  | -8.9170   | -1.4662   | 253.8076  | -8.9173   | -1.3371   |
| 104   | 253.8076  | -8.9173   | -1.3371   | 575.2745  | 129.1437  | 349.2386  |
| 105   | 575.2745  | 129.1437  | 349.2386  | 844.9319  | 106.5543  | 289.7761  |
| 106   | 844.9319  | 106.5543  | 289.7761  | 1060.3872 | 87.9348   | 244.1965  |
| 107   | 1060.3872 | 87.9348   | 244.1965  | 1219.2166 | 52.0382   | 147.8964  |
| 108   | 1219.2166 | 52.0382   | 147.8964  | 1319.3145 | 29.4621   | 88.3598   |
| 109   | 1319.3145 | 29.4621   | 88.3598   | 1363.4025 | 6.9421    | 29.1391   |
| 110   | 1363.4025 | 6.9421    | 29.1391   | 1412.9561 | 14.5033   | 28.5470   |
| 111   | 1412.9561 | 14.5033   | 28.5470   | 1418.5588 | -7.9965   | -30.5628  |
| 112   | 1418.5588 | -7.9965   | -30.5628  | 1368.2460 | -37.2208  | -108.1602 |
| 113   | 1368.2460 | -37.2208  | -108.1602 | 1259.9679 | -62.4564  | -172.0435 |
| 114   | 1259.9679 | -62.4564  | -172.0435 | 1095.7429 | -85.0747  | -231.3083 |
| 115   | 1095.7429 | -85.0747  | -231.3083 | 875.5841  | -107.6661 | -290.8466 |
| 116   | 875.5841  | -107.6661 | -290.8466 | 599.8891  | -136.8654 | -368.9019 |
| 117   | 599.8891  | -136.8654 | -368.9019 | 268.1017  | -161.8941 | -432.9067 |
| 118   | 268.1017  | -161.8941 | -432.9067 | 202.3497  | 6.5887    | 1.2834    |
| 119   | 202.3497  | 6.5887    | 1.2834    | 242.6143  | 32.1118   | -25.5955  |
| 120   | 242.6143  | 32.1118   | -25.5955  | 314.8824  | 11.5534   | -13.5585  |
| 121   | 314.8824  | 11.5534   | -13.5585  | 294.6216  | -9.0053   | -1.5197   |
| 122   | 294.6216  | -9.0053   | -1.5197   | 274.3629  | -9.0063   | -1.4338   |
| 123   | 274.3629  | -9.0063   | -1.4338   | 254.0972  | -9.0060   | -1.3480   |
| 124   | 254.0972  | -9.0060   | -1.3480   | 575.9938  | 128.1360  | 349.1013  |
| 125   | 575.9938  | 128.1360  | 349.1013  | 843.3357  | 105.5661  | 289.7267  |
| 126   | 843.3357  | 105.5661  | 289.7267  | 1056.5127 | 86.9576   | 243.9412  |
| 127   | 1056.5127 | 86.9576   | 243.9412  | 1213.0977 | 51.0475   | 147.6736  |
| 128   | 1213.0977 | 51.0475   | 147.6736  | 1311.0391 | 28.4804   | 88.3343   |
| 129   | 1311.0391 | 28.4804   | 88.3343   | 1353.0894 | 5.9757    | 28.8618   |
| 130   | 1353.0894 | 5.9757    | 28.8618   | 1401.4590 | 13.6027   | 28.5581   |
| 131   | 1401.4590 | 13.6027   | 28.5581   | 1404.5229 | -8.9387   | -30.5826  |
| 132   | 1404.5229 | -8.9387   | -30.5826  | 1351.8635 | -38.1336  | -108.4536 |
| 133   | 1351.8635 | -38.1336  | -108.4536 | 1240.8425 | -63.3845  | -172.3095 |
| 134   | 1240.8425 | -63.3845  | -172.3095 | 1074.2583 | -86.0191  | -231.8015 |
| 135   | 1074.2583 | -86.0191  | -231.8015 | 852.0018  | -108.6008 | -291.2144 |
| 136   | 852.0018  | -108.6008 | -291.2144 | 574.2866  | -137.8452 | -369.1336 |
| 137   | 574.2866  | -137.8452 | -369.1336 | 240.9104  | -162.8477 | -433.1658 |
| 138   | 240.9104  | -162.8477 | -433.1658 | 178.7706  | 32.3877   | -25.6473  |
| 139   | 178.7706  | 32.3877   | -25.6473  | 251.6319  | 32.3871   | -25.5787  |
| 140   | 251.6319  | 32.3871   | -25.5787  | 324.5185  | 11.6871   | -13.6426  |
| 141   | 324.5185  | 11.6871   | -13.6426  | 308.2917  | -9.0147   | -1.6842   |
| 142   | 308.2917  | -9.0147   | -1.6842   | 292.0665  | -9.0129   | -1.6806   |
| 143   | 292.0665  | -9.0129   | -1.6806   | 275.8483  | -9.0124   | -1.6257   |
| 144   | 275.8483  | -9.0124   | -1.6257   | 439.3527  | 129.3179  | 298.0478  |
| 145   | 439.3527  | 129.3179  | 298.0478  | 650.7338  | 102.7096  | 224.5178  |
| 146   | 650.7338  | 102.7096  | 224.5178  | 819.6514  | 76.1518   | 150.9821  |
| 147   | 819.6514  | 76.1518   | 150.9821  | 944.7938  | 62.8932   | 114.3203  |
| 148   | 944.7938  | 62.8932   | 114.3203  | 1025.9788 | 36.2967   | 41.0547   |
| 149   | 1025.9788 | 36.2967   | 41.0547   | 1107.5750 | 61.6151   | 94.9769   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 150   | 1107.5750 | 61.6151   | 94.9769   | 1210.3571 | 51.7048   | 71.5424   |
| 151   | 1210.3571 | 51.7048   | 71.5424   | 1271.0424 | 28.2593   | 10.6242   |
| 152   | 1271.0424 | 28.2593   | 10.6242   | 1292.6488 | 1.6917    | -62.8068  |
| 153   | 1292.6488 | 1.6917    | -62.8068  | 1275.1804 | -22.0318  | -125.1292 |
| 154   | 1275.1804 | -22.0318  | -125.1292 | 1216.9231 | -48.6825  | -198.3295 |
| 155   | 1216.9231 | -48.6825  | -198.3295 | 1118.8254 | -59.3531  | -223.9779 |
| 156   | 1118.8254 | -59.3531  | -223.9779 | 977.3516  | -85.9676  | -297.6031 |
| 157   | 977.3516  | -85.9676  | -297.6031 | 793.6850  | -110.1232 | -361.7473 |
| 158   | 793.6850  | -110.1232 | -361.7473 | 571.6412  | -136.7184 | -435.1286 |
| 159   | 571.6412  | -136.7184 | -435.1286 | 307.1638  | -163.3192 | -508.6133 |
| 160   | 307.1638  | -163.3192 | -508.6133 | 0.0016    | 32.0897   | -33.5531  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | -0.0405    | 164.9000  | 508.5471 | -57.8887   | -32.1656  | 31.0012  |
| 2     | -57.8887   | -32.1656  | 31.0012  | -115.7803  | -32.1635  | 30.9752  |
| 3     | -115.7803  | -32.1635  | 30.9752  | -173.6985  | -32.1544  | 30.9160  |
| 4     | -173.6985  | -32.1544  | 30.9160  | -231.5638  | -32.1542  | 30.8862  |
| 5     | -231.5638  | -32.1542  | 30.8862  | -289.4437  | -32.1691  | 30.8200  |
| 6     | -289.4437  | -32.1691  | 30.8200  | -347.3569  | -32.1686  | 30.7549  |
| 7     | -347.3569  | -32.1686  | 30.7549  | -405.2809  | -32.1431  | 30.6020  |
| 8     | -405.2809  | -32.1431  | 30.6020  | -463.1309  | -32.1166  | 30.5415  |
| 9     | -463.1309  | -32.1166  | 30.5415  | -520.9216  | -32.0963  | 30.4190  |
| 10    | -520.9216  | -32.0963  | 30.4190  | -578.7426  | -32.0923  | 30.2093  |
| 11    | -578.7426  | -32.0923  | 30.2093  | -636.5073  | -32.1168  | 30.0977  |
| 12    | -636.5073  | -32.1168  | 30.0977  | -694.3132  | -32.1302  | 29.9591  |
| 13    | -694.3132  | -32.1302  | 29.9591  | -752.1324  | -32.1047  | 29.7818  |
| 14    | -752.1324  | -32.1047  | 29.7818  | -809.8988  | -32.0991  | 29.4849  |
| 15    | -809.8988  | -32.0991  | 29.4849  | -867.6893  | -32.0960  | 29.4913  |
| 16    | -867.6893  | -32.0960  | 29.4913  | -925.4668  | -32.0956  | 29.1243  |
| 17    | -925.4668  | -32.0956  | 29.1243  | -983.2471  | -32.1064  | 28.7701  |
| 18    | -983.2471  | -32.1064  | 28.7701  | -1041.0310 | -32.1048  | 28.7567  |
| 19    | -1041.0310 | -32.1048  | 28.7567  | -1098.8340 | -32.1086  | 28.3419  |
| 20    | -1098.8340 | -32.1086  | 28.3419  | -1219.2603 | 2.3698    | 27.3696  |
| 21    | -1219.2603 | 2.3698    | 27.3696  | -820.8214  | 173.3140  | 400.2631 |
| 22    | -820.8214  | 173.3140  | 400.2631 | -738.1361  | 24.0225   | -21.6388 |
| 23    | -738.1361  | 24.0225   | -21.6388 | -684.0647  | 24.0251   | -21.8721 |
| 24    | -684.0647  | 24.0251   | -21.8721 | -630.0016  | 24.0280   | -21.8698 |
| 25    | -630.0016  | 24.0280   | -21.8698 | -575.9184  | 24.0267   | -22.0481 |
| 26    | -575.9184  | 24.0267   | -22.0481 | -521.8412  | 24.0243   | -22.3917 |
| 27    | -521.8412  | 24.0243   | -22.3917 | -467.7767  | 24.0233   | -22.5521 |
| 28    | -467.7767  | 24.0233   | -22.5521 | -413.7203  | 24.0210   | -22.6206 |
| 29    | -413.7203  | 24.0210   | -22.6206 | -359.6389  | 24.0248   | -22.8051 |
| 30    | -359.6389  | 24.0248   | -22.8051 | -400.5110  | -32.0855  | 25.3431  |
| 31    | -400.5110  | -32.0855  | 25.3431  | -472.7105  | -32.0872  | 25.1880  |
| 32    | -472.7105  | -32.0872  | 25.1880  | -544.9136  | -32.0936  | 24.9492  |
| 33    | -544.9136  | -32.0936  | 24.9492  | -617.1448  | -32.1110  | 24.9445  |
| 34    | -617.1448  | -32.1110  | 24.9445  | -689.4245  | -32.1213  | 24.7225  |
| 35    | -689.4245  | -32.1213  | 24.7225  | -761.7238  | -32.1337  | 24.2654  |
| 36    | -761.7238  | -32.1337  | 24.2654  | -834.0145  | -32.1304  | 24.1409  |
| 37    | -834.0145  | -32.1304  | 24.1409  | -906.3135  | -32.1161  | 23.8477  |
| 38    | -906.3135  | -32.1161  | 23.8477  | -978.5566  | -32.1110  | 23.5767  |
| 39    | -978.5566  | -32.1110  | 23.5767  | -1050.8248 | -32.1088  | 23.3840  |
| 40    | -1050.8248 | -32.1088  | 23.3840  | -1241.5613 | 7.7201    | 24.7065  |
| 41    | -1241.5613 | 7.7201    | 24.7065  | -1047.5537 | 31.7686   | -23.3465 |
| 42    | -1047.5537 | 31.7686   | -23.3465 | -976.0696  | 31.7645   | -23.6978 |
| 43    | -976.0696  | 31.7645   | -23.6978 | -904.5741  | 31.7612   | -23.9884 |
| 44    | -904.5741  | 31.7612   | -23.9884 | -833.1026  | 31.7606   | -24.1082 |
| 45    | -833.1026  | 31.7606   | -24.1082 | -761.6107  | 31.7567   | -24.3437 |
| 46    | -761.6107  | 31.7567   | -24.3437 | -690.1545  | 31.7556   | -24.6996 |
| 47    | -690.1545  | 31.7556   | -24.6996 | -618.6830  | 31.7524   | -24.9024 |
| 48    | -618.6830  | 31.7524   | -24.9024 | -547.2629  | 31.7535   | -25.0807 |
| 49    | -547.2629  | 31.7535   | -25.0807 | -475.7966  | 31.7597   | -25.1768 |
| 50    | -475.7966  | 31.7597   | -25.1768 | -404.3397  | -31.8362  | 25.3294  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | -404.3397  | -31.8362  | 25.3294  | -475.9482  | -31.8255  | 25.2061  |
| 52    | -475.9482  | -31.8255  | 25.2061  | -547.5507  | -31.8259  | 25.0331  |
| 53    | -547.5507  | -31.8259  | 25.0331  | -619.1410  | -31.8146  | 24.7559  |
| 54    | -619.1410  | -31.8146  | 24.7559  | -690.7225  | -31.8066  | 24.5574  |
| 55    | -690.7225  | -31.8066  | 24.5574  | -762.2958  | -31.8076  | 24.4623  |
| 56    | -762.2958  | -31.8076  | 24.4623  | -833.8450  | -31.8084  | 24.1705  |
| 57    | -833.8450  | -31.8084  | 24.1705  | -905.4579  | -31.8078  | 23.9118  |
| 58    | -905.4579  | -31.8078  | 23.9118  | -977.0100  | -31.8032  | 23.7762  |
| 59    | -977.0100  | -31.8032  | 23.7762  | -1048.5640 | -31.7992  | 23.2830  |
| 60    | -1048.5640 | -31.7992  | 23.2830  | -1242.6903 | 7.6753    | 24.7132  |
| 61    | -1242.6903 | 7.6753    | 24.7132  | -1056.8231 | 32.0188   | -23.2956 |
| 62    | -1056.8231 | 32.0188   | -23.2956 | -984.7763  | 32.0217   | -23.8024 |
| 63    | -984.7763  | 32.0217   | -23.8024 | -912.7074  | 32.0211   | -24.1019 |
| 64    | -912.7074  | 32.0211   | -24.1019 | -840.6533  | 32.0374   | -24.2255 |
| 65    | -840.6533  | 32.0374   | -24.2255 | -768.5375  | 32.0574   | -24.3647 |
| 66    | -768.5375  | 32.0574   | -24.3647 | -696.3745  | 32.0634   | -24.7190 |
| 67    | -696.3745  | 32.0634   | -24.7190 | -624.2305  | 32.0709   | -24.9404 |
| 68    | -624.2305  | 32.0709   | -24.9404 | -552.0458  | 32.0716   | -25.0112 |
| 69    | -552.0458  | 32.0716   | -25.0112 | -479.9230  | 32.0652   | -25.1665 |
| 70    | -479.9230  | 32.0652   | -25.1665 | -407.7502  | 32.0637   | -25.3857 |
| 71    | -407.7502  | 32.0637   | -25.3857 | -475.8831  | -31.7882  | 25.0663  |
| 72    | -475.8831  | -31.7882  | 25.0663  | -547.4010  | -31.7872  | 24.9783  |
| 73    | -547.4010  | -31.7872  | 24.9783  | -618.9335  | -31.7934  | 24.6931  |
| 74    | -618.9335  | -31.7934  | 24.6931  | -690.4818  | -31.7994  | 24.5233  |
| 75    | -690.4818  | -31.7994  | 24.5233  | -762.0085  | -31.7992  | 24.3836  |
| 76    | -762.0085  | -31.7992  | 24.3836  | -833.5930  | -31.7944  | 23.9924  |
| 77    | -833.5930  | -31.7944  | 23.9924  | -905.1149  | -31.7930  | 23.8908  |
| 78    | -905.1149  | -31.7930  | 23.8908  | -976.6613  | -31.7939  | 23.7076  |
| 79    | -976.6613  | -31.7939  | 23.7076  | -1048.2091 | -31.7955  | 23.0742  |
| 80    | -1048.2091 | -31.7955  | 23.0742  | -1242.7034 | 7.6702    | 24.5598  |
| 81    | -1242.7034 | 7.6702    | 24.5598  | -1057.4255 | 32.0664   | -23.3296 |
| 82    | -1057.4255 | 32.0664   | -23.3296 | -985.2583  | 32.0601   | -23.6528 |
| 83    | -985.2583  | 32.0601   | -23.6528 | -913.1244  | 32.0674   | -24.0751 |
| 84    | -913.1244  | 32.0674   | -24.0751 | -840.9807  | 32.0749   | -24.2442 |
| 85    | -840.9807  | 32.0749   | -24.2442 | -768.8140  | 32.0786   | -24.4794 |
| 86    | -768.8140  | 32.0786   | -24.4794 | -696.6618  | 32.0785   | -24.7327 |
| 87    | -696.6618  | 32.0785   | -24.7327 | -624.4858  | 32.0733   | -24.8382 |
| 88    | -624.4858  | 32.0733   | -24.8382 | -552.3192  | 32.0771   | -25.2076 |
| 89    | -552.3192  | 32.0771   | -25.2076 | -480.1386  | 32.0838   | -25.3780 |
| 90    | -480.1386  | 32.0838   | -25.3780 | -407.9372  | 32.0985   | -25.3815 |
| 91    | -407.9372  | 32.0985   | -25.3815 | -475.5678  | -31.7598  | 25.0784  |
| 92    | -475.5678  | -31.7598  | 25.0784  | -547.0709  | -31.7751  | 24.9377  |
| 93    | -547.0709  | -31.7751  | 24.9377  | -618.5699  | -31.7910  | 24.8433  |
| 94    | -618.5699  | -31.7910  | 24.8433  | -690.0914  | -31.7981  | 24.5332  |
| 95    | -690.0914  | -31.7981  | 24.5332  | -761.6486  | -31.7944  | 24.3080  |
| 96    | -761.6486  | -31.7944  | 24.3080  | -833.1821  | -31.8004  | 24.0555  |
| 97    | -833.1821  | -31.8004  | 24.0555  | -904.7529  | -31.8050  | 23.7630  |
| 98    | -904.7529  | -31.8050  | 23.7630  | -976.3285  | -31.7979  | 23.6408  |
| 99    | -976.3285  | -31.7979  | 23.6408  | -1047.8496 | -31.7902  | 23.1675  |
| 100   | -1047.8496 | -31.7902  | 23.1675  | -1242.5958 | 7.6674    | 24.4411  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1242.5958 | 7.6674    | 24.4411   | -1057.3511 | 32.0714   | -23.2200  |
| 102   | -1057.3511 | 32.0714   | -23.2200  | -985.1910  | 32.0710   | -23.5281  |
| 103   | -985.1910  | 32.0710   | -23.5281  | -913.0509  | 32.0714   | -23.9981  |
| 104   | -913.0509  | 32.0714   | -23.9981  | -840.8649  | 32.0707   | -24.1545  |
| 105   | -840.8649  | 32.0707   | -24.1545  | -768.6907  | 32.0730   | -24.3913  |
| 106   | -768.6907  | 32.0730   | -24.3913  | -696.5089  | 32.0715   | -24.7347  |
| 107   | -696.5089  | 32.0715   | -24.7347  | -624.3564  | 32.0771   | -24.9367  |
| 108   | -624.3564  | 32.0771   | -24.9367  | -552.1396  | 32.0941   | -25.0457  |
| 109   | -552.1396  | 32.0941   | -25.0457  | -479.9091  | 32.0918   | -25.1958  |
| 110   | -479.9091  | 32.0918   | -25.1958  | -407.7193  | 32.0846   | -25.3449  |
| 111   | -407.7193  | 32.0846   | -25.3449  | -471.8416  | -31.5066  | 25.2034   |
| 112   | -471.8416  | -31.5066  | 25.2034   | -542.6964  | -31.4990  | 25.0518   |
| 113   | -542.6964  | -31.4990  | 25.0518   | -613.5563  | -31.4884  | 24.8545   |
| 114   | -613.5563  | -31.4884  | 24.8545   | -684.3876  | -31.4748  | 24.5369   |
| 115   | -684.3876  | -31.4748  | 24.5369   | -755.2372  | -31.4832  | 24.3143   |
| 116   | -755.2372  | -31.4832  | 24.3143   | -826.0614  | -31.4904  | 24.2085   |
| 117   | -826.0614  | -31.4904  | 24.2085   | -896.9158  | -31.4942  | 24.0550   |
| 118   | -896.9158  | -31.4942  | 24.0550   | -967.8157  | -31.4991  | 23.6052   |
| 119   | -967.8157  | -31.4991  | 23.6052   | -1038.7003 | -31.4960  | 23.3035   |
| 120   | -1038.7003 | -31.4960  | 23.3035   | -1240.7759 | 7.5865    | 24.6604   |
| 121   | -1240.7759 | 7.5865    | 24.6604   | -1059.8362 | 32.3818   | -23.3505  |
| 122   | -1059.8362 | 32.3818   | -23.3505  | -986.9708  | 32.3844   | -23.6643  |
| 123   | -986.9708  | 32.3844   | -23.6643  | -914.1169  | 32.3858   | -23.9702  |
| 124   | -914.1169  | 32.3858   | -23.9702  | -841.2418  | 32.3855   | -24.1148  |
| 125   | -841.2418  | 32.3855   | -24.1148  | -768.3595  | 32.3743   | -24.4984  |
| 126   | -768.3595  | 32.3743   | -24.4984  | -695.5028  | 32.3602   | -24.7142  |
| 127   | -695.5028  | 32.3602   | -24.7142  | -622.7191  | 32.3530   | -24.9055  |
| 128   | -622.7191  | 32.3530   | -24.9055  | -549.9016  | 32.3589   | -25.1128  |
| 129   | -549.9016  | 32.3589   | -25.1128  | -477.0875  | 32.3689   | -25.1829  |
| 130   | -477.0875  | 32.3689   | -25.1829  | -404.2610  | 32.3758   | -25.3879  |
| 131   | -404.2610  | 32.3758   | -25.3879  | -355.4688  | -23.7207  | 23.8555   |
| 132   | -355.4688  | -23.7207  | 23.8555   | -408.8145  | -23.7111  | 23.7978   |
| 133   | -408.8145  | -23.7111  | 23.7978   | -462.1936  | -23.7141  | 23.6481   |
| 134   | -462.1936  | -23.7141  | 23.6481   | -515.5830  | -23.7184  | 23.4907   |
| 135   | -515.5830  | -23.7184  | 23.4907   | -568.9557  | -23.7202  | 23.2449   |
| 136   | -568.9557  | -23.7202  | 23.2449   | -622.3311  | -23.7128  | 23.0718   |
| 137   | -622.3311  | -23.7128  | 23.0718   | -675.6769  | -23.7104  | 22.9561   |
| 138   | -675.6769  | -23.7104  | 22.9561   | -729.0506  | -23.7175  | 22.7417   |
| 139   | -729.0506  | -23.7175  | 22.7417   | -833.7615  | -158.7989 | -353.8355 |
| 140   | -833.7615  | -158.7989 | -353.8355 | -1201.7191 | 12.9380   | 19.3948   |
| 141   | -1201.7191 | 12.9380   | 19.3948   | -1108.9424 | 32.4159   | -28.8233  |
| 142   | -1108.9424 | 32.4159   | -28.8233  | -1050.5920 | 32.4192   | -28.8387  |
| 143   | -1050.5920 | 32.4192   | -28.8387  | -992.2405  | 32.4275   | -29.0386  |
| 144   | -992.2405  | 32.4275   | -29.0386  | -933.8092  | 32.4220   | -29.4333  |
| 145   | -933.8092  | 32.4220   | -29.4333  | -875.4628  | 32.4165   | -29.5767  |
| 146   | -875.4628  | 32.4165   | -29.5767  | -817.0964  | 32.4009   | -29.7596  |
| 147   | -817.0964  | 32.4009   | -29.7596  | -758.7886  | 32.3877   | -29.9090  |
| 148   | -758.7886  | 32.3877   | -29.9090  | -700.4822  | 32.3968   | -30.1820  |
| 149   | -700.4822  | 32.3968   | -30.1820  | -642.1611  | 32.3904   | -30.3344  |
| 150   | -642.1611  | 32.3904   | -30.3344  | -583.8622  | 32.3895   | -30.4608  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 151   | -583.8622 | 32.3895   | -30.4608 | -525.5040 | 32.4137   | -30.6842  |
| 152   | -525.5040 | 32.4137   | -30.6842 | -467.1423 | 32.4184   | -30.7832  |
| 153   | -467.1423 | 32.4184   | -30.7832 | -408.8170 | 32.4142   | -30.7719  |
| 154   | -408.8170 | 32.4142   | -30.7719 | -350.4507 | 32.4432   | -30.9140  |
| 155   | -350.4507 | 32.4432   | -30.9140 | -292.0244 | 32.4538   | -31.1038  |
| 156   | -292.0244 | 32.4538   | -31.1038 | -233.6190 | 32.4419   | -31.1136  |
| 157   | -233.6190 | 32.4419   | -31.1136 | -175.2229 | 32.4419   | -31.1026  |
| 158   | -175.2229 | 32.4419   | -31.1026 | -116.8038 | 32.4411   | -31.1606  |
| 159   | -116.8038 | 32.4411   | -31.1606 | -58.4083  | 32.4401   | -31.1936  |
| 160   | -58.4083  | 32.4401   | -31.1936 | -0.0464   | -176.6109 | -545.3805 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | -0.0405    | 175.7958  | 543.8220 | 277.6581   | 154.2999  | 489.6491 |
| 2     | 277.6581   | 154.2999  | 489.6491 | 517.8624   | 143.9082  | 464.0479 |
| 3     | 517.8624   | 143.9082  | 464.0479 | 668.8376   | 123.8882  | 415.5409 |
| 4     | 668.8376   | 123.8882  | 415.5409 | 755.5899   | 104.9731  | 370.4943 |
| 5     | 755.5899   | 104.9731  | 370.4943 | 920.9911   | 88.2022   | 283.5786 |
| 6     | 920.9911   | 88.2022   | 283.5786 | 1026.3677  | 78.4592   | 260.8049 |
| 7     | 1026.3677  | 78.4592   | 260.8049 | 791.0362   | 62.8092   | 273.8674 |
| 8     | 791.0362   | 62.8092   | 273.8674 | 692.1568   | 48.0540   | 241.1608 |
| 9     | 692.1568   | 48.0540   | 241.1608 | 560.8821   | 34.6217   | 211.7075 |
| 10    | 560.8821   | 34.6217   | 211.7075 | 404.5426   | 22.4801   | 184.6127 |
| 11    | 404.5426   | 22.4801   | 184.6127 | 230.4148   | 11.6536   | 157.4970 |
| 12    | 230.4148   | 11.6536   | 157.4970 | 193.0230   | 8.9309    | 1.3449   |
| 13    | 193.0230   | 8.9309    | 1.3449   | 209.0949   | 8.9273    | 1.3929   |
| 14    | 209.0949   | 8.9273    | 1.3929   | 225.1590   | 8.9232    | 1.4793   |
| 15    | 225.1590   | 8.9232    | 1.4793   | 241.2192   | 8.9249    | 1.4776   |
| 16    | 241.2192   | 8.9249    | 1.4776   | 257.2841   | 8.9230    | 1.5774   |
| 17    | 257.2841   | 8.9230    | 1.5774   | 273.3384   | 8.9239    | 1.6767   |
| 18    | 273.3384   | 8.9239    | 1.6767   | 289.4097   | 8.9280    | 1.6795   |
| 19    | 289.4097   | 8.9280    | 1.6795   | 305.4774   | 8.9273    | 1.7952   |
| 20    | 305.4774   | 8.9273    | 1.7952   | -1128.0154 | 105.1883  | 342.4231 |
| 21    | -1128.0154 | 105.1883  | 342.4231 | -652.1858  | 223.3124  | 607.4737 |
| 22    | -652.1858  | 223.3124  | 607.4737 | -231.6917  | 204.7268  | 561.4183 |
| 23    | -231.6917  | 204.7268  | 561.4183 | 88.7824    | 176.7926  | 492.4362 |
| 24    | 88.7824    | 176.7926  | 492.4362 | 378.2131   | 158.3631  | 446.9216 |
| 25    | 378.2131   | 158.3631  | 446.9216 | 604.0679   | 140.2433  | 402.6128 |
| 26    | 604.0679   | 140.2433  | 402.6128 | 766.9438   | 122.6084  | 361.4749 |
| 27    | 766.9438   | 122.6084  | 361.4749 | 788.6614   | 97.2885   | 304.8470 |
| 28    | 788.6614   | 97.2885   | 304.8470 | 823.4062   | 81.3202   | 270.7773 |
| 29    | 823.4062   | 81.3202   | 270.7773 | 805.8979   | 66.2148   | 239.8618 |
| 30    | 805.8979   | 66.2148   | 239.8618 | 741.6509   | 52.0690   | 211.5088 |
| 31    | 741.6509   | 52.0690   | 211.5088 | 534.1925   | 32.7611   | 174.0285 |
| 32    | 534.1925   | 32.7611   | 174.0285 | -197.4227  | 24.0279   | -23.0683 |
| 33    | -197.4227  | 24.0279   | -23.0683 | -143.3748  | 24.0120   | -23.0674 |
| 34    | -143.3748  | 24.0120   | -23.0674 | -89.3457   | 24.0038   | -23.1005 |
| 35    | -89.3457   | 24.0038   | -23.1005 | -35.3168   | 24.0040   | -23.1397 |
| 36    | -35.3168   | 24.0040   | -23.1397 | 18.6880    | 24.0057   | -23.1561 |
| 37    | 18.6880    | 24.0057   | -23.1561 | 72.7253    | 24.0086   | -23.1245 |
| 38    | 72.7253    | 24.0086   | -23.1245 | 126.7473   | 24.0100   | -23.1085 |
| 39    | 126.7473   | 24.0100   | -23.1085 | 180.7809   | 24.0105   | -23.0683 |
| 40    | 180.7809   | 24.0105   | -23.0683 | -1095.2266 | 104.7446  | 339.3908 |
| 41    | -1095.2266 | 104.7446  | 339.3908 | -620.7310  | 222.3996  | 607.0870 |
| 42    | -620.7310  | 222.3996  | 607.0870 | -202.3250  | 203.8224  | 561.0889 |
| 43    | -202.3250  | 203.8224  | 561.0889 | 115.0737   | 175.9296  | 492.2156 |
| 44    | 115.0737   | 175.9296  | 492.2156 | 401.1881   | 157.5440  | 446.7357 |
| 45    | 401.1881   | 157.5440  | 446.7357 | 623.6747   | 139.4984  | 402.4570 |
| 46    | 623.6747   | 139.4984  | 402.4570 | 783.3344   | 121.9359  | 361.2186 |
| 47    | 783.3344   | 121.9359  | 361.2186 | 801.1624   | 96.7156   | 304.6391 |
| 48    | 801.1624   | 96.7156   | 304.6391 | 833.0876   | 80.8188   | 270.6811 |
| 49    | 833.0876   | 80.8188   | 270.6811 | 813.1570   | 65.8069   | 239.5223 |
| 50    | 813.1570   | 65.8069   | 239.5223 | 746.6957   | 51.7152   | 211.3835 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 746.6957   | 51.7152   | 211.3835 | 536.9303   | 32.5292   | 173.8947 |
| 52    | 536.9303   | 32.5292   | 173.8947 | -261.2723  | 31.7940   | -25.5069 |
| 53    | -261.2723  | 31.7940   | -25.5069 | -189.7278  | 31.7915   | -25.6176 |
| 54    | -189.7278  | 31.7915   | -25.6176 | -118.1730  | 31.7935   | -25.6642 |
| 55    | -118.1730  | 31.7935   | -25.6642 | -46.6370   | 31.7963   | -25.6819 |
| 56    | -46.6370   | 31.7963   | -25.6819 | 24.9043    | 31.7942   | -25.6736 |
| 57    | 24.9043    | 31.7942   | -25.6736 | 96.4819    | 31.7953   | -25.6686 |
| 58    | 96.4819    | 31.7953   | -25.6686 | 168.0156   | 31.7969   | -25.6406 |
| 59    | 168.0156   | 31.7969   | -25.6406 | 239.5800   | 31.7991   | -25.5360 |
| 60    | 239.5800   | 31.7991   | -25.5360 | -1092.2839 | 104.8638  | 339.4488 |
| 61    | -1092.2839 | 104.8638  | 339.4488 | -617.6992  | 222.3432  | 607.2557 |
| 62    | -617.6992  | 222.3432  | 607.2557 | -199.5361  | 203.7711  | 561.1843 |
| 63    | -199.5361  | 203.7711  | 561.1843 | 117.5886   | 175.8711  | 492.2898 |
| 64    | 117.5886   | 175.8711  | 492.2898 | 403.4076   | 157.4660  | 446.7967 |
| 65    | 403.4076   | 157.4660  | 446.7967 | 625.5670   | 139.3828  | 402.4111 |
| 66    | 625.5670   | 139.3828  | 402.4111 | 784.8904   | 121.8114  | 361.2412 |
| 67    | 784.8904   | 121.8114  | 361.2412 | 802.2353   | 96.5750   | 304.6370 |
| 68    | 802.2353   | 96.5750   | 304.6370 | 833.8329   | 80.7409   | 270.5566 |
| 69    | 833.8329   | 80.7409   | 270.5566 | 813.5659   | 65.7290   | 239.5444 |
| 70    | 813.5659   | 65.7290   | 239.5444 | 746.8798   | 51.6756   | 211.5128 |
| 71    | 746.8798   | 51.6756   | 211.5128 | 536.9880   | 32.5118   | 173.9753 |
| 72    | 536.9880   | 32.5118   | 173.9753 | -263.4470  | 32.0780   | -25.5572 |
| 73    | -263.4470  | 32.0780   | -25.5572 | -191.2324  | 32.0747   | -25.6583 |
| 74    | -191.2324  | 32.0747   | -25.6583 | -119.0554  | 32.0623   | -25.7136 |
| 75    | -119.0554  | 32.0623   | -25.7136 | -46.9427   | 32.0639   | -25.7241 |
| 76    | -46.9427   | 32.0639   | -25.7241 | 25.2472    | 32.0655   | -25.7253 |
| 77    | 25.2472    | 32.0655   | -25.7253 | 97.3850    | 32.0672   | -25.7323 |
| 78    | 97.3850    | 32.0672   | -25.7323 | 169.5538   | 32.0676   | -25.6940 |
| 79    | 169.5538   | 32.0676   | -25.6940 | 241.7232   | 32.0670   | -25.5629 |
| 80    | 241.7232   | 32.0670   | -25.5629 | -1092.0017 | 104.8377  | 339.2746 |
| 81    | -1092.0017 | 104.8377  | 339.2746 | -617.5800  | 222.2856  | 607.1547 |
| 82    | -617.5800  | 222.2856  | 607.1547 | -199.3064  | 203.7144  | 561.1671 |
| 83    | -199.3064  | 203.7144  | 561.1671 | 117.5139   | 175.8268  | 492.3353 |
| 84    | 117.5139   | 175.8268  | 492.3353 | 403.2326   | 157.4421  | 446.7885 |
| 85    | 403.2326   | 157.4421  | 446.7885 | 625.4384   | 139.3965  | 402.5389 |
| 86    | 625.4384   | 139.3965  | 402.5389 | 784.7344   | 121.8089  | 361.1199 |
| 87    | 784.7344   | 121.8089  | 361.1199 | 802.1830   | 96.6309   | 304.5375 |
| 88    | 802.1830   | 96.6309   | 304.5375 | 833.7112   | 80.7385   | 270.8555 |
| 89    | 833.7112   | 80.7385   | 270.8555 | 813.4641   | 65.7179   | 239.7584 |
| 90    | 813.4641   | 65.7179   | 239.7584 | 746.8398   | 51.6498   | 211.3318 |
| 91    | 746.8398   | 51.6498   | 211.3318 | 536.9151   | 32.4906   | 173.9689 |
| 92    | 536.9151   | 32.4906   | 173.9689 | -263.4242  | 32.0920   | -25.6593 |
| 93    | -263.4242  | 32.0920   | -25.6593 | -191.2358  | 32.0922   | -25.6758 |
| 94    | -191.2358  | 32.0922   | -25.6758 | -119.0430  | 32.0867   | -25.7543 |
| 95    | -119.0430  | 32.0867   | -25.7543 | -46.8636   | 32.0760   | -25.7795 |
| 96    | -46.8636   | 32.0760   | -25.7795 | 25.2929    | 32.0731   | -25.7848 |
| 97    | 25.2929    | 32.0731   | -25.7848 | 97.4758    | 32.0718   | -25.7565 |
| 98    | 97.4758    | 32.0718   | -25.7565 | 169.6609   | 32.0718   | -25.7435 |
| 99    | 169.6609   | 32.0718   | -25.7435 | 241.8239   | 32.0758   | -25.6316 |
| 100   | 241.8239   | 32.0758   | -25.6316 | -1091.6731 | 104.8228  | 339.1153 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1091.6731 | 104.8228  | 339.1153 | -617.2040  | 222.2428  | 607.0337 |
| 102   | -617.2040  | 222.2428  | 607.0337 | -199.1173  | 203.6650  | 561.1522 |
| 103   | -199.1173  | 203.6650  | 561.1522 | 117.5851   | 175.7793  | 492.2538 |
| 104   | 117.5851   | 175.7793  | 492.2538 | 403.3366   | 157.3943  | 446.7758 |
| 105   | 403.3366   | 157.3943  | 446.7758 | 625.4261   | 139.3625  | 402.4883 |
| 106   | 625.4261   | 139.3625  | 402.4883 | 784.6971   | 121.7827  | 361.2352 |
| 107   | 784.6971   | 121.7827  | 361.2352 | 801.9817   | 96.5791   | 304.6739 |
| 108   | 801.9817   | 96.5791   | 304.6739 | 833.5816   | 80.7177   | 270.5689 |
| 109   | 833.5816   | 80.7177   | 270.5689 | 813.3986   | 65.7182   | 239.5812 |
| 110   | 813.3986   | 65.7182   | 239.5812 | 746.9554   | 51.6836   | 211.4048 |
| 111   | 746.9554   | 51.6836   | 211.4048 | 537.4907   | 32.5383   | 173.9395 |
| 112   | 537.4907   | 32.5383   | 173.9395 | -263.2628  | 32.1171   | -25.5644 |
| 113   | -263.2628  | 32.1171   | -25.5644 | -190.9974  | 32.1256   | -25.6253 |
| 114   | -190.9974  | 32.1256   | -25.6253 | -118.7202  | 32.1291   | -25.7093 |
| 115   | -118.7202  | 32.1291   | -25.7093 | -46.4366   | 32.1269   | -25.7311 |
| 116   | -46.4366   | 32.1269   | -25.7311 | 25.8340    | 32.1245   | -25.7401 |
| 117   | 25.8340    | 32.1245   | -25.7401 | 98.0786    | 32.1182   | -25.7237 |
| 118   | 98.0786    | 32.1182   | -25.7237 | 170.3525   | 32.1135   | -25.6505 |
| 119   | 170.3525   | 32.1135   | -25.6505 | 242.6143   | 32.1118   | -25.5955 |
| 120   | 242.6143   | 32.1118   | -25.5955 | -1082.5081 | 104.4851  | 339.3597 |
| 121   | -1082.5081 | 104.4851  | 339.3597 | -609.7469  | 221.2507  | 606.8834 |
| 122   | -609.7469  | 221.2507  | 606.8834 | -193.7386  | 202.6408  | 560.9742 |
| 123   | -193.7386  | 202.6408  | 560.9742 | 120.7630   | 174.7298  | 492.0323 |
| 124   | 120.7630   | 174.7298  | 492.0323 | 404.0450   | 156.3852  | 446.5925 |
| 125   | 404.0450   | 156.3852  | 446.5925 | 623.9317   | 138.4018  | 402.3399 |
| 126   | 623.9317   | 138.4018  | 402.3399 | 781.4611   | 120.9373  | 360.8882 |
| 127   | 781.4611   | 120.9373  | 360.8882 | 797.9455   | 95.9471   | 304.2521 |
| 128   | 797.9455   | 95.9471   | 304.2521 | 829.5622   | 80.2601   | 270.1609 |
| 129   | 829.5622   | 80.2601   | 270.1609 | 810.7583   | 65.4736   | 238.8537 |
| 130   | 810.7583   | 65.4736   | 238.8537 | 747.1128   | 51.6889   | 210.6491 |
| 131   | 747.1128   | 51.6889   | 210.6491 | 545.1812   | 33.0458   | 172.8015 |
| 132   | 545.1812   | 33.0458   | 172.8015 | -258.5236  | 32.3801   | -25.5445 |
| 133   | -258.5236  | 32.3801   | -25.5445 | -185.6442  | 32.3818   | -25.6241 |
| 134   | -185.6442  | 32.3818   | -25.6241 | -112.7446  | 32.3782   | -25.6721 |
| 135   | -112.7446  | 32.3782   | -25.6721 | -39.8831   | 32.3841   | -25.6975 |
| 136   | -39.8831   | 32.3841   | -25.6975 | 32.9982    | 32.3909   | -25.7111 |
| 137   | 32.9982    | 32.3909   | -25.7111 | 105.8743   | 32.3904   | -25.6937 |
| 138   | 105.8743   | 32.3904   | -25.6937 | 178.7706   | 32.3877   | -25.6473 |
| 139   | 178.7706   | 32.3877   | -25.6473 | 251.6319   | 32.3871   | -25.5787 |
| 140   | 251.6319   | 32.3871   | -25.5787 | -835.8951  | 99.3563   | 289.1017 |
| 141   | -835.8951  | 99.3563   | 289.1017 | -451.7762  | 195.8320  | 482.0843 |
| 142   | -451.7762  | 195.8320  | 482.0843 | -111.2095  | 182.5349  | 445.1823 |
| 143   | -111.2095  | 182.5349  | 445.1823 | -239.7443  | 164.2950  | 342.1101 |
| 144   | -239.7443  | 164.2950  | 342.1101 | 56.4886    | 149.5013  | 309.1168 |
| 145   | 56.4886    | 149.5013  | 309.1168 | 325.0522   | 141.6345  | 291.5564 |
| 146   | 325.0522   | 141.6345  | 291.5564 | 573.8717   | 125.0139  | 253.9064 |
| 147   | 573.8717   | 125.0139  | 253.9064 | 790.5253   | 107.1878  | 212.8169 |
| 148   | 790.5253   | 107.1878  | 212.8169 | 967.4317   | 88.2138   | 168.4153 |
| 149   | 967.4317   | 88.2138   | 168.4153 | 1097.4082  | 68.1727   | 120.3551 |
| 150   | 1097.4082  | 68.1727   | 120.3551 | 1194.6277  | 57.7925   | 95.1311  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 151   | 1194.6277 | 57.7925   | 95.1311  | 1221.8201 | 36.2665   | 41.9818  |
| 152   | 1221.8201 | 36.2665   | 41.9818  | -467.1423 | 32.4184   | -30.7832 |
| 153   | -467.1423 | 32.4184   | -30.7832 | -408.8170 | 32.4142   | -30.7719 |
| 154   | -408.8170 | 32.4142   | -30.7719 | -350.4507 | 32.4432   | -30.9140 |
| 155   | -350.4507 | 32.4432   | -30.9140 | -292.0244 | 32.4538   | -31.1038 |
| 156   | -292.0244 | 32.4538   | -31.1038 | -233.6190 | 32.4419   | -31.1136 |
| 157   | -233.6190 | 32.4419   | -31.1136 | -175.2229 | 32.4419   | -31.1026 |
| 158   | -175.2229 | 32.4419   | -31.1026 | -116.8038 | 32.4411   | -31.1606 |
| 159   | -116.8038 | 32.4411   | -31.1606 | -58.4083  | 32.4401   | -31.1936 |
| 160   | -58.4083  | 32.4401   | -31.1936 | -0.0024   | 32.4395   | -31.2069 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0032    | -32.1656  | 30.9995   | -57.8887   | -32.1656  | 31.0012   |
| 2     | -57.8887   | -32.1656  | 31.0012   | -115.7803  | -32.1635  | 30.9752   |
| 3     | -115.7803  | -32.1635  | 30.9752   | -173.6985  | -32.1544  | 30.9160   |
| 4     | -173.6985  | -32.1544  | 30.9160   | -231.5638  | -32.1542  | 30.8862   |
| 5     | -231.5638  | -32.1542  | 30.8862   | -289.4437  | -32.1691  | 30.8200   |
| 6     | -289.4437  | -32.1691  | 30.8200   | -347.3569  | -32.1686  | 30.7549   |
| 7     | -347.3569  | -32.1686  | 30.7549   | 588.4041   | -35.6241  | -97.2392  |
| 8     | 588.4041   | -35.6241  | -97.2392  | 708.7489   | -47.7652  | -126.0367 |
| 9     | 708.7489   | -47.7652  | -126.0367 | 811.7253   | -61.5814  | -156.6280 |
| 10    | 811.7253   | -61.5814  | -156.6280 | 874.2112   | -68.9687  | -167.5753 |
| 11    | 874.2112   | -68.9687  | -167.5753 | 814.3576   | -82.5051  | -200.7072 |
| 12    | 814.3576   | -82.5051  | -200.7072 | 798.6536   | -96.0421  | -230.2177 |
| 13    | 798.6536   | -96.0421  | -230.2177 | 748.7232   | -110.3642 | -265.8026 |
| 14    | 748.7232   | -110.3642 | -265.8026 | 664.7847   | -126.0925 | -304.9639 |
| 15    | 664.7847   | -126.0925 | -304.9639 | 541.0763   | -136.4947 | -329.6577 |
| 16    | 541.0763   | -136.4947 | -329.6577 | 325.7329   | -152.1830 | -370.9738 |
| 17    | 325.7329   | -152.1830 | -370.9738 | 115.9976   | -171.1209 | -419.4982 |
| 18    | 115.9976   | -171.1209 | -419.4982 | -146.3598  | -191.2107 | -472.0018 |
| 19    | -146.3598  | -191.2107 | -472.0018 | -463.9164  | -212.3609 | -528.1072 |
| 20    | -463.9164  | -212.3609 | -528.1072 | -845.5961  | -99.6611  | -289.9193 |
| 21    | -845.5961  | -99.6611  | -289.9193 | 249.3466   | -32.0904  | 25.5098   |
| 22    | 249.3466   | -32.0904  | 25.5098   | 177.1218   | -32.0886  | 25.6077   |
| 23    | 177.1218   | -32.0886  | 25.6077   | 104.9140   | -32.0880  | 25.6622   |
| 24    | 104.9140   | -32.0880  | 25.6622   | 32.7164    | -32.0899  | 25.6642   |
| 25    | 32.7164    | -32.0899  | 25.6642   | -39.4929   | -32.0823  | 25.6512   |
| 26    | -39.4929   | -32.0823  | 25.6512   | -111.6850  | -32.0839  | 25.6058   |
| 27    | -111.6850  | -32.0839  | 25.6058   | -183.8950  | -32.0874  | 25.5681   |
| 28    | -183.8950  | -32.0874  | 25.5681   | -256.0858  | -32.0901  | 25.5261   |
| 29    | -256.0858  | -32.0901  | 25.5261   | 649.2838   | -39.4863  | -188.3033 |
| 30    | 649.2838   | -39.4863  | -188.3033 | 750.4658   | -52.2685  | -214.2787 |
| 31    | 750.4658   | -52.2685  | -214.2787 | 813.4094   | -66.1349  | -242.5409 |
| 32    | 813.4094   | -66.1349  | -242.5409 | 921.4235   | -82.0893  | -271.2813 |
| 33    | 921.4235   | -82.0893  | -271.2813 | 879.4956   | -104.8477 | -325.0376 |
| 34    | 879.4956   | -104.8477 | -325.0376 | 780.9129   | -121.7365 | -363.0859 |
| 35    | 780.9129   | -121.7365 | -363.0859 | 622.2355   | -139.2312 | -403.7833 |
| 36    | 622.2355   | -139.2312 | -403.7833 | 453.6428   | -159.7498 | -451.9687 |
| 37    | 453.6428   | -159.7498 | -451.9687 | 158.0699   | -184.8979 | -516.0512 |
| 38    | 158.0699   | -184.8979 | -516.0512 | -199.4023  | -203.5281 | -561.8994 |
| 39    | -199.4023  | -203.5281 | -561.8994 | -616.8196  | -222.1415 | -607.9941 |
| 40    | -616.8196  | -222.1415 | -607.9941 | -1090.5813 | -104.8103 | -339.9740 |
| 41    | -1090.5813 | -104.8103 | -339.9740 | 240.6450   | -31.8449  | 25.5282   |
| 42    | 240.6450   | -31.8449  | 25.5282   | 168.9848   | -31.8454  | 25.6016   |
| 43    | 168.9848   | -31.8454  | 25.6016   | 97.3074    | -31.8463  | 25.6445   |
| 44    | 97.3074    | -31.8463  | 25.6445   | 25.6595    | -31.8465  | 25.6572   |
| 45    | 25.6595    | -31.8465  | 25.6572   | -45.9816   | -31.8495  | 25.6464   |
| 46    | -45.9816   | -31.8495  | 25.6464   | -117.6525  | -31.8541  | 25.6140   |
| 47    | -117.6525  | -31.8541  | 25.6140   | -189.3342  | -31.8547  | 25.5729   |
| 48    | -189.3342  | -31.8547  | 25.5729   | -261.0041  | -31.8496  | 25.5037   |
| 49    | -261.0041  | -31.8496  | 25.5037   | 644.4703   | -39.1215  | -189.5656 |
| 50    | 644.4703   | -39.1215  | -189.5656 | 750.6740   | -52.2403  | -215.2938 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 750.6740   | -52.2403  | -215.2938 | 816.5437   | -66.3871  | -243.3412 |
| 52    | 816.5437   | -66.3871  | -243.3412 | 926.6965   | -82.6570  | -272.1379 |
| 53    | 926.6965   | -82.6570  | -272.1379 | 884.5885   | -105.6315 | -325.3394 |
| 54    | 884.5885   | -105.6315 | -325.3394 | 784.6624   | -122.6360 | -363.2216 |
| 55    | 784.6624   | -122.6360 | -363.2216 | 623.9330   | -140.2477 | -404.2237 |
| 56    | 623.9330   | -140.2477 | -404.2237 | 453.1141   | -160.7966 | -452.4440 |
| 57    | 453.1141   | -160.7966 | -452.4440 | 155.0161   | -185.9595 | -516.3185 |
| 58    | 155.0161   | -185.9595 | -516.3185 | -204.8652  | -204.5831 | -562.3340 |
| 59    | -204.8652  | -204.5831 | -562.3340 | -624.2125  | -223.1632 | -608.4678 |
| 60    | -624.2125  | -223.1632 | -608.4678 | -1099.7405 | -105.1797 | -340.1062 |
| 61    | -1099.7405 | -105.1797 | -340.1062 | 239.7343   | -31.8188  | 25.4510   |
| 62    | 239.7343   | -31.8188  | 25.4510   | 168.1344   | -31.8209  | 25.5559   |
| 63    | 168.1344   | -31.8209  | 25.5559   | 96.5180    | -31.8166  | 25.5988   |
| 64    | 96.5180    | -31.8166  | 25.5988   | 24.9477    | -31.8071  | 25.6115   |
| 65    | 24.9477    | -31.8071  | 25.6115   | -46.6029   | -31.8020  | 25.6008   |
| 66    | -46.6029   | -31.8020  | 25.6008   | -118.1696  | -31.7997  | 25.5511   |
| 67    | -118.1696  | -31.7997  | 25.5511   | -189.7225  | -31.7940  | 25.5156   |
| 68    | -189.7225  | -31.7940  | 25.5156   | -261.2650  | -31.7938  | 25.4806   |
| 69    | -261.2650  | -31.7938  | 25.4806   | 644.2168   | -39.1273  | -189.6078 |
| 70    | 644.2168   | -39.1273  | -189.6078 | 750.6394   | -52.2661  | -215.1797 |
| 71    | 750.6394   | -52.2661  | -215.1797 | 816.6198   | -66.4317  | -243.1860 |
| 72    | 816.6198   | -66.4317  | -243.1860 | 926.8190   | -82.7194  | -272.0674 |
| 73    | 926.8190   | -82.7194  | -272.0674 | 884.5800   | -105.6638 | -325.3077 |
| 74    | 884.5800   | -105.6638 | -325.3077 | 784.5212   | -122.6817 | -363.1754 |
| 75    | 784.5212   | -122.6817 | -363.1754 | 623.7999   | -140.2784 | -404.1856 |
| 76    | 623.7999   | -140.2784 | -404.1856 | 452.7330   | -160.8446 | -452.2794 |
| 77    | 452.7330   | -160.8446 | -452.2794 | 154.6873   | -186.0125 | -516.2020 |
| 78    | 154.6873   | -186.0125 | -516.2020 | -205.3710  | -204.6263 | -562.2797 |
| 79    | -205.3710  | -204.6263 | -562.2797 | -624.6877  | -223.1992 | -608.4312 |
| 80    | -624.6877  | -223.1992 | -608.4312 | -1100.3262 | -105.1664 | -340.1649 |
| 81    | -1100.3262 | -105.1664 | -340.1649 | 239.5831   | -31.7892  | 25.4701   |
| 82    | 239.5831   | -31.7892  | 25.4701   | 168.0348   | -31.7915  | 25.5350   |
| 83    | 168.0348   | -31.7915  | 25.5350   | 96.4971    | -31.7877  | 25.5880   |
| 84    | 96.4971    | -31.7877  | 25.5880   | 24.9851    | -31.7875  | 25.6151   |
| 85    | 24.9851    | -31.7875  | 25.6151   | -46.5667   | -31.7877  | 25.5877   |
| 86    | -46.5667   | -31.7877  | 25.5877   | -118.0627  | -31.7866  | 25.5835   |
| 87    | -118.0627  | -31.7866  | 25.5835   | -189.6031  | -31.7860  | 25.5382   |
| 88    | -189.6031  | -31.7860  | 25.5382   | -261.1473  | -31.7812  | 25.3979   |
| 89    | -261.1473  | -31.7812  | 25.3979   | 644.1798   | -39.1397  | -189.3795 |
| 90    | 644.1798   | -39.1397  | -189.3795 | 750.5105   | -52.2817  | -215.2804 |
| 91    | 750.5105   | -52.2817  | -215.2804 | 816.4161   | -66.4386  | -243.2289 |
| 92    | 816.4161   | -66.4386  | -243.2289 | 926.5103   | -82.7023  | -271.9077 |
| 93    | 926.5103   | -82.7023  | -271.9077 | 884.2452   | -105.6736 | -325.4895 |
| 94    | 884.2452   | -105.6736 | -325.4895 | 784.3535   | -122.6650 | -363.2346 |
| 95    | 784.3535   | -122.6650 | -363.2346 | 623.4977   | -140.2496 | -404.1047 |
| 96    | 623.4977   | -140.2496 | -404.1047 | 452.6205   | -160.8237 | -452.2889 |
| 97    | 452.6205   | -160.8237 | -452.2889 | 154.6472   | -185.9785 | -516.2284 |
| 98    | 154.6472   | -185.9785 | -516.2284 | -205.5196  | -204.6057 | -562.1441 |
| 99    | -205.5196  | -204.6057 | -562.1441 | -624.7403  | -223.1837 | -608.3658 |
| 100   | -624.7403  | -223.1837 | -608.3658 | -1100.2590 | -105.1600 | -340.2245 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1100.2590 | -105.1600 | -340.2245 | 237.6346   | -31.5298  | 25.5422   |
| 102   | 237.6346   | -31.5298  | 25.5422   | 166.6798   | -31.5331  | 25.5944   |
| 103   | 166.6798   | -31.5331  | 25.5944   | 95.7164    | -31.5327  | 25.6630   |
| 104   | 95.7164    | -31.5327  | 25.6630   | 24.7584    | -31.5266  | 25.6771   |
| 105   | 24.7584    | -31.5266  | 25.6771   | -46.2011   | -31.5293  | 25.6631   |
| 106   | -46.2011   | -31.5293  | 25.6631   | -117.1756  | -31.5345  | 25.6332   |
| 107   | -117.1756  | -31.5345  | 25.6332   | -188.1118  | -31.5258  | 25.5853   |
| 108   | -188.1118  | -31.5258  | 25.5853   | -259.0294  | -31.5149  | 25.5633   |
| 109   | -259.0294  | -31.5149  | 25.5633   | 644.0527   | -39.1415  | -189.5533 |
| 110   | 644.0527   | -39.1415  | -189.5533 | 750.3717   | -52.2847  | -215.2344 |
| 111   | 750.3717   | -52.2847  | -215.2344 | 816.2686   | -66.4491  | -243.3199 |
| 112   | 816.2686   | -66.4491  | -243.3199 | 926.2316   | -82.7850  | -272.0481 |
| 113   | 926.2316   | -82.7850  | -272.0481 | 883.7446   | -105.7468 | -325.4435 |
| 114   | 883.7446   | -105.7468 | -325.4435 | 783.5051   | -122.7845 | -363.1774 |
| 115   | 783.5051   | -122.7845 | -363.1774 | 622.2128   | -140.3988 | -404.0503 |
| 116   | 622.2128   | -140.3988 | -404.0503 | 450.6910   | -160.9677 | -452.2810 |
| 117   | 450.6910   | -160.9677 | -452.2810 | 152.3112   | -186.1299 | -516.3176 |
| 118   | 152.3112   | -186.1299 | -516.3176 | -207.9312  | -204.7469 | -562.3309 |
| 119   | -207.9312  | -204.7469 | -562.3309 | -627.7020  | -223.3112 | -608.2903 |
| 120   | -627.7020  | -223.3112 | -608.2903 | -1103.5531 | -105.0778 | -340.1079 |
| 121   | -1103.5531 | -105.0778 | -340.1079 | 178.6006   | -23.7292  | 24.1441   |
| 122   | 178.6006   | -23.7292  | 24.1441   | 125.2004   | -23.7288  | 24.1834   |
| 123   | 125.2004   | -23.7288  | 24.1834   | 71.8053    | -23.7274  | 24.2215   |
| 124   | 71.8053    | -23.7274  | 24.2215   | 18.4203    | -23.7275  | 24.2244   |
| 125   | 18.4203    | -23.7275  | 24.2244   | -34.9954   | -23.7308  | 24.2170   |
| 126   | -34.9954   | -23.7308  | 24.2170   | -88.4052   | -23.7402  | 24.2107   |
| 127   | -88.4052   | -23.7402  | 24.2107   | -141.8112  | -23.7456  | 24.1684   |
| 128   | -141.8112  | -23.7456  | 24.1684   | -195.2365  | -23.7421  | 24.1241   |
| 129   | -195.2365  | -23.7421  | 24.1241   | 641.0105   | -39.4230  | -189.6682 |
| 130   | 641.0105   | -39.4230  | -189.6682 | 745.6285   | -52.6535  | -215.2647 |
| 131   | 745.6285   | -52.6535  | -215.2647 | 809.2238   | -66.9156  | -243.2888 |
| 132   | 809.2238   | -66.9156  | -243.2888 | 915.8641   | -83.3388  | -272.2379 |
| 133   | 915.8641   | -83.3388  | -272.2379 | 870.3715   | -106.4213 | -325.6006 |
| 134   | 870.3715   | -106.4213 | -325.6006 | 766.8046   | -123.5078 | -363.5239 |
| 135   | 766.8046   | -123.5078 | -363.5239 | 602.2579   | -141.1995 | -404.3652 |
| 136   | 602.2579   | -141.1995 | -404.3652 | 426.7266   | -161.8806 | -452.5166 |
| 137   | 426.7266   | -161.8806 | -452.5166 | 125.1271   | -187.0807 | -516.5575 |
| 138   | 125.1271   | -187.0807 | -516.5575 | -238.0670  | -205.7096 | -562.5531 |
| 139   | -238.0670  | -205.7096 | -562.5531 | -659.9421  | -224.2874 | -608.6081 |
| 140   | -659.9421  | -224.2874 | -608.6081 | -1137.1858 | -105.5283 | -343.2568 |
| 141   | -1137.1858 | -105.5283 | -343.2568 | 308.2917   | -9.0147   | -1.6842   |
| 142   | 308.2917   | -9.0147   | -1.6842   | 292.0665   | -9.0129   | -1.6806   |
| 143   | 292.0665   | -9.0129   | -1.6806   | 275.8483   | -9.0124   | -1.6257   |
| 144   | 275.8483   | -9.0124   | -1.6257   | 259.6077   | -9.0149   | -1.5141   |
| 145   | 259.6077   | -9.0149   | -1.5141   | 243.3809   | -9.0165   | -1.4741   |
| 146   | 243.3809   | -9.0165   | -1.4741   | 227.1537   | -9.0137   | -1.4237   |
| 147   | 227.1537   | -9.0137   | -1.4237   | 210.9410   | -9.0086   | -1.3848   |
| 148   | 210.9410   | -9.0086   | -1.3848   | 194.7407   | -9.0050   | -1.3070   |
| 149   | 194.7407   | -9.0050   | -1.3070   | 339.4157   | -17.1496  | -169.8006 |
| 150   | 339.4157   | -17.1496  | -169.8006 | 409.6511   | -22.7658  | -184.9178 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 409.6511 | -22.7658  | -184.9178 | 566.5736 | -34.9841  | -215.3401 |
| 152   | 566.5736 | -34.9841  | -215.3401 | 698.2457 | -48.4962  | -245.9849 |
| 153   | 698.2457 | -48.4962  | -245.9849 | 797.3882 | -63.2953  | -278.6605 |
| 154   | 797.3882 | -63.2953  | -278.6605 | 856.7610 | -79.3608  | -314.2322 |
| 155   | 856.7610 | -79.3608  | -314.2322 | 790.3384 | -87.8606  | -332.8998 |
| 156   | 790.3384 | -87.8606  | -332.8998 | 760.5129 | -105.6920 | -373.8804 |
| 157   | 760.5129 | -105.6920 | -373.8804 | 672.6963 | -124.6531 | -418.5507 |
| 158   | 672.6963 | -124.6531 | -418.5507 | 520.5510 | -144.6916 | -466.5132 |
| 159   | 520.5510 | -144.6916 | -466.5132 | 298.2177 | -165.7340 | -518.1758 |
| 160   | 298.2177 | -165.7340 | -518.1758 | -0.0464  | -176.6109 | -545.3805 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | -0.0405    | 175.7958  | 543.8220 | 277.6581   | 154.2999  | 489.6491 |
| 2     | 277.6581   | 154.2999  | 489.6491 | 517.8624   | 143.9082  | 464.0479 |
| 3     | 517.8624   | 143.9082  | 464.0479 | 668.8376   | 123.8882  | 415.5409 |
| 4     | 668.8376   | 123.8882  | 415.5409 | 755.5899   | 104.9731  | 370.4943 |
| 5     | 755.5899   | 104.9731  | 370.4943 | 784.5818   | 87.2223   | 329.1039 |
| 6     | 784.5818   | 87.2223   | 329.1039 | 762.5696   | 70.6566   | 291.2419 |
| 7     | 762.5696   | 70.6566   | 291.2419 | 791.0362   | 62.8092   | 273.8674 |
| 8     | 791.0362   | 62.8092   | 273.8674 | 692.1568   | 48.0540   | 241.1608 |
| 9     | 692.1568   | 48.0540   | 241.1608 | 560.8821   | 34.6217   | 211.7075 |
| 10    | 560.8821   | 34.6217   | 211.7075 | 404.5426   | 22.4801   | 184.6127 |
| 11    | 404.5426   | 22.4801   | 184.6127 | 230.4148   | 11.6536   | 157.4970 |
| 12    | 230.4148   | 11.6536   | 157.4970 | 144.8836   | 6.7239    | 144.0750 |
| 13    | 144.8836   | 6.7239    | 144.0750 | -51.0569   | -2.1593   | 117.9768 |
| 14    | -51.0569   | -2.1593   | 117.9768 | -247.1015  | -9.7776   | 95.1099  |
| 15    | -247.1015  | -9.7776   | 95.1099  | -437.5178  | -16.1735  | 75.8828  |
| 16    | -437.5178  | -16.1735  | 75.8828  | -617.1576  | -21.3938  | 60.0005  |
| 17    | -617.1576  | -21.3938  | 60.0005  | -722.6755  | -23.5924  | 53.2360  |
| 18    | -722.6755  | -23.5924  | 53.2360  | -880.7450  | -27.1574  | 42.8852  |
| 19    | -880.7450  | -27.1574  | 42.8852  | -1016.7986 | -29.7106  | 35.6055  |
| 20    | -1016.7986 | -29.7106  | 35.6055  | -1128.0154 | 105.1883  | 342.4231 |
| 21    | -1128.0154 | 105.1883  | 342.4231 | -652.1858  | 223.3124  | 607.4737 |
| 22    | -652.1858  | 223.3124  | 607.4737 | -231.6917  | 204.7268  | 561.4183 |
| 23    | -231.6917  | 204.7268  | 561.4183 | 88.7824    | 176.7926  | 492.4362 |
| 24    | 88.7824    | 176.7926  | 492.4362 | 378.2131   | 158.3631  | 446.9216 |
| 25    | 378.2131   | 158.3631  | 446.9216 | 604.0679   | 140.2433  | 402.6128 |
| 26    | 604.0679   | 140.2433  | 402.6128 | 766.9438   | 122.6084  | 361.4749 |
| 27    | 766.9438   | 122.6084  | 361.4749 | 788.6614   | 97.2885   | 304.8470 |
| 28    | 788.6614   | 97.2885   | 304.8470 | 823.4062   | 81.3202   | 270.7773 |
| 29    | 823.4062   | 81.3202   | 270.7773 | 805.8979   | 66.2148   | 239.8618 |
| 30    | 805.8979   | 66.2148   | 239.8618 | 741.6509   | 52.0690   | 211.5088 |
| 31    | 741.6509   | 52.0690   | 211.5088 | 534.1925   | 32.7611   | 174.0285 |
| 32    | 534.1925   | 32.7611   | 174.0285 | 393.8419   | 21.2509   | 151.6893 |
| 33    | 393.8419   | 21.2509   | 151.6893 | 229.0441   | 10.8874   | 129.3494 |
| 34    | 229.0441   | 10.8874   | 129.3494 | 46.8203    | 1.6773    | 107.3537 |
| 35    | 46.8203    | 1.6773    | 107.3537 | -232.5815  | -9.9479   | 78.1062  |
| 36    | -232.5815  | -9.9479   | 78.1062  | -420.9597  | -16.2498  | 62.2636  |
| 37    | -420.9597  | -16.2498  | 62.2636  | -604.6411  | -21.4233  | 49.2432  |
| 38    | -604.6411  | -21.4233  | 49.2432  | -777.6637  | -25.5105  | 39.1389  |
| 39    | -777.6637  | -25.5105  | 39.1389  | -972.3893  | -29.7066  | 29.3930  |
| 40    | -972.3893  | -29.7066  | 29.3930  | -1095.2266 | 104.7446  | 339.3908 |
| 41    | -1095.2266 | 104.7446  | 339.3908 | -620.7310  | 222.3996  | 607.0870 |
| 42    | -620.7310  | 222.3996  | 607.0870 | -202.3250  | 203.8224  | 561.0889 |
| 43    | -202.3250  | 203.8224  | 561.0889 | 115.0737   | 175.9296  | 492.2156 |
| 44    | 115.0737   | 175.9296  | 492.2156 | 401.1881   | 157.5440  | 446.7357 |
| 45    | 401.1881   | 157.5440  | 446.7357 | 623.6747   | 139.4984  | 402.4570 |
| 46    | 623.6747   | 139.4984  | 402.4570 | 783.3344   | 121.9359  | 361.2186 |
| 47    | 783.3344   | 121.9359  | 361.2186 | 801.1624   | 96.7156   | 304.6391 |
| 48    | 801.1624   | 96.7156   | 304.6391 | 833.0876   | 80.8188   | 270.6811 |
| 49    | 833.0876   | 80.8188   | 270.6811 | 813.1570   | 65.8069   | 239.5223 |
| 50    | 813.1570   | 65.8069   | 239.5223 | 746.6957   | 51.7152   | 211.3835 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 746.6957   | 51.7152   | 211.3835 | 536.9303   | 32.5292   | 173.8947 |
| 52    | 536.9303   | 32.5292   | 173.8947 | 395.3239   | 21.0989   | 151.5381 |
| 53    | 395.3239   | 21.0989   | 151.5381 | 229.5323   | 10.8048   | 129.3512 |
| 54    | 229.5323   | 10.8048   | 129.3512 | 46.7761    | 1.6713    | 107.3148 |
| 55    | 46.7761    | 1.6713    | 107.3148 | -232.7998  | -9.8468   | 78.1295  |
| 56    | -232.7998  | -9.8468   | 78.1295  | -420.9049  | -16.0898  | 62.2470  |
| 57    | -420.9049  | -16.0898  | 62.2470  | -604.1267  | -21.2211  | 49.2634  |
| 58    | -604.1267  | -21.2211  | 49.2634  | -776.4462  | -25.2628  | 39.2795  |
| 59    | -776.4462  | -25.2628  | 39.2795  | -970.3137  | -29.4180  | 29.2892  |
| 60    | -970.3137  | -29.4180  | 29.2892  | -1092.2839 | 104.8638  | 339.4488 |
| 61    | -1092.2839 | 104.8638  | 339.4488 | -617.6992  | 222.3432  | 607.2557 |
| 62    | -617.6992  | 222.3432  | 607.2557 | -199.5361  | 203.7711  | 561.1843 |
| 63    | -199.5361  | 203.7711  | 561.1843 | 117.5886   | 175.8711  | 492.2898 |
| 64    | 117.5886   | 175.8711  | 492.2898 | 403.4076   | 157.4660  | 446.7967 |
| 65    | 403.4076   | 157.4660  | 446.7967 | 625.5670   | 139.3828  | 402.4111 |
| 66    | 625.5670   | 139.3828  | 402.4111 | 784.8904   | 121.8114  | 361.2412 |
| 67    | 784.8904   | 121.8114  | 361.2412 | 802.2353   | 96.5750   | 304.6370 |
| 68    | 802.2353   | 96.5750   | 304.6370 | 833.8329   | 80.7409   | 270.5566 |
| 69    | 833.8329   | 80.7409   | 270.5566 | 813.5659   | 65.7290   | 239.5444 |
| 70    | 813.5659   | 65.7290   | 239.5444 | 746.8798   | 51.6756   | 211.5128 |
| 71    | 746.8798   | 51.6756   | 211.5128 | 536.9880   | 32.5118   | 173.9753 |
| 72    | 536.9880   | 32.5118   | 173.9753 | 395.3630   | 21.0830   | 151.5192 |
| 73    | 395.3630   | 21.0830   | 151.5192 | 229.5902   | 10.8022   | 129.3352 |
| 74    | 229.5902   | 10.8022   | 129.3352 | 46.8708    | 1.6739    | 107.2891 |
| 75    | 46.8708    | 1.6739    | 107.2891 | -232.6313  | -9.8426   | 78.0925  |
| 76    | -232.6313  | -9.8426   | 78.0925  | -420.7325  | -16.0863  | 62.1525  |
| 77    | -420.7325  | -16.0863  | 62.1525  | -603.8560  | -21.2083  | 49.2435  |
| 78    | -603.8560  | -21.2083  | 49.2435  | -776.1404  | -25.2573  | 39.2270  |
| 79    | -776.1404  | -25.2573  | 39.2270  | -969.9614  | -29.4103  | 29.0949  |
| 80    | -969.9614  | -29.4103  | 29.0949  | -1092.0017 | 104.8377  | 339.2746 |
| 81    | -1092.0017 | 104.8377  | 339.2746 | -617.5800  | 222.2856  | 607.1547 |
| 82    | -617.5800  | 222.2856  | 607.1547 | -199.3064  | 203.7144  | 561.1671 |
| 83    | -199.3064  | 203.7144  | 561.1671 | 117.5139   | 175.8268  | 492.3353 |
| 84    | 117.5139   | 175.8268  | 492.3353 | 403.2326   | 157.4421  | 446.7885 |
| 85    | 403.2326   | 157.4421  | 446.7885 | 625.4384   | 139.3965  | 402.5389 |
| 86    | 625.4384   | 139.3965  | 402.5389 | 784.7344   | 121.8089  | 361.1199 |
| 87    | 784.7344   | 121.8089  | 361.1199 | 802.1830   | 96.6309   | 304.5375 |
| 88    | 802.1830   | 96.6309   | 304.5375 | 833.7112   | 80.7385   | 270.8555 |
| 89    | 833.7112   | 80.7385   | 270.8555 | 813.4641   | 65.7179   | 239.7584 |
| 90    | 813.4641   | 65.7179   | 239.7584 | 746.8398   | 51.6498   | 211.3318 |
| 91    | 746.8398   | 51.6498   | 211.3318 | 536.9151   | 32.4906   | 173.9689 |
| 92    | 536.9151   | 32.4906   | 173.9689 | 395.3034   | 21.0924   | 151.5432 |
| 93    | 395.3034   | 21.0924   | 151.5432 | 229.6340   | 10.8076   | 129.2696 |
| 94    | 229.6340   | 10.8076   | 129.2696 | 46.9483    | 1.6776    | 107.2790 |
| 95    | 46.9483    | 1.6776    | 107.2790 | -232.5071  | -9.8375   | 78.0594  |
| 96    | -232.5071  | -9.8375   | 78.0594  | -420.5361  | -16.0830  | 62.1762  |
| 97    | -420.5361  | -16.0830  | 62.1762  | -603.6418  | -21.2155  | 49.1602  |
| 98    | -603.6418  | -21.2155  | 49.1602  | -775.9412  | -25.2572  | 39.1718  |
| 99    | -775.9412  | -25.2572  | 39.1718  | -969.6854  | -29.4105  | 29.1800  |
| 100   | -969.6854  | -29.4105  | 29.1800  | -1091.6731 | 104.8228  | 339.1153 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1091.6731 | 104.8228  | 339.1153 | -617.2040  | 222.2428  | 607.0337 |
| 102   | -617.2040  | 222.2428  | 607.0337 | -199.1173  | 203.6650  | 561.1522 |
| 103   | -199.1173  | 203.6650  | 561.1522 | 117.5851   | 175.7793  | 492.2538 |
| 104   | 117.5851   | 175.7793  | 492.2538 | 403.3366   | 157.3943  | 446.7758 |
| 105   | 403.3366   | 157.3943  | 446.7758 | 625.4261   | 139.3625  | 402.4883 |
| 106   | 625.4261   | 139.3625  | 402.4883 | 784.6971   | 121.7827  | 361.2352 |
| 107   | 784.6971   | 121.7827  | 361.2352 | 801.9817   | 96.5791   | 304.6739 |
| 108   | 801.9817   | 96.5791   | 304.6739 | 833.5816   | 80.7177   | 270.5689 |
| 109   | 833.5816   | 80.7177   | 270.5689 | 813.3986   | 65.7182   | 239.5812 |
| 110   | 813.3986   | 65.7182   | 239.5812 | 746.9554   | 51.6836   | 211.4048 |
| 111   | 746.9554   | 51.6836   | 211.4048 | 537.4907   | 32.5383   | 173.9395 |
| 112   | 537.4907   | 32.5383   | 173.9395 | 396.2236   | 21.1266   | 151.5586 |
| 113   | 396.2236   | 21.1266   | 151.5586 | 231.0206   | 10.8713   | 129.3418 |
| 114   | 231.0206   | 10.8713   | 129.3418 | 48.9481    | 1.7717    | 107.3396 |
| 115   | 48.9481    | 1.7717    | 107.3396 | -229.4185  | -9.6929   | 78.1048  |
| 116   | -229.4185  | -9.6929   | 78.1048  | -416.4467  | -15.9070  | 62.2859  |
| 117   | -416.4467  | -15.9070  | 62.2859  | -598.4291  | -21.0104  | 49.3745  |
| 118   | -598.4291  | -21.0104  | 49.3745  | -769.5309  | -25.0275  | 39.1511  |
| 119   | -769.5309  | -25.0275  | 39.1511  | -961.7439  | -29.1553  | 29.3099  |
| 120   | -961.7439  | -29.1553  | 29.3099  | -1082.5081 | 104.4851  | 339.3597 |
| 121   | -1082.5081 | 104.4851  | 339.3597 | -609.7469  | 221.2507  | 606.8834 |
| 122   | -609.7469  | 221.2507  | 606.8834 | -193.7386  | 202.6408  | 560.9742 |
| 123   | -193.7386  | 202.6408  | 560.9742 | 120.7630   | 174.7298  | 492.0323 |
| 124   | 120.7630   | 174.7298  | 492.0323 | 404.0450   | 156.3852  | 446.5925 |
| 125   | 404.0450   | 156.3852  | 446.5925 | 623.9317   | 138.4018  | 402.3399 |
| 126   | 623.9317   | 138.4018  | 402.3399 | 781.4611   | 120.9373  | 360.8882 |
| 127   | 781.4611   | 120.9373  | 360.8882 | 797.9455   | 95.9471   | 304.2521 |
| 128   | 797.9455   | 95.9471   | 304.2521 | 829.5622   | 80.2601   | 270.1609 |
| 129   | 829.5622   | 80.2601   | 270.1609 | 810.7583   | 65.4736   | 238.8537 |
| 130   | 810.7583   | 65.4736   | 238.8537 | 747.1128   | 51.6889   | 210.6491 |
| 131   | 747.1128   | 51.6889   | 210.6491 | 545.1812   | 33.0458   | 172.8015 |
| 132   | 545.1812   | 33.0458   | 172.8015 | 412.0411   | 22.0483   | 150.1154 |
| 133   | 412.0411   | 22.0483   | 150.1154 | 257.7786   | 12.2497   | 127.6816 |
| 134   | 257.7786   | 12.2497   | 127.6816 | 89.9421    | 3.6589    | 105.4597 |
| 135   | 89.9421    | 3.6589    | 105.4597 | -163.5676  | -6.9530   | 75.9064  |
| 136   | -163.5676  | -6.9530   | 75.9064  | -327.7336  | -12.5306  | 59.7835  |
| 137   | -327.7336  | -12.5306  | 59.7835  | -482.2639  | -16.9277  | 46.5798  |
| 138   | -482.2639  | -16.9277  | 46.5798  | -620.8885  | -20.1909  | 36.2089  |
| 139   | -620.8885  | -20.1909  | 36.2089  | -760.9365  | -23.0599  | 25.9170  |
| 140   | -760.9365  | -23.0599  | 25.9170  | -835.8951  | 99.3563   | 289.1017 |
| 141   | -835.8951  | 99.3563   | 289.1017 | -451.7762  | 195.8320  | 482.0843 |
| 142   | -451.7762  | 195.8320  | 482.0843 | -111.2095  | 182.5349  | 445.1823 |
| 143   | -111.2095  | 182.5349  | 445.1823 | 185.3051   | 155.9321  | 371.6292 |
| 144   | 185.3051   | 155.9321  | 371.6292 | 56.4886    | 149.5013  | 309.1168 |
| 145   | 56.4886    | 149.5013  | 309.1168 | 325.0522   | 141.6345  | 291.5564 |
| 146   | 325.0522   | 141.6345  | 291.5564 | 573.8717   | 125.0139  | 253.9064 |
| 147   | 573.8717   | 125.0139  | 253.9064 | 790.5253   | 107.1878  | 212.8169 |
| 148   | 790.5253   | 107.1878  | 212.8169 | 967.4317   | 88.2138   | 168.4153 |
| 149   | 967.4317   | 88.2138   | 168.4153 | 1097.4082  | 68.1727   | 120.3551 |
| 150   | 1097.4082  | 68.1727   | 120.3551 | 1194.6277  | 57.7925   | 95.1311  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 151   | 1194.6277 | 57.7925   | 95.1311 | 1221.8201 | 36.2665   | 41.9818 |
| 152   | 1221.8201 | 36.2665   | 41.9818 | 9.6281    | -0.6683   | 0.0089  |
| 153   | 9.6281    | -0.6683   | 0.0089  | 8.7071    | -0.6902   | 0.0088  |
| 154   | 8.7071    | -0.6902   | 0.0088  | 7.5283    | -0.6969   | 0.0117  |
| 155   | 7.5283    | -0.6969   | 0.0117  | 6.2738    | -0.6972   | 0.0160  |
| 156   | 6.2738    | -0.6972   | 0.0160  | 5.0185    | -0.6973   | 0.0162  |
| 157   | 5.0185    | -0.6973   | 0.0162  | 3.7639    | -0.6970   | 0.0159  |
| 158   | 3.7639    | -0.6970   | 0.0159  | 2.5093    | -0.6969   | 0.0172  |
| 159   | 2.5093    | -0.6969   | 0.0172  | 1.2439    | -0.6910   | 0.0179  |
| 160   | 1.2439    | -0.6910   | 0.0179  | -0.0001   | -0.6993   | 0.0182  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0026    | -0.0028   | -1.8990   | 12.4522    | -0.4674   | -4.7431   |
| 2     | 12.4522    | -0.4674   | -4.7431   | 69.7785    | -2.7800   | -13.2511  |
| 3     | 69.7785    | -2.7800   | -13.2511  | 162.0466   | -6.9299   | -25.4679  |
| 4     | 162.0466   | -6.9299   | -25.4679  | 279.4539   | -12.9014  | -41.4161  |
| 5     | 279.4539   | -12.9014  | -41.4161  | 329.6843   | -16.5588  | -50.7369  |
| 6     | 329.6843   | -16.5588  | -50.7369  | 459.0396   | -25.2055  | -72.1964  |
| 7     | 459.0396   | -25.2055  | -72.1964  | 588.4041   | -35.6241  | -97.2392  |
| 8     | 588.4041   | -35.6241  | -97.2392  | 708.7489   | -47.7652  | -126.0367 |
| 9     | 708.7489   | -47.7652  | -126.0367 | 811.7253   | -61.5814  | -156.6280 |
| 10    | 811.7253   | -61.5814  | -156.6280 | 786.9568   | -68.6336  | -171.1352 |
| 11    | 786.9568   | -68.6336  | -171.1352 | 814.3576   | -82.5051  | -200.7072 |
| 12    | 814.3576   | -82.5051  | -200.7072 | 798.6536   | -96.0421  | -230.2177 |
| 13    | 798.6536   | -96.0421  | -230.2177 | 748.7232   | -110.3642 | -265.8026 |
| 14    | 748.7232   | -110.3642 | -265.8026 | 664.7847   | -126.0925 | -304.9639 |
| 15    | 664.7847   | -126.0925 | -304.9639 | 541.0763   | -136.4947 | -329.6577 |
| 16    | 541.0763   | -136.4947 | -329.6577 | 325.7329   | -152.1830 | -370.9738 |
| 17    | 325.7329   | -152.1830 | -370.9738 | 115.9976   | -171.1209 | -419.4982 |
| 18    | 115.9976   | -171.1209 | -419.4982 | -146.3598  | -191.2107 | -472.0018 |
| 19    | -146.3598  | -191.2107 | -472.0018 | -463.9164  | -212.3609 | -528.1072 |
| 20    | -463.9164  | -212.3609 | -528.1072 | -845.5961  | -99.6611  | -289.9193 |
| 21    | -845.5961  | -99.6611  | -289.9193 | -745.5079  | 22.5996   | -28.0450  |
| 22    | -745.5079  | 22.5996   | -28.0450  | -626.4502  | 20.3834   | -35.3603  |
| 23    | -626.4502  | 20.3834   | -35.3603  | -485.8580  | 17.0608   | -45.2927  |
| 24    | -485.8580  | 17.0608   | -45.2927  | -329.3753  | 12.5882   | -57.9811  |
| 25    | -329.3753  | 12.5882   | -57.9811  | -82.9635   | 3.6442    | -82.5813  |
| 26    | -82.9635   | 3.6442    | -82.5813  | 92.6969    | -3.8356   | -102.5484 |
| 27    | 92.6969    | -3.8356   | -102.5484 | 261.4005   | -12.5288  | -125.3343 |
| 28    | 261.4005   | -12.5288  | -125.3343 | 415.8809   | -22.4247  | -150.3817 |
| 29    | 415.8809   | -22.4247  | -150.3817 | 649.2838   | -39.4863  | -188.3033 |
| 30    | 649.2838   | -39.4863  | -188.3033 | 750.4658   | -52.2685  | -214.2787 |
| 31    | 750.4658   | -52.2685  | -214.2787 | 813.4094   | -66.1349  | -242.5409 |
| 32    | 813.4094   | -66.1349  | -242.5409 | 831.3645   | -80.9792  | -273.1291 |
| 33    | 831.3645   | -80.9792  | -273.1291 | 879.4956   | -104.8477 | -325.0376 |
| 34    | 879.4956   | -104.8477 | -325.0376 | 780.9129   | -121.7365 | -363.0859 |
| 35    | 780.9129   | -121.7365 | -363.0859 | 622.2355   | -139.2312 | -403.7833 |
| 36    | 622.2355   | -139.2312 | -403.7833 | 453.6428   | -159.7498 | -451.9687 |
| 37    | 453.6428   | -159.7498 | -451.9687 | 158.0699   | -184.8979 | -516.0512 |
| 38    | 158.0699   | -184.8979 | -516.0512 | -199.4023  | -203.5281 | -561.8994 |
| 39    | -199.4023  | -203.5281 | -561.8994 | -616.8196  | -222.1415 | -607.9941 |
| 40    | -616.8196  | -222.1415 | -607.9941 | -1090.5813 | -104.8103 | -339.9740 |
| 41    | -1090.5813 | -104.8103 | -339.9740 | -930.4816  | 28.2024   | -31.3012  |
| 42    | -930.4816  | 28.2024   | -31.3012  | -773.7195  | 25.1670   | -38.2538  |
| 43    | -773.7195  | 25.1670   | -38.2538  | -600.8351  | 21.0955   | -47.9211  |
| 44    | -600.8351  | 21.0955   | -47.9211  | -417.0538  | 15.9253   | -60.3928  |
| 45    | -417.0538  | 15.9253   | -60.3928  | -140.8443  | 6.0560    | -84.6014  |
| 46    | -140.8443  | 6.0560    | -84.6014  | 52.1577    | -1.9653   | -104.3611 |
| 47    | 52.1577    | -1.9653   | -104.3611 | 234.8235   | -11.1456  | -126.9617 |
| 48    | 234.8235   | -11.1456  | -126.9617 | 400.2508   | -21.4894  | -151.7618 |
| 49    | 400.2508   | -21.4894  | -151.7618 | 644.4703   | -39.1215  | -189.5656 |
| 50    | 644.4703   | -39.1215  | -189.5656 | 750.6740   | -52.2403  | -215.2938 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 750.6740   | -52.2403  | -215.2938 | 816.5437   | -66.3871  | -243.3412 |
| 52    | 816.5437   | -66.3871  | -243.3412 | 835.8295   | -81.4590  | -274.0292 |
| 53    | 835.8295   | -81.4590  | -274.0292 | 884.5885   | -105.6315 | -325.3394 |
| 54    | 884.5885   | -105.6315 | -325.3394 | 784.6624   | -122.6360 | -363.2216 |
| 55    | 784.6624   | -122.6360 | -363.2216 | 623.9330   | -140.2477 | -404.2237 |
| 56    | 623.9330   | -140.2477 | -404.2237 | 453.1141   | -160.7966 | -452.4440 |
| 57    | 453.1141   | -160.7966 | -452.4440 | 155.0161   | -185.9595 | -516.3185 |
| 58    | 155.0161   | -185.9595 | -516.3185 | -204.8652  | -204.5831 | -562.3340 |
| 59    | -204.8652  | -204.5831 | -562.3340 | -624.2125  | -223.1632 | -608.4678 |
| 60    | -624.2125  | -223.1632 | -608.4678 | -1099.7405 | -105.1797 | -340.1062 |
| 61    | -1099.7405 | -105.1797 | -340.1062 | -938.1597  | 28.4136   | -31.2597  |
| 62    | -938.1597  | 28.4136   | -31.2597  | -780.2531  | 25.3600   | -38.3334  |
| 63    | -780.2531  | 25.3600   | -38.3334  | -606.2231  | 21.2661   | -47.9881  |
| 64    | -606.2231  | 21.2661   | -47.9881  | -421.3533  | 16.0877   | -60.4453  |
| 65    | -421.3533  | 16.0877   | -60.4453  | -143.8071  | 6.1802    | -84.6035  |
| 66    | -143.8071  | 6.1802    | -84.6035  | 50.0846    | -1.8702   | -104.3650 |
| 67    | 50.0846    | -1.8702   | -104.3650 | 233.4751   | -11.0854  | -126.9611 |
| 68    | 233.4751   | -11.0854  | -126.9611 | 399.4070   | -21.4583  | -151.8356 |
| 69    | 399.4070   | -21.4583  | -151.8356 | 644.2168   | -39.1273  | -189.6078 |
| 70    | 644.2168   | -39.1273  | -189.6078 | 750.6394   | -52.2661  | -215.1797 |
| 71    | 750.6394   | -52.2661  | -215.1797 | 816.6198   | -66.4317  | -243.1860 |
| 72    | 816.6198   | -66.4317  | -243.1860 | 835.9327   | -81.4928  | -273.9567 |
| 73    | 835.9327   | -81.4928  | -273.9567 | 884.5800   | -105.6638 | -325.3077 |
| 74    | 884.5800   | -105.6638 | -325.3077 | 784.5212   | -122.6817 | -363.1754 |
| 75    | 784.5212   | -122.6817 | -363.1754 | 623.7999   | -140.2784 | -404.1856 |
| 76    | 623.7999   | -140.2784 | -404.1856 | 452.7330   | -160.8446 | -452.2794 |
| 77    | 452.7330   | -160.8446 | -452.2794 | 154.6873   | -186.0125 | -516.2020 |
| 78    | 154.6873   | -186.0125 | -516.2020 | -205.3710  | -204.6263 | -562.2797 |
| 79    | -205.3710  | -204.6263 | -562.2797 | -624.6877  | -223.1992 | -608.4312 |
| 80    | -624.6877  | -223.1992 | -608.4312 | -1100.3262 | -105.1664 | -340.1649 |
| 81    | -1100.3262 | -105.1664 | -340.1649 | -938.6856  | 28.4556   | -31.2866  |
| 82    | -938.6856  | 28.4556   | -31.2866  | -780.6026  | 25.3843   | -38.2177  |
| 83    | -780.6026  | 25.3843   | -38.2177  | -606.4814  | 21.2892   | -47.9737  |
| 84    | -606.4814  | 21.2892   | -47.9737  | -421.5515  | 16.0988   | -60.4557  |
| 85    | -421.5515  | 16.0988   | -60.4557  | -143.9368  | 6.1840    | -84.6302  |
| 86    | -143.9368  | 6.1840    | -84.6302  | 49.9481    | -1.8653   | -104.3775 |
| 87    | 49.9481    | -1.8653   | -104.3775 | 233.3594   | -11.0782  | -127.0214 |
| 88    | 233.3594   | -11.0782  | -127.0214 | 399.3972   | -21.4533  | -151.7264 |
| 89    | 399.3972   | -21.4533  | -151.7264 | 644.1798   | -39.1397  | -189.3795 |
| 90    | 644.1798   | -39.1397  | -189.3795 | 750.5105   | -52.2817  | -215.2804 |
| 91    | 750.5105   | -52.2817  | -215.2804 | 816.4161   | -66.4386  | -243.2289 |
| 92    | 816.4161   | -66.4386  | -243.2289 | 835.6235   | -81.4960  | -273.8050 |
| 93    | 835.6235   | -81.4960  | -273.8050 | 884.2452   | -105.6736 | -325.4895 |
| 94    | 884.2452   | -105.6736 | -325.4895 | 784.3535   | -122.6650 | -363.2346 |
| 95    | 784.3535   | -122.6650 | -363.2346 | 623.4977   | -140.2496 | -404.1047 |
| 96    | 623.4977   | -140.2496 | -404.1047 | 452.6205   | -160.8237 | -452.2889 |
| 97    | 452.6205   | -160.8237 | -452.2889 | 154.6472   | -185.9785 | -516.2284 |
| 98    | 154.6472   | -185.9785 | -516.2284 | -205.5196  | -204.6057 | -562.1441 |
| 99    | -205.5196  | -204.6057 | -562.1441 | -624.7403  | -223.1837 | -608.3658 |
| 100   | -624.7403  | -223.1837 | -608.3658 | -1100.2590 | -105.1600 | -340.2245 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1100.2590 | -105.1600 | -340.2245 | -938.6124  | 28.4628   | -31.1865  |
| 102   | -938.6124  | 28.4628   | -31.1865  | -780.5455  | 25.3904   | -38.1170  |
| 103   | -780.5455  | 25.3904   | -38.1170  | -606.4241  | 21.2931   | -47.9115  |
| 104   | -606.4241  | 21.2931   | -47.9115  | -421.4747  | 16.1012   | -60.3985  |
| 105   | -421.4747  | 16.1012   | -60.3985  | -143.8672  | 6.1839    | -84.5952  |
| 106   | -143.8672  | 6.1839    | -84.5952  | 50.0232    | -1.8683   | -104.3454 |
| 107   | 50.0232    | -1.8683   | -104.3454 | 233.4243   | -11.0876  | -126.9404 |
| 108   | 233.4243   | -11.0876  | -126.9404 | 399.3400   | -21.4660  | -151.7944 |
| 109   | 399.3400   | -21.4660  | -151.7944 | 644.0527   | -39.1415  | -189.5533 |
| 110   | 644.0527   | -39.1415  | -189.5533 | 750.3717   | -52.2847  | -215.2344 |
| 111   | 750.3717   | -52.2847  | -215.2344 | 816.2686   | -66.4491  | -243.3199 |
| 112   | 816.2686   | -66.4491  | -243.3199 | 835.3737   | -81.5439  | -273.9438 |
| 113   | 835.3737   | -81.5439  | -273.9438 | 883.7446   | -105.7468 | -325.4435 |
| 114   | 883.7446   | -105.7468 | -325.4435 | 783.5051   | -122.7845 | -363.1774 |
| 115   | 783.5051   | -122.7845 | -363.1774 | 622.2128   | -140.3988 | -404.0503 |
| 116   | 622.2128   | -140.3988 | -404.0503 | 450.6910   | -160.9677 | -452.2810 |
| 117   | 450.6910   | -160.9677 | -452.2810 | 152.3112   | -186.1299 | -516.3176 |
| 118   | 152.3112   | -186.1299 | -516.3176 | -207.9312  | -204.7469 | -562.3309 |
| 119   | -207.9312  | -204.7469 | -562.3309 | -627.7020  | -223.3112 | -608.2903 |
| 120   | -627.7020  | -223.3112 | -608.2903 | -1103.5531 | -105.0778 | -340.1079 |
| 121   | -1103.5531 | -105.0778 | -340.1079 | -940.8031  | 28.7332   | -31.3122  |
| 122   | -940.8031  | 28.7332   | -31.3122  | -781.9395  | 25.6389   | -38.2415  |
| 123   | -781.9395  | 25.6389   | -38.2415  | -607.1365  | 21.5030   | -47.9225  |
| 124   | -607.1365  | 21.5030   | -47.9225  | -421.6741  | 16.2586   | -60.4123  |
| 125   | -421.6741  | 16.2586   | -60.4123  | -143.8342  | 6.2505    | -84.6633  |
| 126   | -143.8342  | 6.2505    | -84.6633  | 49.9396    | -1.8729   | -104.4096 |
| 127   | 49.9396    | -1.8729   | -104.4096 | 232.8882   | -11.1620  | -127.0260 |
| 128   | 232.8882   | -11.1620  | -127.0260 | 397.9941   | -21.6133  | -151.8248 |
| 129   | 397.9941   | -21.6133  | -151.8248 | 641.0105   | -39.4230  | -189.6682 |
| 130   | 641.0105   | -39.4230  | -189.6682 | 745.6285   | -52.6535  | -215.2647 |
| 131   | 745.6285   | -52.6535  | -215.2647 | 809.2238   | -66.9156  | -243.2888 |
| 132   | 809.2238   | -66.9156  | -243.2888 | 825.7666   | -82.0970  | -274.1185 |
| 133   | 825.7666   | -82.0970  | -274.1185 | 870.3715   | -106.4213 | -325.6006 |
| 134   | 870.3715   | -106.4213 | -325.6006 | 766.8046   | -123.5078 | -363.5239 |
| 135   | 766.8046   | -123.5078 | -363.5239 | 602.2579   | -141.1995 | -404.3652 |
| 136   | 602.2579   | -141.1995 | -404.3652 | 426.7266   | -161.8806 | -452.5166 |
| 137   | 426.7266   | -161.8806 | -452.5166 | 125.1271   | -187.0807 | -516.5575 |
| 138   | 125.1271   | -187.0807 | -516.5575 | -238.0670  | -205.7096 | -562.5531 |
| 139   | -238.0670  | -205.7096 | -562.5531 | -659.9421  | -224.2874 | -608.6081 |
| 140   | -659.9421  | -224.2874 | -608.6081 | -1137.1858 | -105.5283 | -343.2568 |
| 141   | -1137.1858 | -105.5283 | -343.2568 | -1024.4353 | 29.9476   | -35.5938  |
| 142   | -1024.4353 | 29.9476   | -35.5938  | -886.6329  | 27.3610   | -42.0268  |
| 143   | -886.6329  | 27.3610   | -42.0268  | -726.6865  | 23.7412   | -51.9908  |
| 144   | -726.6865  | 23.7412   | -51.9908  | -548.0775  | 19.0252   | -65.6195  |
| 145   | -548.0775  | 19.0252   | -65.6195  | -438.4954  | 16.2320   | -73.7142  |
| 146   | -438.4954  | 16.2320   | -73.7142  | -246.1122  | 9.7495    | -92.4761  |
| 147   | -246.1122  | 9.7495    | -92.4761  | -48.3893   | 2.0489    | -114.7514 |
| 148   | -48.3893   | 2.0489    | -114.7514 | 148.8701   | -6.9088   | -140.5231 |
| 149   | 148.8701   | -6.9088   | -140.5231 | 339.4157   | -17.1496  | -169.8006 |
| 150   | 339.4157   | -17.1496  | -169.8006 | 409.6511   | -22.7658  | -184.9178 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 409.6511 | -22.7658  | -184.9178 | 566.5736 | -34.9841  | -215.3401 |
| 152   | 566.5736 | -34.9841  | -215.3401 | 698.2457 | -48.4962  | -245.9849 |
| 153   | 698.2457 | -48.4962  | -245.9849 | 797.3882 | -63.2953  | -278.6605 |
| 154   | 797.3882 | -63.2953  | -278.6605 | 856.7610 | -79.3608  | -314.2322 |
| 155   | 856.7610 | -79.3608  | -314.2322 | 790.3384 | -87.8606  | -332.8998 |
| 156   | 790.3384 | -87.8606  | -332.8998 | 760.5129 | -105.6920 | -373.8804 |
| 157   | 760.5129 | -105.6920 | -373.8804 | 672.6963 | -124.6531 | -418.5507 |
| 158   | 672.6963 | -124.6531 | -418.5507 | 520.5510 | -144.6916 | -466.5132 |
| 159   | 520.5510 | -144.6916 | -466.5132 | 298.2177 | -165.7340 | -518.1758 |
| 160   | 298.2177 | -165.7340 | -518.1758 | -0.0464  | -176.6109 | -545.3805 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | 0.0003    | 9.7141    | 1.5424    | 378.6638  | 202.0932  | 553.0056  |
| 2     | 378.6638  | 202.0932  | 553.0056  | 709.2698  | 172.0851  | 478.1058  |
| 3     | 709.2698  | 172.0851  | 478.1058  | 993.3840  | 145.1284  | 416.2328  |
| 4     | 993.3840  | 145.1284  | 416.2328  | 1233.4612 | 115.0921  | 341.3494  |
| 5     | 1233.4612 | 115.0921  | 341.3494  | 1425.5393 | 92.6188   | 285.3808  |
| 6     | 1425.5393 | 92.6188   | 285.3808  | 1571.6747 | 73.3776   | 242.2641  |
| 7     | 1571.6747 | 73.3776   | 242.2641  | 1670.7170 | 43.3246   | 167.8686  |
| 8     | 1670.7170 | 43.3246   | 167.8686  | 1725.9746 | 16.7125   | 105.9481  |
| 9     | 1725.9746 | 16.7125   | 105.9481  | 1734.9866 | -13.3326  | 31.2698   |
| 10    | 1734.9866 | -13.3326  | 31.2698   | 1701.3826 | -32.2108  | -11.4576  |
| 11    | 1701.3826 | -32.2108  | -11.4576  | 1619.3740 | -50.8470  | -54.5815  |
| 12    | 1619.3740 | -50.8470  | -54.5815  | 1494.8588 | -80.8150  | -129.2888 |
| 13    | 1494.8588 | -80.8150  | -129.2888 | 1328.2068 | -106.7768 | -191.1503 |
| 14    | 1328.2068 | -106.7768 | -191.1503 | 1119.2993 | -132.4565 | -254.7404 |
| 15    | 1119.2993 | -132.4565 | -254.7404 | 870.9250  | -150.8773 | -300.8685 |
| 16    | 870.9250  | -150.8773 | -300.8685 | 578.9479  | -169.5355 | -347.7139 |
| 17    | 578.9479  | -169.5355 | -347.7139 | 299.2679  | 9.7716    | 2.0540    |
| 18    | 299.2679  | 9.7716    | 2.0540    | 316.8594  | 9.7737    | 2.0582    |
| 19    | 316.8594  | 9.7737    | 2.0582    | 334.4526  | 9.7747    | 2.1846    |
| 20    | 334.4526  | 9.7747    | 2.1846    | 352.0424  | -12.6894  | 17.1981   |
| 21    | 352.0424  | -12.6894  | 17.1981   | 272.9517  | -35.1525  | 32.1864   |
| 22    | 272.9517  | -35.1525  | 32.1864   | 193.8333  | -35.1513  | 32.2937   |
| 23    | 193.8333  | -35.1513  | 32.2937   | 340.7354  | 191.6969  | 514.7070  |
| 24    | 340.7354  | 191.6969  | 514.7070  | 729.7581  | 155.4844  | 429.6962  |
| 25    | 729.7581  | 155.4844  | 429.6962  | 1040.1294 | 117.9888  | 336.1879  |
| 26    | 1040.1294 | 117.9888  | 336.1879  | 1277.5540 | 89.4279   | 271.3569  |
| 27    | 1277.5540 | 89.4279   | 271.3569  | 1441.1575 | 59.4351   | 196.6899  |
| 28    | 1441.1575 | 59.4351   | 196.6899  | 1532.7694 | 23.5619   | 113.2770  |
| 29    | 1532.7694 | 23.5619   | 113.2770  | 1547.4521 | -12.1350  | 31.0334   |
| 30    | 1547.4521 | -12.1350  | 31.0334   | 1580.7366 | 37.9669   | 34.5847   |
| 31    | 1580.7366 | 37.9669   | 34.5847   | 1628.6274 | 7.9458    | -39.9379  |
| 32    | 1628.6274 | 7.9458    | -39.9379  | 1605.7764 | -27.6279  | -122.2503 |
| 33    | 1605.7764 | -27.6279  | -122.2503 | 1506.7324 | -63.3429  | -206.0340 |
| 34    | 1506.7324 | -63.3429  | -206.0340 | 1334.3196 | -93.3104  | -280.6678 |
| 35    | 1334.3196 | -93.3104  | -280.6678 | 1090.3240 | -121.7578 | -345.5834 |
| 36    | 1090.3240 | -121.7578 | -345.5834 | 771.4376  | -159.2727 | -439.1516 |
| 37    | 771.4376  | -159.2727 | -439.1516 | 376.5040  | -195.4208 | -524.1973 |
| 38    | 376.5040  | -195.4208 | -524.1973 | 297.8972  | 9.7816    | 1.7570    |
| 39    | 297.8972  | 9.7816    | 1.7570    | 319.9091  | 9.7801    | 1.8158    |
| 40    | 319.9091  | 9.7801    | 1.8158    | 341.9178  | -12.5537  | 17.0353   |
| 41    | 341.9178  | -12.5537  | 17.0353   | 285.0060  | -8.6458   | -1.4053   |
| 42    | 285.0060  | -8.6458   | -1.4053   | 265.5525  | -8.6471   | -1.3104   |
| 43    | 265.5525  | -8.6471   | -1.3104   | 370.9697  | 190.6971  | 514.3623  |
| 44    | 370.9697  | 190.6971  | 514.3623  | 757.4611  | 154.4883  | 429.4109  |
| 45    | 757.4611  | 154.4883  | 429.4109  | 1065.5264 | 116.9843  | 335.9232  |
| 46    | 1065.5264 | 116.9843  | 335.9232  | 1300.5144 | 88.4514   | 270.9141  |
| 47    | 1300.5144 | 88.4514   | 270.9141  | 1461.9730 | 58.4873   | 196.2529  |
| 48    | 1461.9730 | 58.4873   | 196.2529  | 1551.1379 | 22.5891   | 113.0674  |
| 49    | 1551.1379 | 22.5891   | 113.0674  | 1563.3800 | -13.0772  | 30.3512   |
| 50    | 1563.3800 | -13.0772  | 30.3512   | 1577.6718 | 38.3083   | 33.0447   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 51    | 1577.6718 | 38.3083   | 33.0447   | 1628.3134 | 10.0466   | -30.7018  |
| 52    | 1628.3134 | 10.0466   | -30.7018  | 1605.8296 | -27.5004  | -124.0162 |
| 53    | 1605.8296 | -27.5004  | -124.0162 | 1508.0508 | -63.4424  | -206.9196 |
| 54    | 1508.0508 | -63.4424  | -206.9196 | 1335.6729 | -92.0910  | -272.0415 |
| 55    | 1335.6729 | -92.0910  | -272.0415 | 1091.0476 | -122.0968 | -346.9192 |
| 56    | 1091.0476 | -122.0968 | -346.9192 | 771.5187  | -159.5853 | -440.4687 |
| 57    | 771.5187  | -159.5853 | -440.4687 | 375.3354  | -195.8702 | -525.2074 |
| 58    | 375.3354  | -195.8702 | -525.2074 | 297.3224  | 9.6839    | 1.6894    |
| 59    | 297.3224  | 9.6839    | 1.6894    | 319.1071  | 9.6815    | 1.8389    |
| 60    | 319.1071  | 9.6815    | 1.8389    | 349.3161  | 12.9042   | -17.2497  |
| 61    | 349.3161  | 12.9042   | -17.2497  | 327.0135  | -9.9127   | -1.8770   |
| 62    | 327.0135  | -9.9127   | -1.8770   | 304.7146  | -9.9123   | -1.7222   |
| 63    | 304.7146  | -9.9123   | -1.7222   | 373.8401  | 190.6261  | 514.4417  |
| 64    | 373.8401  | 190.6261  | 514.4417  | 760.1203  | 154.4087  | 429.4800  |
| 65    | 760.1203  | 154.4087  | 429.4800  | 1068.0264 | 116.8741  | 335.8438  |
| 66    | 1068.0264 | 116.8741  | 335.8438  | 1302.7158 | 88.3298   | 270.8873  |
| 67    | 1302.7158 | 88.3298   | 270.8873  | 1463.8381 | 58.3194   | 196.2412  |
| 68    | 1463.8381 | 58.3194   | 196.2412  | 1552.6067 | 22.4356   | 112.8000  |
| 69    | 1552.6067 | 22.4356   | 112.8000  | 1564.4517 | -13.2674  | 30.2983   |
| 70    | 1564.4517 | -13.2674  | 30.2983   | 1577.2671 | 38.2914   | 33.3413   |
| 71    | 1577.2671 | 38.2914   | 33.3413   | 1627.9583 | 10.0096   | -30.3958  |
| 72    | 1627.9583 | 10.0096   | -30.3958  | 1605.4784 | -26.0092  | -113.7646 |
| 73    | 1605.4784 | -26.0092  | -113.7646 | 1507.6492 | -63.4901  | -206.8542 |
| 74    | 1507.6492 | -63.4901  | -206.8542 | 1335.3137 | -92.0876  | -272.0008 |
| 75    | 1335.3137 | -92.0876  | -272.0008 | 1090.7972 | -122.0817 | -346.8696 |
| 76    | 1090.7972 | -122.0817 | -346.8696 | 771.1932  | -159.5702 | -440.2545 |
| 77    | 771.1932  | -159.5702 | -440.2545 | 375.1671  | -195.8675 | -525.0847 |
| 78    | 375.1671  | -195.8675 | -525.0847 | 297.2123  | 9.6812    | 1.7100    |
| 79    | 297.2123  | 9.6812    | 1.7100    | 318.9899  | 9.6810    | 1.9028    |
| 80    | 318.9899  | 9.6810    | 1.9028    | 350.4176  | 12.9323   | -17.2521  |
| 81    | 350.4176  | 12.9323   | -17.2521  | 328.0158  | -9.9513   | -1.8714   |
| 82    | 328.0158  | -9.9513   | -1.8714   | 305.6198  | -9.9485   | -1.7727   |
| 83    | 305.6198  | -9.9485   | -1.7727   | 373.7624  | 190.5923  | 514.4777  |
| 84    | 373.7624  | 190.5923  | 514.4777  | 759.9516  | 154.3711  | 429.4946  |
| 85    | 759.9516  | 154.3711  | 429.4946  | 1067.8658 | 116.8549  | 336.0540  |
| 86    | 1067.8658 | 116.8549  | 336.0540  | 1302.5491 | 88.3098   | 270.7817  |
| 87    | 1302.5491 | 88.3098   | 270.7817  | 1463.7795 | 58.3172   | 196.0222  |
| 88    | 1463.7795 | 58.3172   | 196.0222  | 1552.5359 | 22.4346   | 113.3177  |
| 89    | 1552.5359 | 22.4346   | 113.3177  | 1564.4254 | -13.2215  | 30.8120   |
| 90    | 1564.4254 | -13.2215  | 30.8120   | 1577.0227 | 38.1916   | 33.0093   |
| 91    | 1577.0227 | 38.1916   | 33.0093   | 1627.5081 | 9.9291    | -30.4352  |
| 92    | 1627.5081 | 9.9291    | -30.4352  | 1604.9962 | -25.9869  | -113.5928 |
| 93    | 1604.9962 | -25.9869  | -113.5928 | 1507.2529 | -63.4566  | -207.2376 |
| 94    | 1507.2529 | -63.4566  | -207.2376 | 1335.0347 | -92.0585  | -272.0980 |
| 95    | 1335.0347 | -92.0585  | -272.0980 | 1090.4614 | -122.0466 | -346.7770 |
| 96    | 1090.4614 | -122.0466 | -346.7770 | 771.0365  | -159.5573 | -440.3129 |
| 97    | 771.0365  | -159.5573 | -440.3129 | 375.0734  | -195.8286 | -525.1333 |
| 98    | 375.0734  | -195.8286 | -525.1333 | 296.5021  | 9.6628    | 1.7280    |
| 99    | 296.5021  | 9.6628    | 1.7280    | 318.2299  | 9.6589    | 1.8726    |
| 100   | 318.2299  | 9.6589    | 1.8726    | 350.4267  | 12.9305   | -17.2551  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 101   | 350.4267  | 12.9305   | -17.2551  | 328.0220  | -9.9544   | -1.9053   |
| 102   | 328.0220  | -9.9544   | -1.9053   | 305.6299  | -9.9530   | -1.8114   |
| 103   | 305.6299  | -9.9530   | -1.8114   | 373.6941  | 190.5851  | 514.4281  |
| 104   | 373.6941  | 190.5851  | 514.4281  | 759.9861  | 154.3715  | 429.5152  |
| 105   | 759.9861  | 154.3715  | 429.5152  | 1067.8833 | 116.8815  | 336.0209  |
| 106   | 1067.8833 | 116.8815  | 336.0209  | 1302.6978 | 88.3512   | 270.9717  |
| 107   | 1302.6978 | 88.3512   | 270.9717  | 1463.8076 | 58.3453   | 196.3261  |
| 108   | 1463.8076 | 58.3453   | 196.3261  | 1552.6995 | 22.4742   | 112.9102  |
| 109   | 1552.6995 | 22.4742   | 112.9102  | 1564.6328 | -13.2129  | 30.4268   |
| 110   | 1564.6328 | -13.2129  | 30.4268   | 1576.4866 | 38.2143   | 33.1050   |
| 111   | 1576.4866 | 38.2143   | 33.1050   | 1627.0476 | 9.8753    | -30.6137  |
| 112   | 1627.0476 | 9.8753    | -30.6137  | 1604.2908 | -26.1064  | -113.7626 |
| 113   | 1604.2908 | -26.1064  | -113.7626 | 1506.2954 | -63.6061  | -207.1071 |
| 114   | 1506.2954 | -63.6061  | -207.1071 | 1333.6960 | -92.2485  | -271.9616 |
| 115   | 1333.6960 | -92.2485  | -271.9616 | 1088.6924 | -122.2501 | -346.6356 |
| 116   | 1088.6924 | -122.2501 | -346.6356 | 768.7275  | -159.7311 | -440.3080 |
| 117   | 768.7275  | -159.7311 | -440.3080 | 372.4313  | -195.9969 | -525.2404 |
| 118   | 372.4313  | -195.9969 | -525.2404 | 190.0117  | 35.8531   | -32.7565  |
| 119   | 190.0117  | 35.8531   | -32.7565  | 270.7091  | 35.8562   | -32.6968  |
| 120   | 270.7091  | 35.8562   | -32.6968  | 351.3973  | 12.9031   | -17.2851  |
| 121   | 351.3973  | 12.9031   | -17.2851  | 328.7894  | -10.0506  | -1.8724   |
| 122   | 328.7894  | -10.0506  | -1.8724   | 306.1791  | -10.0513  | -1.7752   |
| 123   | 306.1791  | -10.0513  | -1.7752   | 374.9155  | 190.1863  | 513.3873  |
| 124   | 374.9155  | 190.1863  | 513.3873  | 760.1339  | 154.1342  | 428.4203  |
| 125   | 760.1339  | 154.1342  | 428.4203  | 1067.4159 | 116.6264  | 335.0573  |
| 126   | 1067.4159 | 116.6264  | 335.0573  | 1302.3304 | 88.3018   | 269.6780  |
| 127   | 1302.3304 | 88.3018   | 269.6780  | 1463.4749 | 60.1450   | 205.1263  |
| 128   | 1463.4749 | 60.1450   | 205.1263  | 1553.6997 | 22.6458   | 111.7770  |
| 129   | 1553.6997 | 22.6458   | 111.7770  | 1568.1919 | -12.8288  | 28.8947   |
| 130   | 1568.1919 | -12.8288  | 28.8947   | 1562.9297 | 37.1604   | 33.0811   |
| 131   | 1562.9297 | 37.1604   | 33.0811   | 1610.7373 | 8.8424    | -30.6758  |
| 132   | 1610.7373 | 8.8424    | -30.6758  | 1585.6309 | -28.6684  | -124.2863 |
| 133   | 1585.6309 | -28.6684  | -124.2863 | 1484.9167 | -64.6544  | -207.4233 |
| 134   | 1484.9167 | -64.6544  | -207.4233 | 1309.7059 | -93.2982  | -272.5450 |
| 135   | 1309.7059 | -93.2982  | -272.5450 | 1062.4392 | -123.3101 | -347.0800 |
| 136   | 1062.4392 | -123.3101 | -347.0800 | 740.1431  | -160.8067 | -440.5973 |
| 137   | 740.1431  | -160.8067 | -440.5973 | 341.2186  | -197.1095 | -525.5400 |
| 138   | 341.2186  | -197.1095 | -525.5400 | 199.4084  | 36.1599   | -32.7575  |
| 139   | 199.4084  | 36.1599   | -32.7575  | 280.7621  | 36.1601   | -32.6805  |
| 140   | 280.7621  | 36.1601   | -32.6805  | 362.1428  | 13.0513   | -17.3995  |
| 141   | 362.1428  | 13.0513   | -17.3995  | 344.0376  | -10.0600  | -2.0921   |
| 142   | 344.0376  | -10.0600  | -2.0921   | 325.9301  | -10.0616  | -2.0872   |
| 143   | 325.9301  | -10.0616  | -2.0872   | 307.8227  | -10.0610  | -2.0262   |
| 144   | 307.8227  | -10.0610  | -2.0262   | 289.7101  | -10.0620  | -1.9060   |
| 145   | 289.7101  | -10.0620  | -1.9060   | 271.6018  | -10.0640  | -1.8593   |
| 146   | 271.6018  | -10.0640  | -1.8593   | 253.4896  | -10.0603  | -1.8011   |
| 147   | 253.4896  | -10.0603  | -1.8011   | 534.6572  | 152.1532  | 209.1444  |
| 148   | 534.6572  | 152.1532  | 209.1444  | 781.4109  | 122.1455  | 134.3408  |
| 149   | 781.4109  | 122.1455  | 134.3408  | 981.8699  | 93.5957   | 70.5941   |
| 150   | 981.8699  | 93.5957   | 70.5941   | 1135.3608 | 78.6056   | 33.3102   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| 151   | 1135.3608 | 78.6056   | 33.3102   | 1237.8579 | 48.5734   | -41.2682  |
| 152   | 1237.8579 | 48.5734   | -41.2682  | 1293.2675 | 19.5877   | -105.7839 |
| 153   | 1293.2675 | 19.5877   | -105.7839 | 1301.5129 | -10.4478  | -180.8504 |
| 154   | 1301.5129 | -10.4478  | -180.8504 | 1261.7495 | -40.5088  | -255.4185 |
| 155   | 1261.7495 | -40.5088  | -255.4185 | 1173.9866 | -55.5341  | -292.2015 |
| 156   | 1173.9866 | -55.5341  | -292.2015 | 1035.0215 | -85.5270  | -367.2338 |
| 157   | 1035.0215 | -85.5270  | -367.2338 | 848.1476  | -115.5092 | -442.3486 |
| 158   | 848.1476  | -115.5092 | -442.3486 | 613.3933  | -145.4958 | -517.1107 |
| 159   | 613.3933  | -145.4958 | -517.1107 | 330.7733  | -175.4896 | -591.9936 |
| 160   | 330.7733  | -175.4896 | -591.9936 | 0.0018    | 21.8881   | -21.8450  |



ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| ===== | =====      | =====     | =====     | =====      | =====     | =====     |
| 1     | -0.0483    | 183.7899  | 591.1966  | -63.4311   | -35.2435  | 39.0887   |
| 2     | -63.4311   | -35.2435  | 39.0887   | -126.8611  | -35.2432  | 39.0592   |
| 3     | -126.8611  | -35.2432  | 39.0592   | -190.3335  | -35.2365  | 38.9972   |
| 4     | -190.3335  | -35.2365  | 38.9972   | -253.7426  | -35.2292  | 38.9657   |
| 5     | -253.7426  | -35.2292  | 38.9657   | -317.1551  | -35.2377  | 38.8887   |
| 6     | -317.1551  | -35.2377  | 38.8887   | -380.6121  | -35.2400  | 38.8187   |
| 7     | -380.6121  | -35.2400  | 38.8187   | -444.0789  | -35.2227  | 38.6542   |
| 8     | -444.0789  | -35.2227  | 38.6542   | -507.4738  | -35.1873  | 38.5909   |
| 9     | -507.4738  | -35.1873  | 38.5909   | -570.7950  | -35.1581  | 38.4524   |
| 10    | -570.7950  | -35.1581  | 38.4524   | -634.1449  | -35.1618  | 38.2344   |
| 11    | -634.1449  | -35.1618  | 38.2344   | -697.4557  | -35.1816  | 38.1068   |
| 12    | -697.4557  | -35.1816  | 38.1068   | -760.7899  | -35.1899  | 37.9373   |
| 13    | -760.7899  | -35.1899  | 37.9373   | -824.1354  | -35.1804  | 37.7665   |
| 14    | -824.1354  | -35.1804  | 37.7665   | -887.4717  | -35.1706  | 37.4212   |
| 15    | -887.4717  | -35.1706  | 37.4212   | -950.7444  | -35.1707  | 37.4422   |
| 16    | -950.7444  | -35.1707  | 37.4422   | -1014.0951 | -35.1758  | 37.0354   |
| 17    | -1014.0951 | -35.1758  | 37.0354   | -1077.3888 | -35.1781  | 36.6506   |
| 18    | -1077.3888 | -35.1781  | 36.6506   | -1436.8752 | -249.9217 | -432.7235 |
| 19    | -1436.8752 | -249.9217 | -432.7235 | -1902.7201 | -260.9221 | -457.1969 |
| 20    | -1902.7201 | -260.9221 | -457.1969 | -2392.9983 | -3.8299   | 30.7081   |
| 21    | -2392.9983 | -3.8299   | 30.7081   | -1784.5710 | 263.6671  | 544.9528  |
| 22    | -1784.5710 | 263.6671  | 544.9528  | -1206.2004 | 253.1517  | 522.9236  |
| 23    | -1206.2004 | 253.1517  | 522.9236  | -886.3421  | 31.1367   | -21.7043  |
| 24    | -886.3421  | 31.1367   | -21.7043  | -816.2878  | 31.1353   | -21.7008  |
| 25    | -816.2878  | 31.1353   | -21.7008  | -746.2029  | 31.1402   | -21.9321  |
| 26    | -746.2029  | 31.1402   | -21.9321  | -676.1321  | 31.1440   | -22.3806  |
| 27    | -676.1321  | 31.1440   | -22.3806  | -606.0574  | 31.1448   | -22.5891  |
| 28    | -606.0574  | 31.1448   | -22.5891  | -536.0105  | 31.1408   | -22.6810  |
| 29    | -536.0105  | 31.1408   | -22.6810  | -465.9142  | 31.1412   | -22.9217  |
| 30    | -465.9142  | 31.1412   | -22.9217  | -438.9423  | -35.1566  | 32.0072   |
| 31    | -438.9423  | -35.1566  | 32.0072   | -518.0372  | -35.1510  | 31.8254   |
| 32    | -518.0372  | -35.1510  | 31.8254   | -597.1329  | -35.1490  | 31.5655   |
| 33    | -597.1329  | -35.1490  | 31.5655   | -676.2642  | -35.1678  | 31.5672   |
| 34    | -676.2642  | -35.1678  | 31.5672   | -755.4348  | -35.1799  | 31.3199   |
| 35    | -755.4348  | -35.1799  | 31.3199   | -834.6332  | -35.1929  | 30.8232   |
| 36    | -834.6332  | -35.1929  | 30.8232   | -913.8362  | -35.1933  | 30.6857   |
| 37    | -913.8362  | -35.1933  | 30.6857   | -993.0329  | -35.1805  | 30.3622   |
| 38    | -993.0329  | -35.1805  | 30.3622   | -1334.5381 | -249.8528 | -495.5565 |
| 39    | -1334.5381 | -249.8528 | -495.5565 | -1910.8513 | -259.9398 | -515.6650 |
| 40    | -1910.8513 | -259.9398 | -515.6650 | -2519.9963 | 4.1302    | 14.5722   |
| 41    | -2519.9963 | 4.1302    | 14.5722   | -1884.2776 | 277.1135  | 563.3110  |
| 42    | -1884.2776 | 277.1135  | 563.3110  | -1283.0564 | 255.7040  | 520.3861  |
| 43    | -1283.0564 | 255.7040  | 520.3861  | -1016.3130 | 35.6737   | -30.8643  |
| 44    | -1016.3130 | 35.6737   | -30.8643  | -936.0365  | 35.6781   | -31.0053  |
| 45    | -936.0365  | 35.6781   | -31.0053  | -855.7204  | 35.6859   | -31.2782  |
| 46    | -855.7204  | 35.6859   | -31.2782  | -775.4417  | 35.6762   | -31.6670  |
| 47    | -775.4417  | 35.6762   | -31.6670  | -695.1654  | 35.6682   | -31.8907  |
| 48    | -695.1654  | 35.6682   | -31.8907  | -614.9403  | 35.6702   | -32.0954  |
| 49    | -614.9403  | 35.6702   | -32.0954  | -534.6696  | 35.6741   | -32.2017  |
| 50    | -534.6696  | 35.6741   | -32.2017  | -454.3523  | 35.6803   | -32.3344  |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| ===== | =====      | =====     | =====     | =====      | =====     | =====     |
| 51    | -454.3523  | 35.6803   | -32.3344  | -521.6299  | -34.8624  | 31.8474   |
| 52    | -521.6299  | -34.8624  | 31.8474   | -600.0635  | -34.8490  | 31.6573   |
| 53    | -600.0635  | -34.8490  | 31.6573   | -678.4813  | -34.8514  | 31.3540   |
| 54    | -678.4813  | -34.8514  | 31.3540   | -756.9253  | -34.8508  | 31.1341   |
| 55    | -756.9253  | -34.8508  | 31.1341   | -835.3350  | -34.8421  | 31.0294   |
| 56    | -835.3350  | -34.8421  | 31.0294   | -913.7077  | -34.8423  | 30.7091   |
| 57    | -913.7077  | -34.8423  | 30.7091   | -992.1672  | -34.8446  | 30.4247   |
| 58    | -992.1672  | -34.8446  | 30.4247   | -1338.2406 | -250.5475 | -495.6996 |
| 59    | -1338.2406 | -250.5475 | -495.6996 | -1915.5293 | -260.5850 | -516.2195 |
| 60    | -1915.5293 | -260.5850 | -516.2195 | -2524.9600 | 3.9343    | 14.5569   |
| 61    | -2524.9600 | 3.9343    | 14.5569   | -1888.2571 | 277.2482  | 563.5448  |
| 62    | -1888.2571 | 277.2482  | 563.5448  | -1285.9556 | 255.8089  | 520.3671  |
| 63    | -1285.9556 | 255.8089  | 520.3671  | -1019.7106 | 35.7665   | -31.0257  |
| 64    | -1019.7106 | 35.7665   | -31.0257  | -939.2217  | 35.7851   | -31.1635  |
| 65    | -939.2217  | 35.7851   | -31.1635  | -858.6610  | 35.7962   | -31.3144  |
| 66    | -858.6610  | 35.7962   | -31.3144  | -778.0735  | 35.8015   | -31.7176  |
| 67    | -778.0735  | 35.8015   | -31.7176  | -697.4584  | 35.8172   | -31.9585  |
| 68    | -697.4584  | 35.8172   | -31.9585  | -616.8526  | 35.8190   | -32.0443  |
| 69    | -616.8526  | 35.8190   | -32.0443  | -536.2775  | 35.8192   | -32.2226  |
| 70    | -536.2775  | 35.8192   | -32.2226  | -455.6628  | 35.8234   | -32.4613  |
| 71    | -455.6628  | 35.8234   | -32.4613  | -521.5599  | -34.8235  | 31.7013   |
| 72    | -521.5599  | -34.8235  | 31.7013   | -599.9115  | -34.8139  | 31.6017   |
| 73    | -599.9115  | -34.8139  | 31.6017   | -678.2844  | -34.8100  | 31.2836   |
| 74    | -678.2844  | -34.8100  | 31.2836   | -756.6472  | -34.8302  | 31.1024   |
| 75    | -756.6472  | -34.8302  | 31.1024   | -835.0340  | -34.8473  | 30.9529   |
| 76    | -835.0340  | -34.8473  | 30.9529   | -913.4517  | -34.8356  | 30.5193   |
| 77    | -913.4517  | -34.8356  | 30.5193   | -991.8058  | -34.8293  | 30.3988   |
| 78    | -991.8058  | -34.8293  | 30.3988   | -1338.3969 | -250.5739 | -495.6910 |
| 79    | -1338.3969 | -250.5739 | -495.6910 | -1915.6003 | -260.6046 | -516.4046 |
| 80    | -1915.6003 | -260.6046 | -516.4046 | -2525.1321 | 3.9192    | 14.2679   |
| 81    | -2525.1321 | 3.9192    | 14.2679   | -1888.5529 | 277.2285  | 563.4127  |
| 82    | -1888.5529 | 277.2285  | 563.4127  | -1285.9675 | 255.7863  | 520.5432  |
| 83    | -1285.9675 | 255.7863  | 520.5432  | -1019.7744 | 35.8045   | -30.9996  |
| 84    | -1019.7744 | 35.8045   | -30.9996  | -939.2249  | 35.8026   | -31.1836  |
| 85    | -939.2249  | 35.8026   | -31.1836  | -858.6469  | 35.8052   | -31.4482  |
| 86    | -858.6469  | 35.8052   | -31.4482  | -778.0735  | 35.8111   | -31.7305  |
| 87    | -778.0735  | 35.8111   | -31.7305  | -697.4930  | 35.8121   | -31.8474  |
| 88    | -697.4930  | 35.8121   | -31.8474  | -616.9092  | 35.8181   | -32.2557  |
| 89    | -616.9092  | 35.8181   | -32.2557  | -536.3215  | 35.8312   | -32.4548  |
| 90    | -536.3215  | 35.8312   | -32.4548  | -455.6831  | 35.8507   | -32.4553  |
| 91    | -455.6831  | 35.8507   | -32.4553  | -521.3774  | -34.8067  | 31.7089   |
| 92    | -521.3774  | -34.8067  | 31.7089   | -599.7516  | -34.8280  | 31.5618   |
| 93    | -599.7516  | -34.8280  | 31.5618   | -678.1127  | -34.8321  | 31.4523   |
| 94    | -678.1127  | -34.8321  | 31.4523   | -756.4868  | -34.8418  | 31.1105   |
| 95    | -756.4868  | -34.8418  | 31.1105   | -834.9144  | -34.8552  | 30.8620   |
| 96    | -834.9144  | -34.8552  | 30.8620   | -913.3193  | -34.8571  | 30.5942   |
| 97    | -913.3193  | -34.8571  | 30.5942   | -991.7399  | -34.8540  | 30.2731   |
| 98    | -991.7399  | -34.8540  | 30.2731   | -1338.3328 | -250.5508 | -495.6591 |
| 99    | -1338.3328 | -250.5508 | -495.6591 | -1915.4062 | -260.5864 | -516.2374 |
| 100   | -1915.4062 | -260.5864 | -516.2374 | -2524.7568 | 3.9114    | 14.0068   |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -2524.7568 | 3.9114    | 14.0068   | -1888.1270 | 277.1939  | 563.3948  |
| 102   | -1888.1270 | 277.1939  | 563.3948  | -1285.7737 | 255.7466  | 520.6371  |
| 103   | -1285.7737 | 255.7466  | 520.6371  | -1019.6882 | 35.8040   | -30.9074  |
| 104   | -1019.6882 | 35.8040   | -30.9074  | -939.0838  | 35.8098   | -31.0858  |
| 105   | -939.0838  | 35.8098   | -31.0858  | -858.4923  | 35.8041   | -31.3576  |
| 106   | -858.4923  | 35.8041   | -31.3576  | -777.8936  | 35.8024   | -31.7341  |
| 107   | -777.8936  | 35.8024   | -31.7341  | -697.3157  | 35.8081   | -31.9538  |
| 108   | -697.3157  | 35.8081   | -31.9538  | -616.7042  | 35.8226   | -32.0638  |
| 109   | -616.7042  | 35.8226   | -32.0638  | -536.0570  | 35.8243   | -32.2382  |
| 110   | -536.0570  | 35.8243   | -32.2382  | -455.4546  | 35.8184   | -32.4128  |
| 111   | -455.4546  | 35.8184   | -32.4128  | -520.2939  | -34.7226  | 31.8083   |
| 112   | -520.2939  | -34.7226  | 31.8083   | -598.3963  | -34.7055  | 31.6461   |
| 113   | -598.3963  | -34.7055  | 31.6461   | -676.5022  | -34.7044  | 31.4356   |
| 114   | -676.5022  | -34.7044  | 31.4356   | -754.5955  | -34.6978  | 31.0847   |
| 115   | -754.5955  | -34.6978  | 31.0847   | -832.6885  | -34.7038  | 30.8391   |
| 116   | -832.6885  | -34.7038  | 30.8391   | -910.7560  | -34.7166  | 30.7234   |
| 117   | -910.7560  | -34.7166  | 30.7234   | -988.8605  | -34.7155  | 30.5555   |
| 118   | -988.8605  | -34.7155  | 30.5555   | -1334.1423 | -250.4677 | -495.9049 |
| 119   | -1334.1423 | -250.4677 | -495.9049 | -1910.7786 | -260.4805 | -516.0144 |
| 120   | -1910.7786 | -260.4805 | -516.0144 | -2518.9639 | 3.6634    | 14.4731   |
| 121   | -2518.9639 | 3.6634    | 14.4731   | -1883.1333 | 276.5037  | 563.1382  |
| 122   | -1883.1333 | 276.5037  | 563.1382  | -1281.7523 | 254.9524  | 520.3484  |
| 123   | -1281.7523 | 254.9524  | 520.3484  | -1020.8480 | 36.1589   | -30.8852  |
| 124   | -1020.8480 | 36.1589   | -30.8852  | -939.5034  | 36.1634   | -31.0450  |
| 125   | -939.5034  | 36.1634   | -31.0450  | -858.1102  | 36.1661   | -31.4778  |
| 126   | -858.1102  | 36.1661   | -31.4778  | -776.7534  | 36.1484   | -31.7215  |
| 127   | -776.7534  | 36.1484   | -31.7215  | -695.5000  | 36.1289   | -31.9296  |
| 128   | -695.5000  | 36.1289   | -31.9296  | -614.1971  | 36.1254   | -32.1607  |
| 129   | -614.1971  | 36.1254   | -32.1607  | -532.8973  | 36.1345   | -32.2379  |
| 130   | -532.8973  | 36.1345   | -32.2379  | -451.5827  | 36.1447   | -32.4675  |
| 131   | -451.5827  | 36.1447   | -32.4675  | -370.1935  | 36.1490   | -32.6100  |
| 132   | -370.1935  | 36.1490   | -32.6100  | -288.8620  | 36.1645   | -32.6505  |
| 133   | -288.8620  | 36.1645   | -32.6505  | -207.4767  | 36.1714   | -32.7375  |
| 134   | -207.4767  | 36.1714   | -32.7375  | -126.0836  | 36.1601   | -32.7855  |
| 135   | -126.0836  | 36.1601   | -32.7855  | -44.7203   | 36.1594   | -32.8177  |
| 136   | -44.7203   | 36.1594   | -32.8177  | -241.9986  | -205.1685 | -414.9122 |
| 137   | -241.9986  | -205.1685 | -414.9122 | -718.9968  | -226.8354 | -458.0313 |
| 138   | -718.9968  | -226.8354 | -458.0313 | -1238.3944 | -237.1548 | -478.8425 |
| 139   | -1238.3944 | -237.1548 | -478.8425 | -1787.7784 | -247.1242 | -499.1782 |
| 140   | -1787.7784 | -247.1242 | -499.1782 | -2369.2686 | 10.9688   | -6.7597   |
| 141   | -2369.2686 | 10.9688   | -6.7597   | -1858.2861 | 276.7028  | 499.7129  |
| 142   | -1858.2861 | 276.7028  | 499.7129  | -1371.7177 | 265.0211  | 473.9854  |
| 143   | -1371.7177 | 265.0211  | 473.9854  | -1108.0869 | 36.2133   | -37.4118  |
| 144   | -1108.0869 | 36.2133   | -37.4118  | -1042.8589 | 36.2251   | -37.8571  |
| 145   | -1042.8589 | 36.2251   | -37.8571  | -977.6776  | 36.2070   | -38.0175  |
| 146   | -977.6776  | 36.2070   | -38.0175  | -912.5103  | 36.1769   | -38.2182  |
| 147   | -912.5103  | 36.1769   | -38.2182  | -847.3669  | 36.1745   | -38.3716  |
| 148   | -847.3669  | 36.1745   | -38.3716  | -782.2797  | 36.1824   | -38.6996  |
| 149   | -782.2797  | 36.1824   | -38.6996  | -717.1365  | 36.1718   | -38.8646  |
| 150   | -717.1365  | 36.1718   | -38.8646  | -652.0276  | 36.1718   | -39.0013  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 151   | -652.0276 | 36.1718   | -39.0013 | -586.8496 | 36.1831   | -39.2477  |
| 152   | -586.8496 | 36.1831   | -39.2477 | -521.6818 | 36.1810   | -39.3476  |
| 153   | -521.6818 | 36.1810   | -39.3476 | -456.5718 | 36.1942   | -39.3480  |
| 154   | -456.5718 | 36.1942   | -39.3480 | -391.3693 | 36.2130   | -39.4949  |
| 155   | -391.3693 | 36.2130   | -39.4949 | -326.1367 | 36.2229   | -39.7213  |
| 156   | -326.1367 | 36.2229   | -39.7213 | -260.8878 | 36.2335   | -39.7309  |
| 157   | -260.8878 | 36.2335   | -39.7309 | -195.6898 | 36.2338   | -39.7126  |
| 158   | -195.6898 | 36.2338   | -39.7126 | -130.4442 | 36.2346   | -39.7842  |
| 159   | -130.4442 | 36.2346   | -39.7842 | -65.2240  | 36.2295   | -39.8207  |
| 160   | -65.2240  | 36.2295   | -39.8207 | -0.0552   | -162.9061 | -575.9321 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | -0.0438    | 217.0918  | 590.5358 | 369.1651   | 205.1458  | 565.8649 |
| 2     | 369.1651   | 205.1458  | 565.8649 | 654.2319   | 181.7996  | 516.7583 |
| 3     | 654.2319   | 181.7996  | 516.7583 | 859.8687   | 159.2859  | 467.8457 |
| 4     | 859.8687   | 159.2859  | 467.8457 | 991.1453   | 137.7003  | 416.9522 |
| 5     | 991.1453   | 137.7003  | 416.9522 | 1155.5461  | 119.2878  | 371.1476 |
| 6     | 1155.5461  | 119.2878  | 371.1476 | 1214.6040  | 104.1909  | 332.9940 |
| 7     | 1214.6040  | 104.1909  | 332.9940 | 1240.5681  | 80.6508   | 275.3516 |
| 8     | 1240.5681  | 80.6508   | 275.3516 | 1229.5435  | 56.1916   | 217.2444 |
| 9     | 1229.5435  | 56.1916   | 217.2444 | 1178.3597  | 31.0261   | 159.0922 |
| 10    | 1178.3597  | 31.0261   | 159.0922 | 1153.2528  | 10.6939   | 111.4905 |
| 11    | 1153.2528  | 10.6939   | 111.4905 | 193.7354   | 9.7737    | 1.6486   |
| 12    | 193.7354   | 9.7737    | 1.6486   | 211.3301   | 9.7746    | 1.6941   |
| 13    | 211.3301   | 9.7746    | 1.6941   | 228.9254   | 9.7706    | 1.7430   |
| 14    | 228.9254   | 9.7706    | 1.7430   | 246.5110   | 9.7685    | 1.8352   |
| 15    | 246.5110   | 9.7685    | 1.8352   | 264.0966   | 9.7732    | 1.8313   |
| 16    | 264.0966   | 9.7732    | 1.8313   | 281.6862   | 9.7733    | 1.9454   |
| 17    | 281.6862   | 9.7733    | 1.9454   | 299.2679   | 9.7716    | 2.0540   |
| 18    | 299.2679   | 9.7716    | 2.0540   | 316.8594   | 9.7737    | 2.0582   |
| 19    | 316.8594   | 9.7737    | 2.0582   | 334.4526   | 9.7747    | 2.1846   |
| 20    | 334.4526   | 9.7747    | 2.1846   | -1267.5220 | 123.2622  | 388.0524 |
| 21    | -1267.5220 | 123.2622  | 388.0524 | -1713.5212 | 293.0597  | 608.8308 |
| 22    | -1713.5212 | 293.0597  | 608.8308 | -1161.3496 | 273.8280  | 565.6301 |
| 23    | -1161.3496 | 273.8280  | 565.6301 | -636.7430  | 253.1476  | 522.5522 |
| 24    | -636.7430  | 253.1476  | 522.5522 | -149.6065  | 223.6197  | 460.4503 |
| 25    | -149.6065  | 223.6197  | 460.4503 | 269.7504   | 195.7379  | 409.4243 |
| 26    | 269.7504   | 195.7379  | 409.4243 | 650.8812   | 170.7856  | 359.6733 |
| 27    | 650.8812   | 170.7856  | 359.6733 | 966.1517   | 144.8701  | 306.9288 |
| 28    | 966.1517   | 144.8701  | 306.9288 | 1209.0967  | 110.6474  | 232.7791 |
| 29    | 1209.0967  | 110.6474  | 232.7791 | 1339.7256  | 76.8676   | 164.5453 |
| 30    | 1339.7256  | 76.8676   | 164.5453 | 1411.9958  | 48.7190   | 105.9169 |
| 31    | 1411.9958  | 48.7190   | 105.9169 | -325.7919  | 31.1474   | -23.0898 |
| 32    | -325.7919  | 31.1474   | -23.0898 | -255.7075  | 31.1440   | -23.2553 |
| 33    | -255.7075  | 31.1440   | -23.2553 | -185.6572  | 31.1245   | -23.2538 |
| 34    | -185.6572  | 31.1245   | -23.2538 | -115.6567  | 31.1143   | -23.2955 |
| 35    | -115.6567  | 31.1143   | -23.2955 | -45.6369   | 31.1118   | -23.3505 |
| 36    | -45.6369   | 31.1118   | -23.3505 | 24.3442    | 31.1141   | -23.3682 |
| 37    | 24.3442    | 31.1141   | -23.3682 | 94.3829    | 31.1181   | -23.3283 |
| 38    | 94.3829    | 31.1181   | -23.3283 | 164.3816   | 31.1171   | -23.3095 |
| 39    | 164.3816   | 31.1171   | -23.3095 | 234.4125   | 31.1177   | -23.2576 |
| 40    | 234.4125   | 31.1177   | -23.2576 | -1230.5863 | 122.7602  | 384.6219 |
| 41    | -1230.5863 | 122.7602  | 384.6219 | -1847.8195 | 297.1663  | 605.5446 |
| 42    | -1847.8195 | 297.1663  | 605.5446 | -1260.9651 | 277.1107  | 562.7587 |
| 43    | -1260.9651 | 277.1107  | 562.7587 | -707.7281  | 255.7066  | 520.0664 |
| 44    | -707.7281  | 255.7066  | 520.0664 | -197.7332  | 225.5147  | 458.2015 |
| 45    | -197.7332  | 225.5147  | 458.2015 | 245.9458   | 196.8090  | 407.5881 |
| 46    | 245.9458   | 196.8090  | 407.5881 | 639.6593   | 171.3965  | 358.0051 |
| 47    | 639.6593   | 171.3965  | 358.0051 | 964.1308   | 145.1084  | 305.5475 |
| 48    | 964.1308   | 145.1084  | 305.5475 | 1213.2449  | 110.5314  | 231.7418 |
| 49    | 1213.2449  | 110.5314  | 231.7418 | 1349.3502  | 76.2726   | 163.3622 |
| 50    | 1349.3502  | 76.2726   | 163.3622 | 1422.7955  | 47.9649   | 105.1671 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 1422.7955  | 47.9649   | 105.1671 | -374.0398  | 35.6968   | -32.4753 |
| 52    | -374.0398  | 35.6968   | -32.4753 | -293.6809  | 35.7087   | -32.5705 |
| 53    | -293.6809  | 35.7087   | -32.5705 | -213.3099  | 35.7078   | -32.6908 |
| 54    | -213.3099  | 35.7078   | -32.6908 | -132.9327  | 35.7084   | -32.7478 |
| 55    | -132.9327  | 35.7084   | -32.7478 | -52.5830   | 35.7149   | -32.7684 |
| 56    | -52.5830   | 35.7149   | -32.7684 | 27.7866    | 35.7127   | -32.7588 |
| 57    | 27.7866    | 35.7127   | -32.7588 | 108.1875   | 35.7104   | -32.7543 |
| 58    | 108.1875   | 35.7104   | -32.7543 | 188.5431   | 35.7158   | -32.7217 |
| 59    | 188.5431   | 35.7158   | -32.7217 | 268.9343   | 35.7190   | -32.6052 |
| 60    | 268.9343   | 35.7190   | -32.6052 | -1227.3367 | 122.9062  | 384.6816 |
| 61    | -1227.3367 | 122.9062  | 384.6816 | -1852.7524 | 297.3300  | 605.7754 |
| 62    | -1852.7524 | 297.3300  | 605.7754 | -1264.7648 | 277.2486  | 562.7385 |
| 63    | -1264.7648 | 277.2486  | 562.7385 | -710.4313  | 255.8021  | 520.0443 |
| 64    | -710.4313  | 255.8021  | 520.0443 | -199.5054  | 225.5721  | 458.1818 |
| 65    | -199.5054  | 225.5721  | 458.1818 | 245.2899   | 196.8077  | 407.5320 |
| 66    | 245.2899   | 196.8077  | 407.5320 | 639.6033   | 171.3268  | 358.0464 |
| 67    | 639.6033   | 171.3268  | 358.0464 | 964.3658   | 144.9840  | 305.5469 |
| 68    | 964.3658   | 144.9840  | 305.5469 | 1213.6920  | 110.4136  | 231.5681 |
| 69    | 1213.6920  | 110.4136  | 231.5681 | 1349.8881  | 76.1814   | 163.3891 |
| 70    | 1349.8881  | 76.1814   | 163.3891 | 1423.2163  | 47.9049   | 105.4406 |
| 71    | 1423.2163  | 47.9049   | 105.4406 | -375.0681  | 35.8200   | -32.6060 |
| 72    | -375.0681  | 35.8200   | -32.6060 | -294.4709  | 35.8233   | -32.6532 |
| 73    | -294.4709  | 35.8233   | -32.6532 | -213.8127  | 35.8272   | -32.7645 |
| 74    | -213.8127  | 35.8272   | -32.7645 | -133.1821  | 35.8195   | -32.8292 |
| 75    | -133.1821  | 35.8195   | -32.8292 | -52.6348   | 35.8177   | -32.8359 |
| 76    | -52.6348   | 35.8177   | -32.8359 | 28.0086    | 35.8206   | -32.8392 |
| 77    | 28.0086    | 35.8206   | -32.8392 | 108.5902   | 35.8210   | -32.8481 |
| 78    | 108.5902   | 35.8210   | -32.8481 | 189.1984   | 35.8220   | -32.8051 |
| 79    | 189.1984   | 35.8220   | -32.8051 | 269.8221   | 35.8211   | -32.6609 |
| 80    | 269.8221   | 35.8211   | -32.6609 | -1227.0583 | 122.8729  | 384.4659 |
| 81    | -1227.0583 | 122.8729  | 384.4659 | -1853.1311 | 297.3163  | 605.6369 |
| 82    | -1853.1311 | 297.3163  | 605.6369 | -1264.8152 | 277.2296  | 562.9080 |
| 83    | -1264.8152 | 277.2296  | 562.9080 | -710.7406  | 255.7814  | 520.1413 |
| 84    | -710.7406  | 255.7814  | 520.1413 | -199.8456  | 225.5638  | 458.1738 |
| 85    | -199.8456  | 225.5638  | 458.1738 | 245.0945   | 196.8060  | 407.6324 |
| 86    | 245.0945   | 196.8060  | 407.6324 | 639.3300   | 171.3434  | 357.8990 |
| 87    | 639.3300   | 171.3434  | 357.8990 | 964.2391   | 145.0096  | 305.4343 |
| 88    | 964.2391   | 145.0096  | 305.4343 | 1213.5085  | 110.4247  | 231.9957 |
| 89    | 1213.5085  | 110.4247  | 231.9957 | 1349.7185  | 76.1686   | 163.7715 |
| 90    | 1349.7185  | 76.1686   | 163.7715 | 1423.0847  | 47.7980   | 105.1461 |
| 91    | 1423.0847  | 47.7980   | 105.1461 | -374.9834  | 35.8513   | -32.6391 |
| 92    | -374.9834  | 35.8513   | -32.6391 | -294.3337  | 35.8299   | -32.7616 |
| 93    | -294.3337  | 35.8299   | -32.7616 | -213.7311  | 35.8186   | -32.7779 |
| 94    | -213.7311  | 35.8186   | -32.7779 | -133.1192  | 35.8169   | -32.8695 |
| 95    | -133.1192  | 35.8169   | -32.8695 | -52.5151   | 35.8120   | -32.9023 |
| 96    | -52.5151   | 35.8120   | -32.9023 | 28.0479    | 35.8099   | -32.9067 |
| 97    | 28.0479    | 35.8099   | -32.9067 | 108.6393   | 35.8129   | -32.8762 |
| 98    | 108.6393   | 35.8129   | -32.8762 | 189.2537   | 35.8128   | -32.8605 |
| 99    | 189.2537   | 35.8128   | -32.8605 | 269.8264   | 35.8137   | -32.7365 |
| 100   | 269.8264   | 35.8137   | -32.7365 | -1227.0627 | 122.8673  | 384.3277 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1227.0627 | 122.8673  | 384.3277 | -1852.7388 | 297.2867  | 605.6238 |
| 102   | -1852.7388 | 297.2867  | 605.6238 | -1264.6350 | 277.1950  | 563.0072 |
| 103   | -1264.6350 | 277.1950  | 563.0072 | -710.6471  | 255.7466  | 520.1063 |
| 104   | -710.6471  | 255.7466  | 520.1063 | -199.6570  | 225.5235  | 458.2128 |
| 105   | -199.6570  | 225.5235  | 458.2128 | 245.1621   | 196.7592  | 407.6125 |
| 106   | 245.1621   | 196.7592  | 407.6125 | 639.3683   | 171.3125  | 358.0188 |
| 107   | 639.3683   | 171.3125  | 358.0188 | 963.9617   | 144.9503  | 305.5750 |
| 108   | 963.9617   | 144.9503  | 305.5750 | 1213.0928  | 110.3493  | 231.5880 |
| 109   | 1213.0928  | 110.3493  | 231.5880 | 1349.1859  | 76.1396   | 163.4420 |
| 110   | 1349.1859  | 76.1396   | 163.4420 | 1422.4926  | 47.8085   | 105.2455 |
| 111   | 1422.4926  | 47.8085   | 105.2455 | -374.8302  | 35.8407   | -32.5383 |
| 112   | -374.8302  | 35.8407   | -32.5383 | -294.1473  | 35.8605   | -32.6553 |
| 113   | -294.1473  | 35.8605   | -32.6553 | -213.4584  | 35.8638   | -32.7232 |
| 114   | -213.4584  | 35.8638   | -32.7232 | -132.7666  | 35.8673   | -32.8177 |
| 115   | -132.7666  | 35.8673   | -32.8177 | -52.0388   | 35.8682   | -32.8485 |
| 116   | -52.0388   | 35.8682   | -32.8485 | 28.6521    | 35.8609   | -32.8553 |
| 117   | 28.6521    | 35.8609   | -32.8553 | 109.3172   | 35.8513   | -32.8361 |
| 118   | 109.3172   | 35.8513   | -32.8361 | 190.0117   | 35.8531   | -32.7565 |
| 119   | 190.0117   | 35.8531   | -32.7565 | 270.7091   | 35.8562   | -32.6968 |
| 120   | 270.7091   | 35.8562   | -32.6968 | -1223.3335 | 122.7343  | 384.1687 |
| 121   | -1223.3335 | 122.7343  | 384.1687 | -1848.5278 | 296.6998  | 605.3753 |
| 122   | -1848.5278 | 296.6998  | 605.3753 | -1261.1777 | 276.5037  | 562.7363 |
| 123   | -1261.1777 | 276.5037  | 562.7363 | -708.3082  | 254.9514  | 519.9553 |
| 124   | -708.3082  | 254.9514  | 519.9553 | -199.1343  | 224.6375  | 458.1539 |
| 125   | -199.1343  | 224.6375  | 458.1539 | 243.4917   | 195.7689  | 407.4777 |
| 126   | 243.4917   | 195.7689  | 407.4777 | 635.3650   | 170.2776  | 357.7448 |
| 127   | 635.3650   | 170.2776  | 357.7448 | 957.2747   | 143.8980  | 305.3478 |
| 128   | 957.2747   | 143.8980  | 305.3478 | 1203.8457  | 109.2742  | 231.5090 |
| 129   | 1203.8457  | 109.2742  | 231.5090 | 1337.6420  | 75.0512   | 163.0833 |
| 130   | 1337.6420  | 75.0512   | 163.0833 | 692.9207   | 46.8168   | 244.3416 |
| 131   | 692.9207   | 46.8168   | 244.3416 | -370.1935  | 36.1490   | -32.6100 |
| 132   | -370.1935  | 36.1490   | -32.6100 | -288.8620  | 36.1645   | -32.6505 |
| 133   | -288.8620  | 36.1645   | -32.6505 | -207.4767  | 36.1714   | -32.7375 |
| 134   | -207.4767  | 36.1714   | -32.7375 | -126.0836  | 36.1601   | -32.7855 |
| 135   | -126.0836  | 36.1601   | -32.7855 | -44.7203   | 36.1594   | -32.8177 |
| 136   | -44.7203   | 36.1594   | -32.8177 | 36.6448    | 36.1655   | -32.8267 |
| 137   | 36.6448    | 36.1655   | -32.8267 | 118.0174   | 36.1644   | -32.8101 |
| 138   | 118.0174   | 36.1644   | -32.8101 | 199.4084   | 36.1599   | -32.7575 |
| 139   | 199.4084   | 36.1599   | -32.7575 | 280.7621   | 36.1601   | -32.6805 |
| 140   | 280.7621   | 36.1601   | -32.6805 | -2305.4307 | 33.2338   | 42.3559  |
| 141   | -2305.4307 | 33.2338   | 42.3559  | -1827.9655 | 298.6218  | 550.7805 |
| 142   | -1827.9655 | 298.6218  | 550.7805 | -1360.1532 | 276.7028  | 499.6066 |
| 143   | -1360.1532 | 276.7028  | 499.6066 | -912.8860  | 252.8705  | 448.2808 |
| 144   | -912.8860  | 252.8705  | 448.2808 | -496.6697  | 227.1357  | 396.7241 |
| 145   | -496.6697  | 227.1357  | 396.7241 | -111.7399  | 213.5798  | 370.3317 |
| 146   | -111.7399  | 213.5798  | 370.3317 | 224.1223   | 184.5624  | 305.6054 |
| 147   | 224.1223   | 184.5624  | 305.6054 | 523.3433   | 154.5868  | 230.6357 |
| 148   | 523.3433   | 154.5868  | 230.6357 | 774.4214   | 124.5755  | 155.8286 |
| 149   | 774.4214   | 124.5755  | 155.8286 | 977.6228   | 94.5699   | 80.9458  |
| 150   | 977.6228   | 94.5699   | 80.9458  | 1132.8469  | 79.5706   | 43.6450  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 151   | 1132.8469 | 79.5706   | 43.6450  | 1237.0902 | 49.5768   | -30.9444 |
| 152   | 1237.0902 | 49.5768   | -30.9444 | -521.6818 | 36.1810   | -39.3476 |
| 153   | -521.6818 | 36.1810   | -39.3476 | -456.5718 | 36.1942   | -39.3480 |
| 154   | -456.5718 | 36.1942   | -39.3480 | -391.3693 | 36.2130   | -39.4949 |
| 155   | -391.3693 | 36.2130   | -39.4949 | -326.1367 | 36.2229   | -39.7213 |
| 156   | -326.1367 | 36.2229   | -39.7213 | -260.8878 | 36.2335   | -39.7309 |
| 157   | -260.8878 | 36.2335   | -39.7309 | -195.6898 | 36.2338   | -39.7126 |
| 158   | -195.6898 | 36.2338   | -39.7126 | -130.4442 | 36.2346   | -39.7842 |
| 159   | -130.4442 | 36.2346   | -39.7842 | -65.2240  | 36.2295   | -39.8207 |
| 160   | -65.2240  | 36.2295   | -39.8207 | -0.0043   | 36.2229   | -39.8337 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0037    | -35.2453  | 39.0893   | -63.4311   | -35.2435  | 39.0887   |
| 2     | -63.4311   | -35.2435  | 39.0887   | -126.8611  | -35.2432  | 39.0592   |
| 3     | -126.8611  | -35.2432  | 39.0592   | -190.3335  | -35.2365  | 38.9972   |
| 4     | -190.3335  | -35.2365  | 38.9972   | -253.7426  | -35.2292  | 38.9657   |
| 5     | -253.7426  | -35.2292  | 38.9657   | -317.1551  | -35.2377  | 38.8887   |
| 6     | -317.1551  | -35.2377  | 38.8887   | -380.6121  | -35.2400  | 38.8187   |
| 7     | -380.6121  | -35.2400  | 38.8187   | 663.6344   | -40.1846  | -99.1055  |
| 8     | 663.6344   | -40.1846  | -99.1055  | 799.3610   | -53.8686  | -128.4332 |
| 9     | 799.3610   | -53.8686  | -128.4332 | 915.4379   | -69.4660  | -161.5269 |
| 10    | 915.4379   | -69.4660  | -161.5269 | 958.2476   | -81.8047  | -86.6845  |
| 11    | 958.2476   | -81.8047  | -86.6845  | 806.9285   | -103.2142 | -134.9753 |
| 12    | 806.9285   | -103.2142 | -134.9753 | 629.4332   | -131.3005 | -194.1978 |
| 13    | 629.4332   | -131.3005 | -194.1978 | 403.9307   | -159.6805 | -253.6953 |
| 14    | 403.9307   | -159.6805 | -253.6953 | 127.9223   | -187.8044 | -308.5294 |
| 15    | 127.9223   | -187.8044 | -308.5294 | -199.2088  | -206.5639 | -341.2685 |
| 16    | -199.2088  | -206.5639 | -341.2685 | -582.4221  | -226.4957 | -384.9245 |
| 17    | -582.4221  | -226.4957 | -384.9245 | -986.9266  | -249.9221 | -432.6490 |
| 18    | -986.9266  | -249.9221 | -432.6490 | -1414.3545 | -271.4439 | -480.3559 |
| 19    | -1414.3545 | -271.4439 | -480.3559 | -1853.4243 | -291.0538 | -528.4579 |
| 20    | -1853.4243 | -291.0538 | -528.4579 | -1061.2048 | -122.1998 | -317.3873 |
| 21    | -1061.2048 | -122.1998 | -317.3873 | 272.9517   | -35.1525  | 32.1864   |
| 22    | 272.9517   | -35.1525  | 32.1864   | 193.8333   | -35.1513  | 32.2937   |
| 23    | 193.8333   | -35.1513  | 32.2937   | 114.7301   | -35.1521  | 32.3531   |
| 24    | 114.7301   | -35.1521  | 32.3531   | 35.6355    | -35.1493  | 32.3533   |
| 25    | 35.6355    | -35.1493  | 32.3533   | -43.4538   | -35.1473  | 32.3401   |
| 26    | -43.4538   | -35.1473  | 32.3401   | -122.5598  | -35.1477  | 32.2902   |
| 27    | -122.5598  | -35.1477  | 32.2902   | -201.6425  | -35.1498  | 32.2537   |
| 28    | -201.6425  | -35.1498  | 32.2537   | -280.7280  | -35.1538  | 32.2056   |
| 29    | -280.7280  | -35.1538  | 32.2056   | 597.2963   | -35.5214  | -209.6888 |
| 30    | 597.2963   | -35.5214  | -209.6888 | 1384.9500  | -50.4743  | -99.4949  |
| 31    | 1384.9500  | -50.4743  | -99.4949  | 1293.4547  | -78.2906  | -157.7814 |
| 32    | 1293.4547  | -78.2906  | -157.7814 | 1137.3347  | -111.4494 | -222.4258 |
| 33    | 1137.3347  | -111.4494 | -222.4258 | 878.4260   | -145.0570 | -293.8792 |
| 34    | 878.4260   | -145.0570 | -293.8792 | 549.3708   | -170.2953 | -343.4844 |
| 35    | 549.3708   | -170.2953 | -343.4844 | 156.6777   | -194.4998 | -390.0818 |
| 36    | 156.6777   | -194.4998 | -390.0818 | -278.4659  | -221.1559 | -436.2510 |
| 37    | -278.4659  | -221.1559 | -436.2510 | -772.6347  | -249.8524 | -495.3907 |
| 38    | -772.6347  | -249.8524 | -495.3907 | -1302.5815 | -269.6728 | -534.9587 |
| 39    | -1302.5815 | -269.6728 | -534.9587 | -1859.3484 | -288.0671 | -574.6580 |
| 40    | -1859.3484 | -288.0671 | -574.6580 | -1257.2162 | -124.8790 | -389.7603 |
| 41    | -1257.2162 | -124.8790 | -389.7603 | 263.4442   | -34.8873  | 32.2012   |
| 42    | 263.4442   | -34.8873  | 32.2012   | 184.9370   | -34.8879  | 32.2820   |
| 43    | 184.9370   | -34.8879  | 32.2820   | 106.4073   | -34.8885  | 32.3290   |
| 44    | 106.4073   | -34.8885  | 32.3290   | 27.9144    | -34.8850  | 32.3406   |
| 45    | 27.9144    | -34.8850  | 32.3406   | -50.5724   | -34.8884  | 32.3284   |
| 46    | -50.5724   | -34.8884  | 32.3284   | -129.0909  | -34.8965  | 32.2882   |
| 47    | -129.0909  | -34.8965  | 32.2882   | -207.6161  | -34.9007  | 32.2458   |
| 48    | -207.6161  | -34.9007  | 32.2458   | -286.1501  | -34.8955  | 32.1738   |
| 49    | -286.1501  | -34.8955  | 32.1738   | -364.6610  | -34.8815  | 32.1231   |
| 50    | -364.6610  | -34.8815  | 32.1231   | 1399.3591  | -51.5077  | -100.0035 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 1399.3591  | -51.5077  | -100.0035 | 1305.5326  | -79.3732  | -158.2183 |
| 52    | 1305.5326  | -79.3732  | -158.2183 | 1146.7185  | -112.4913 | -223.1465 |
| 53    | 1146.7185  | -112.4913 | -223.1465 | 885.2260   | -146.1279 | -294.0797 |
| 54    | 885.2260   | -146.1279 | -294.0797 | 553.4482   | -171.2957 | -343.5999 |
| 55    | 553.4482   | -171.2957 | -343.5999 | 158.1979   | -195.4473 | -390.3022 |
| 56    | 158.1979   | -195.4473 | -390.3022 | -278.8961  | -221.9638 | -436.6360 |
| 57    | -278.8961  | -221.9638 | -436.6360 | -774.6885  | -250.5430 | -495.4972 |
| 58    | -774.6885  | -250.5430 | -495.4972 | -1305.7379 | -270.2681 | -535.0894 |
| 59    | -1305.7379 | -270.2681 | -535.0894 | -1862.8303 | -288.5540 | -575.1513 |
| 60    | -1862.8303 | -288.5540 | -575.1513 | -1261.1707 | -125.0545 | -390.3100 |
| 61    | -1261.1707 | -125.0545 | -390.3100 | 262.4510   | -34.8585  | 32.1153   |
| 62    | 262.4510   | -34.8585  | 32.1153   | 184.0055   | -34.8585  | 32.2276   |
| 63    | 184.0055   | -34.8585  | 32.2276   | 105.5528   | -34.8546  | 32.2765   |
| 64    | 105.5528   | -34.8546  | 32.2765   | 27.1379    | -34.8461  | 32.2909   |
| 65    | 27.1379    | -34.8461  | 32.2909   | -51.2513   | -34.8350  | 32.2814   |
| 66    | -51.2513   | -34.8350  | 32.2814   | -129.6413  | -34.8324  | 32.2276   |
| 67    | -129.6413  | -34.8324  | 32.2276   | -208.0416  | -34.8372  | 32.1855   |
| 68    | -208.0416  | -34.8372  | 32.1855   | -286.4193  | -34.8419  | 32.1510   |
| 69    | -286.4193  | -34.8419  | 32.1510   | -364.7835  | -34.8383  | 32.0563   |
| 70    | -364.7835  | -34.8383  | 32.0563   | 1400.1858  | -51.6524  | -99.7588  |
| 71    | 1400.1858  | -51.6524  | -99.7588  | 1306.1670  | -79.4451  | -157.9767 |
| 72    | 1306.1670  | -79.4451  | -157.9767 | 1147.1421  | -112.5508 | -223.0927 |
| 73    | 1147.1421  | -112.5508 | -223.0927 | 885.3607   | -146.1685 | -294.0722 |
| 74    | 885.3607   | -146.1685 | -294.0722 | 553.4077   | -171.3506 | -343.5604 |
| 75    | 553.4077   | -171.3506 | -343.5604 | 158.2657   | -195.4914 | -390.3307 |
| 76    | 158.2657   | -195.4914 | -390.3307 | -279.0805  | -222.0037 | -436.6173 |
| 77    | -279.0805  | -222.0037 | -436.6173 | -774.6409  | -250.5743 | -495.3774 |
| 78    | -774.6409  | -250.5743 | -495.3774 | -1305.8309 | -270.2879 | -535.0896 |
| 79    | -1305.8309 | -270.2879 | -535.0896 | -1862.7758 | -288.5671 | -575.3349 |
| 80    | -1862.7758 | -288.5671 | -575.3349 | -1261.3762 | -125.0296 | -390.3727 |
| 81    | -1261.3762 | -125.0296 | -390.3727 | 262.3774   | -34.8377  | 32.1384   |
| 82    | 262.3774   | -34.8377  | 32.1384   | 183.9657   | -34.8421  | 32.2099   |
| 83    | 183.9657   | -34.8421  | 32.2099   | 105.5630   | -34.8422  | 32.2720   |
| 84    | 105.5630   | -34.8422  | 32.2720   | 27.1857    | -34.8390  | 32.2996   |
| 85    | 27.1857    | -34.8390  | 32.2996   | -51.2251   | -34.8357  | 32.2717   |
| 86    | -51.2251   | -34.8357  | 32.2717   | -129.5890  | -34.8400  | 32.2661   |
| 87    | -129.5890  | -34.8400  | 32.2661   | -207.9872  | -34.8424  | 32.2175   |
| 88    | -207.9872  | -34.8424  | 32.2175   | -286.4005  | -34.8345  | 32.0573   |
| 89    | -286.4005  | -34.8345  | 32.0573   | -364.7657  | -34.8190  | 31.9665   |
| 90    | -364.7657  | -34.8190  | 31.9665   | 1400.0232  | -51.6711  | -99.9822  |
| 91    | 1400.0232  | -51.6711  | -99.9822  | 1305.8604  | -79.5290  | -158.0273 |
| 92    | 1305.8604  | -79.5290  | -158.0273 | 1146.7461  | -112.5955 | -222.8492 |
| 93    | 1146.7461  | -112.5955 | -222.8492 | 885.0579   | -146.1801 | -294.2403 |
| 94    | 885.0579   | -146.1801 | -294.2403 | 553.3628   | -171.3236 | -343.6305 |
| 95    | 553.3628   | -171.3236 | -343.6305 | 158.0710   | -195.4608 | -390.2992 |
| 96    | 158.0710   | -195.4608 | -390.2992 | -278.9497  | -221.9775 | -436.5748 |
| 97    | -278.9497  | -221.9775 | -436.5748 | -774.4625  | -250.5507 | -495.5662 |
| 98    | -774.4625  | -250.5507 | -495.5662 | -1305.7515 | -270.2645 | -535.0596 |
| 99    | -1305.7515 | -270.2645 | -535.0596 | -1862.5221 | -288.5468 | -575.2020 |
| 100   | -1862.5221 | -288.5468 | -575.2020 | -1261.2892 | -125.0192 | -390.4600 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1261.2892 | -125.0192 | -390.4600 | 261.7504   | -34.7557  | 32.1939   |
| 102   | 261.7504   | -34.7557  | 32.1939   | 183.5352   | -34.7579  | 32.2507   |
| 103   | 183.5352   | -34.7579  | 32.2507   | 105.3185   | -34.7583  | 32.3279   |
| 104   | 105.3185   | -34.7583  | 32.3279   | 27.0984    | -34.7556  | 32.3435   |
| 105   | 27.0984    | -34.7556  | 32.3435   | -51.1273   | -34.7556  | 32.3258   |
| 106   | -51.1273   | -34.7556  | 32.3258   | -129.3580  | -34.7537  | 32.2927   |
| 107   | -129.3580  | -34.7537  | 32.2927   | -207.5439  | -34.7464  | 32.2443   |
| 108   | -207.5439  | -34.7464  | 32.2443   | -285.7120  | -34.7424  | 32.2141   |
| 109   | -285.7120  | -34.7424  | 32.2141   | -363.8980  | -34.7484  | 32.0925   |
| 110   | -363.8980  | -34.7484  | 32.0925   | 1399.7900  | -51.6625  | -99.9049  |
| 111   | 1399.7900  | -51.6625  | -99.9049  | 1305.9558  | -79.5152  | -158.1436 |
| 112   | 1305.9558  | -79.5152  | -158.1436 | 1147.2644  | -112.6098 | -222.9952 |
| 113   | 1147.2644  | -112.6098 | -222.9952 | 885.8842   | -146.1971 | -294.1681 |
| 114   | 885.8842   | -146.1971 | -294.1681 | 554.6053   | -171.3642 | -343.5406 |
| 115   | 554.6053   | -171.3642 | -343.5406 | 159.8172   | -195.4830 | -390.2059 |
| 116   | 159.8172   | -195.4830 | -390.2059 | -276.2516  | -221.9361 | -436.4227 |
| 117   | -276.2516  | -221.9361 | -436.4227 | -770.7758  | -250.4669 | -495.3544 |
| 118   | -770.7758  | -250.4669 | -495.3544 | -1300.6462 | -270.1442 | -535.2912 |
| 119   | -1300.6462 | -270.1442 | -535.2912 | -1856.4724 | -288.3915 | -574.9373 |
| 120   | -1856.4724 | -288.3915 | -574.9373 | -1265.0588 | -124.9231 | -390.3065 |
| 121   | -1265.0588 | -124.9231 | -390.3065 | 328.7894   | -10.0506  | -1.8724   |
| 122   | 328.7894   | -10.0506  | -1.8724   | 306.1791   | -10.0513  | -1.7752   |
| 123   | 306.1791   | -10.0513  | -1.7752   | 283.5679   | -10.0520  | -1.6781   |
| 124   | 283.5679   | -10.0520  | -1.6781   | 260.9528   | -10.0514  | -1.6330   |
| 125   | 260.9528   | -10.0514  | -1.6330   | 238.3344   | -10.0485  | -1.5143   |
| 126   | 238.3344   | -10.0485  | -1.5143   | 215.7253   | -10.0469  | -1.4461   |
| 127   | 215.7253   | -10.0469  | -1.4461   | 193.1362   | -10.0443  | -1.3885   |
| 128   | 193.1362   | -10.0443  | -1.3885   | 170.5413   | -10.0440  | -1.3237   |
| 129   | 170.5413   | -10.0440  | -1.3237   | 468.1965   | -27.1730  | -214.8449 |
| 130   | 468.1965   | -27.1730  | -214.8449 | 1392.2173  | -52.2403  | -100.5593 |
| 131   | 1392.2173  | -52.2403  | -100.5593 | 1300.6517  | -79.8206  | -158.9621 |
| 132   | 1300.6517  | -79.8206  | -158.9621 | 1149.7072  | -112.4231 | -224.4105 |
| 133   | 1149.7072  | -112.4231 | -224.4105 | 896.6843   | -145.6289 | -295.7409 |
| 134   | 896.6843   | -145.6289 | -295.7409 | 576.9495   | -170.2831 | -345.5292 |
| 135   | 576.9495   | -170.2831 | -345.5292 | 197.9828   | -193.8533 | -392.4949 |
| 136   | 197.9828   | -193.8533 | -392.4949 | -208.7420  | -219.3296 | -439.1473 |
| 137   | -208.7420  | -219.3296 | -439.1473 | -676.0105  | -247.1320 | -498.4005 |
| 138   | -676.0105  | -247.1320 | -498.4005 | -1172.6570 | -265.9624 | -538.4280 |
| 139   | -1172.6570 | -265.9624 | -538.4280 | -1688.1907 | -283.2792 | -578.4760 |
| 140   | -1688.1907 | -283.2792 | -578.4760 | -1303.6443 | -125.4437 | -393.9310 |
| 141   | -1303.6443 | -125.4437 | -393.9310 | 344.0376   | -10.0600  | -2.0921   |
| 142   | 344.0376   | -10.0600  | -2.0921   | 325.9301   | -10.0616  | -2.0872   |
| 143   | 325.9301   | -10.0616  | -2.0872   | 307.8227   | -10.0610  | -2.0262   |
| 144   | 307.8227   | -10.0610  | -2.0262   | 289.7101   | -10.0620  | -1.9060   |
| 145   | 289.7101   | -10.0620  | -1.9060   | 271.6018   | -10.0640  | -1.8593   |
| 146   | 271.6018   | -10.0640  | -1.8593   | 253.4896   | -10.0603  | -1.8011   |
| 147   | 253.4896   | -10.0603  | -1.8011   | 235.3953   | -10.0504  | -1.7603   |
| 148   | 235.3953   | -10.0504  | -1.7603   | 217.3217   | -10.0493  | -1.6708   |
| 149   | 217.3217   | -10.0493  | -1.6708   | 199.2176   | -10.0515  | -1.6234   |
| 150   | 199.2176   | -10.0515  | -1.6234   | 181.1388   | -10.0538  | -1.5860   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 181.1388 | -10.0538  | -1.5860   | 365.7914 | -22.6066  | -241.5882 |
| 152   | 365.7914 | -22.6066  | -241.5882 | 532.7279 | -37.0162  | -281.9324 |
| 153   | 532.7279 | -37.0162  | -281.9324 | 670.7902 | -53.2696  | -326.0031 |
| 154   | 670.7902 | -53.2696  | -326.0031 | 770.6218 | -71.3936  | -373.4540 |
| 155   | 770.6218 | -71.3936  | -373.4540 | 730.2091 | -81.1741  | -398.1732 |
| 156   | 730.2091 | -81.1741  | -398.1732 | 734.9380 | -102.1596 | -448.7567 |
| 157   | 734.9380 | -102.1596 | -448.7567 | 674.6247 | -125.0252 | -499.8096 |
| 158   | 674.6247 | -125.0252 | -499.8096 | 538.9282 | -149.8198 | -550.6345 |
| 159   | 538.9282 | -149.8198 | -550.6345 | 317.5173 | -176.4709 | -602.3461 |
| 160   | 317.5173 | -176.4709 | -602.3461 | -0.0447  | -190.4884 | -629.4503 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2  | Torsor2  |
|-------|------------|-----------|----------|------------|------------|----------|
| 1     | -0.0454    | 186.1173  | 616.1953 | 310.0340   | 172.2904   | 589.1664 |
| 2     | 310.0340   | 172.2904  | 589.1664 | 525.4484   | 146.0207   | 537.8008 |
| 3     | 525.4484   | 146.0207  | 537.8008 | 656.4987   | 121.6313   | 489.7980 |
| 4     | 656.4987   | 121.6313  | 489.7980 | 713.4500   | 99.1416    | 442.4818 |
| 5     | 713.4500   | 99.1416   | 442.4818 | 797.0518   | 81.1028    | 400.1918 |
| 6     | 797.0518   | 81.1028   | 400.1918 | 744.6987   | 69.0135    | 371.8647 |
| 7     | 744.6987   | 69.0135   | 371.8647 | 645.5278   | 51.2670    | 325.2736 |
| 8     | 645.5278   | 51.2670   | 325.2736 | 509.3552   | 35.3937    | 281.2681 |
| 9     | 509.3552   | 35.3937   | 281.2681 | 345.5175   | 21.3449    | 240.9241 |
| 10    | 345.5175   | 21.3449   | 240.9241 | 162.8303   | 9.0728     | 204.1548 |
| 11    | 162.8303   | 9.0728    | 204.1548 | 70.2968    | 3.5776     | 187.0847 |
| 12    | 70.2968    | 3.5776    | 187.0847 | -133.8249  | -6.1685    | 155.6006 |
| 13    | -133.8249  | -6.1685   | 155.6006 | -335.6046  | -14.3102   | 127.6893 |
| 14    | -335.6046  | -14.3102  | 127.6893 | -528.6014  | -20.9321   | 103.3412 |
| 15    | -528.6014  | -20.9321  | 103.3412 | -707.2654  | -26.1555   | 82.9294  |
| 16    | -707.2654  | -26.1555  | 82.9294  | -815.2670  | -28.2747   | 73.8428  |
| 17    | -815.2670  | -28.2747  | 73.8428  | -967.2642  | -31.5662   | 58.7757  |
| 18    | -967.2642  | -31.5662  | 58.7757  | -1094.4702 | -33.7497   | 47.8322  |
| 19    | -1094.4702 | -33.7497  | 47.8322  | -1194.9786 | -34.9133   | 40.0648  |
| 20    | -1194.9786 | -34.9133  | 40.0648  | -1267.5220 | -1267.5220 | 388.0524 |
| 21    | -1267.5220 | 123.2622  | 388.0524 | -676.6465  | 254.4430   | 683.3344 |
| 22    | -676.6465  | 254.4430  | 683.3344 | -180.8318  | 227.8775   | 629.1343 |
| 23    | -180.8318  | 227.8775  | 629.1343 | 221.8380   | 202.1386   | 577.9052 |
| 24    | 221.8380   | 202.1386  | 577.9052 | 534.5359   | 169.8994   | 510.9749 |
| 25    | 534.5359   | 169.8994  | 510.9749 | 683.8577   | 142.3575   | 463.2635 |
| 26    | 683.8577   | 142.3575  | 463.2635 | 816.5811   | 120.5331   | 422.5912 |
| 27    | 816.5811   | 120.5331  | 422.5912 | 877.5812   | 100.0299   | 383.6380 |
| 28    | 877.5812   | 100.0299  | 383.6380 | 874.3469   | 73.4268    | 325.8654 |
| 29    | 874.3469   | 73.4268   | 325.8654 | 704.8251   | 55.0014    | 286.7439 |
| 30    | 704.8251   | 55.0014   | 286.7439 | 594.1538   | 39.5954    | 249.0045 |
| 31    | 594.1538   | 39.5954   | 249.0045 | 446.7065   | 25.7246    | 214.3737 |
| 32    | 446.7065   | 25.7246   | 214.3737 | 166.6907   | 7.7782     | 167.8445 |
| 33    | 166.6907   | 7.7782    | 167.8445 | -23.6739   | -2.2987    | 140.4655 |
| 34    | -23.6739   | -2.2987   | 140.4655 | -222.8322  | -10.8948   | 116.0527 |
| 35    | -222.8322  | -10.8948  | 116.0527 | -423.0001  | -18.0551   | 94.4408  |
| 36    | -423.0001  | -18.0551  | 94.4408  | -680.3127  | -26.2386   | 68.0416  |
| 37    | -680.3127  | -26.2386  | 68.0416  | -849.4138  | -30.0953   | 54.1661  |
| 38    | -849.4138  | -30.0953  | 54.1661  | -999.8148  | -32.7979   | 43.4237  |
| 39    | -999.8148  | -32.7979  | 43.4237  | -1127.6106 | -34.4463   | 35.7458  |
| 40    | -1127.6106 | -34.4463  | 35.7458  | -1230.5863 | 122.7602   | 384.6219 |
| 41    | -1230.5863 | 122.7602  | 384.6219 | -642.5329  | 253.4416   | 682.9135 |
| 42    | -642.5329  | 253.4416  | 682.9135 | -150.0585  | 226.9142   | 628.7560 |
| 43    | -150.0585  | 226.9142  | 628.7560 | 249.0779   | 201.2442   | 577.6111 |
| 44    | 249.0779   | 201.2442  | 577.6111 | 557.8323   | 169.0557   | 510.7477 |
| 45    | 557.8323   | 169.0557  | 510.7477 | 702.2926   | 141.6331   | 463.0549 |
| 46    | 702.2926   | 141.6331  | 463.0549 | 831.5090   | 119.9124   | 422.2779 |
| 47    | 831.5090   | 119.9124  | 422.2779 | 889.2981   | 99.5106    | 383.3835 |
| 48    | 889.2981   | 99.5106   | 383.3835 | 883.0939   | 72.9707    | 325.7475 |
| 49    | 883.0939   | 72.9707   | 325.7475 | 710.3588   | 54.6740    | 286.4066 |
| 50    | 710.3588   | 54.6740   | 286.4066 | 597.6265   | 39.3633    | 248.8603 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 51    | 597.6265   | 39.3633   | 248.8603 | 448.5864   | 25.5708   | 214.2193 |
| 52    | 448.5864   | 25.5708   | 214.2193 | 167.0851   | 7.7418    | 167.7216 |
| 53    | 167.0851   | 7.7418    | 167.7216 | -23.9694   | -2.2568   | 140.3900 |
| 54    | -23.9694   | -2.2568   | 140.3900 | -223.3497  | -10.7798  | 115.9474 |
| 55    | -223.3497  | -10.7798  | 115.9474 | -423.3346  | -17.8625  | 94.5034  |
| 56    | -423.3346  | -17.8625  | 94.5034  | -680.1957  | -25.9795  | 68.0365  |
| 57    | -680.1957  | -25.9795  | 68.0365  | -848.6705  | -29.8074  | 54.1988  |
| 58    | -848.6705  | -29.8074  | 54.1988  | -998.2717  | -32.4813  | 43.6121  |
| 59    | -998.2717  | -32.4813  | 43.6121  | -1125.2493 | -34.1098  | 35.6214  |
| 60    | -1125.2493 | -34.1098  | 35.6214  | -1227.3367 | 122.9062  | 384.6816 |
| 61    | -1227.3367 | 122.9062  | 384.6816 | -639.3068  | 253.3873  | 683.0665 |
| 62    | -639.3068  | 253.3873  | 683.0665 | -147.1860  | 226.8679  | 628.8204 |
| 63    | -147.1860  | 226.8679  | 628.8204 | 251.6405   | 201.1938  | 577.6628 |
| 64    | 251.6405   | 201.1938  | 577.6628 | 560.0513   | 168.9893  | 510.7785 |
| 65    | 560.0513   | 168.9893  | 510.7785 | 704.0818   | 141.5526  | 462.9598 |
| 66    | 704.0818   | 141.5526  | 462.9598 | 832.9477   | 119.7896  | 422.2564 |
| 67    | 832.9477   | 119.7896  | 422.2564 | 890.3278   | 99.3934   | 383.3257 |
| 68    | 890.3278   | 99.3934   | 383.3257 | 883.8657   | 72.8787   | 325.5668 |
| 69    | 883.8657   | 72.8787   | 325.5668 | 710.7604   | 54.6324   | 286.3777 |
| 70    | 710.7604   | 54.6324   | 286.3777 | 597.8346   | 39.3365   | 248.9307 |
| 71    | 597.8346   | 39.3365   | 248.9307 | 448.7313   | 25.5630   | 214.2557 |
| 72    | 448.7313   | 25.5630   | 214.2557 | 167.2318   | 7.7476    | 167.6790 |
| 73    | 167.2318   | 7.7476    | 167.6790 | -23.7887   | -2.2470   | 140.3439 |
| 74    | -23.7887   | -2.2470   | 140.3439 | -223.1194  | -10.7699  | 115.9092 |
| 75    | -223.1194  | -10.7699  | 115.9092 | -423.0496  | -17.8568  | 94.4426  |
| 76    | -423.0496  | -17.8568  | 94.4426  | -679.9144  | -25.9627  | 67.8839  |
| 77    | -679.9144  | -25.9627  | 67.8839  | -848.2886  | -29.7950  | 54.1794  |
| 78    | -848.2886  | -29.7950  | 54.1794  | -997.8817  | -32.4705  | 43.5458  |
| 79    | -997.8817  | -32.4705  | 43.5458  | -1124.8523 | -34.1053  | 35.4002  |
| 80    | -1124.8523 | -34.1053  | 35.4002  | -1227.0583 | 122.8729  | 384.4659 |
| 81    | -1227.0583 | 122.8729  | 384.4659 | -639.2124  | 253.3338  | 682.9552 |
| 82    | -639.2124  | 253.3338  | 682.9552 | -146.9377  | 226.8131  | 628.8174 |
| 83    | -146.9377  | 226.8131  | 628.8174 | 251.5665   | 201.1445  | 577.7285 |
| 84    | 251.5665   | 201.1445  | 577.7285 | 559.8822   | 168.9609  | 510.8024 |
| 85    | 559.8822   | 168.9609  | 510.8024 | 703.9800   | 141.5741  | 463.1210 |
| 86    | 703.9800   | 141.5741  | 463.1210 | 832.8348   | 119.8071  | 422.1533 |
| 87    | 832.8348   | 119.8071  | 422.1533 | 890.3929   | 99.4111   | 383.2265 |
| 88    | 890.3929   | 99.4111   | 383.2265 | 883.8362   | 72.9066   | 325.8721 |
| 89    | 883.8362   | 72.9066   | 325.8721 | 710.7704   | 54.6471   | 286.5754 |
| 90    | 710.7704   | 54.6471   | 286.5754 | 597.9840   | 39.3260   | 248.7868 |
| 91    | 597.9840   | 39.3260   | 248.7868 | 448.8573   | 25.5576   | 214.2524 |
| 92    | 448.8573   | 25.5576   | 214.2524 | 167.4352   | 7.7603    | 167.6887 |
| 93    | 167.4352   | 7.7603    | 167.6887 | -23.4552   | -2.2334   | 140.3416 |
| 94    | -23.4552   | -2.2334   | 140.3416 | -222.7486  | -10.7549  | 115.9026 |
| 95    | -222.7486  | -10.7549  | 115.9026 | -422.6682  | -17.8499  | 94.3907  |
| 96    | -422.6682  | -17.8499  | 94.3907  | -679.4883  | -25.9582  | 67.9249  |
| 97    | -679.4883  | -25.9582  | 67.9249  | -847.9376  | -29.7917  | 54.0571  |
| 98    | -847.9376  | -29.7917  | 54.0571  | -997.6362  | -32.4710  | 43.4739  |
| 99    | -997.6362  | -32.4710  | 43.4739  | -1124.6671 | -34.1090  | 35.4997  |
| 100   | -1124.6671 | -34.1090  | 35.4997  | -1227.0627 | 122.8673  | 384.3277 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 101   | -1227.0627 | 122.8673  | 384.3277 | -639.2422  | 253.3407  | 682.8828 |
| 102   | -639.2422  | 253.3407  | 682.8828 | -147.1787  | 226.8418  | 628.8424 |
| 103   | -147.1787  | 226.8418  | 628.8424 | 251.3123   | 201.1889  | 577.6838 |
| 104   | 251.3123   | 201.1889  | 577.6838 | 559.8640   | 169.0513  | 510.8122 |
| 105   | 559.8640   | 169.0513  | 510.8122 | 704.1799   | 141.6667  | 463.1150 |
| 106   | 704.1799   | 141.6667  | 463.1150 | 833.4534   | 119.9627  | 422.3188 |
| 107   | 833.4534   | 119.9627  | 422.3188 | 891.2769   | 99.5758   | 383.4316 |
| 108   | 891.2769   | 99.5758   | 383.4316 | 885.4318   | 73.0838   | 325.6432 |
| 109   | 885.4318   | 73.0838   | 325.6432 | 713.1873   | 54.8641   | 286.4761 |
| 110   | 713.1873   | 54.8641   | 286.4761 | 601.1522   | 39.5882   | 248.8989 |
| 111   | 601.1522   | 39.5882   | 248.8989 | 452.9390   | 25.8369   | 214.2751 |
| 112   | 452.9390   | 25.8369   | 214.2751 | 172.4536   | 8.0501    | 167.7534 |
| 113   | 172.4536   | 8.0501    | 167.7534 | -17.6365   | -1.9266   | 140.4197 |
| 114   | -17.6365   | -1.9266   | 140.4197 | -216.1244  | -10.4284  | 115.9659 |
| 115   | -216.1244  | -10.4284  | 115.9659 | -415.3235  | -17.5170  | 94.4465  |
| 116   | -415.3235  | -17.5170  | 94.4465  | -671.7197  | -25.6350  | 68.0806  |
| 117   | -671.7197  | -25.6350  | 68.0806  | -839.9724  | -29.4921  | 54.3470  |
| 118   | -839.9724  | -29.4921  | 54.3470  | -989.9875  | -32.2015  | 43.4293  |
| 119   | -989.9875  | -32.2015  | 43.4293  | -1117.9967 | -33.8921  | 35.6250  |
| 120   | -1117.9967 | -33.8921  | 35.6250  | -1223.3335 | 122.7343  | 384.1687 |
| 121   | -1223.3335 | 122.7343  | 384.1687 | -638.6840  | 253.2653  | 681.6832 |
| 122   | -638.6840  | 253.2653  | 681.6832 | -148.8058  | 227.1414  | 627.3842 |
| 123   | -148.8058  | 227.1414  | 627.3842 | 249.0626   | 201.9389  | 575.9225 |
| 124   | 249.0626   | 201.9389  | 575.9225 | 558.7762   | 170.3109  | 508.8170 |
| 125   | 558.7762   | 170.3109  | 508.8170 | 707.2101   | 143.8687  | 460.6682 |
| 126   | 707.2101   | 143.8687  | 460.6682 | 844.1945   | 122.8849  | 419.3448 |
| 127   | 844.1945   | 122.8849  | 419.3448 | 913.3449   | 103.3250  | 380.1031 |
| 128   | 913.3449   | 103.3250  | 380.1031 | 923.1965   | 77.7314   | 322.0635 |
| 129   | 923.1965   | 77.7314   | 322.0635 | 777.1775   | 61.0077   | 282.1469 |
| 130   | 777.1775   | 61.0077   | 282.1469 | 692.9207   | 46.8168   | 244.3416 |
| 131   | 692.9207   | 46.8168   | 244.3416 | 673.1797   | 25.3438   | 189.0078 |
| 132   | 673.1797   | 25.3438   | 189.0078 | 685.1647   | -12.1622  | 95.2851  |
| 133   | 685.1647   | -12.1622  | 95.2851  | 618.3743   | -49.6620  | 1.6793   |
| 134   | 618.3743   | -49.6620  | 1.6793   | 2.6939     | -0.7765   | 0.0139   |
| 135   | 2.6939     | -0.7765   | 0.0139   | 0.9497     | -0.7793   | 0.0146   |
| 136   | 0.9497     | -0.7793   | 0.0146   | -0.8004    | -0.7767   | 0.0148   |
| 137   | -0.8004    | -0.7767   | 0.0148   | -2.5261    | -0.7700   | 0.0143   |
| 138   | -2.5261    | -0.7700   | 0.0143   | -4.2956    | -0.7765   | 0.0133   |
| 139   | -4.2956    | -0.7765   | 0.0133   | -6.0427    | -0.7766   | 0.0116   |
| 140   | -6.0427    | -0.7766   | 0.0116   | -2305.4307 | 33.2338   | 42.3559  |
| 141   | -2305.4307 | 33.2338   | 42.3559  | -1827.9655 | 298.6218  | 550.7805 |
| 142   | -1827.9655 | 298.6218  | 550.7805 | -1360.1532 | 276.7028  | 499.6066 |
| 143   | -1360.1532 | 276.7028  | 499.6066 | -912.8860  | 252.8705  | 448.2808 |
| 144   | -912.8860  | 252.8705  | 448.2808 | -496.6697  | 227.1357  | 396.7241 |
| 145   | -496.6697  | 227.1357  | 396.7241 | -111.7399  | 213.5798  | 370.3317 |
| 146   | -111.7399  | 213.5798  | 370.3317 | 224.1223   | 184.5624  | 305.6054 |
| 147   | 224.1223   | 184.5624  | 305.6054 | 523.3433   | 154.5868  | 230.6357 |
| 148   | 523.3433   | 154.5868  | 230.6357 | 774.4214   | 124.5755  | 155.8286 |
| 149   | 774.4214   | 124.5755  | 155.8286 | 977.6228   | 94.5699   | 80.9458  |
| 150   | 977.6228   | 94.5699   | 80.9458  | 1132.8469  | 79.5706   | 43.6450  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|----------|-----------|---------|
| 151   | 1132.8469 | 79.5706   | 43.6450 | 12.3162  | -0.7598   | 0.0074  |
| 152   | 12.3162   | -0.7598   | 0.0074  | 11.2348  | -0.7806   | 0.0098  |
| 153   | 11.2348   | -0.7806   | 0.0098  | 9.8318   | -0.7801   | 0.0097  |
| 154   | 9.8318    | -0.7801   | 0.0097  | 8.3999   | -0.7776   | 0.0127  |
| 155   | 8.3999    | -0.7776   | 0.0127  | 6.9999   | -0.7779   | 0.0175  |
| 156   | 6.9999    | -0.7779   | 0.0175  | 5.5511   | -0.7713   | 0.0177  |
| 157   | 5.5511    | -0.7713   | 0.0177  | 4.2140   | -0.7805   | 0.0174  |
| 158   | 4.2140    | -0.7805   | 0.0174  | 2.7996   | -0.7778   | 0.0188  |
| 159   | 2.7996    | -0.7778   | 0.0188  | 1.3999   | -0.7776   | 0.0197  |
| 160   | 1.3999    | -0.7776   | 0.0197  | 0.0001   | -0.7775   | 0.0199  |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 1     | -0.0027    | -0.0032   | -1.9352   | 14.0445    | -0.5272   | -4.8354   |
| 2     | 14.0445    | -0.5272   | -4.8354   | 78.6983    | -3.1350   | -13.5129  |
| 3     | 78.6983    | -3.1350   | -13.5129  | 182.7629   | -7.8139   | -25.9681  |
| 4     | 182.7629   | -7.8139   | -25.9681  | 315.1808   | -14.5491  | -42.2270  |
| 5     | 315.1808   | -14.5491  | -42.2270  | 371.8318   | -18.6716  | -51.7262  |
| 6     | 371.8318   | -18.6716  | -51.7262  | 517.7305   | -28.4425  | -73.5903  |
| 7     | 517.7305   | -28.4425  | -73.5903  | 663.6344   | -40.1846  | -99.1055  |
| 8     | 663.6344   | -40.1846  | -99.1055  | 799.3610   | -53.8686  | -128.4332 |
| 9     | 799.3610   | -53.8686  | -128.4332 | 915.4379   | -69.4660  | -161.5269 |
| 10    | 915.4379   | -69.4660  | -161.5269 | 1002.6669  | -79.3313  | -179.3482 |
| 11    | 1002.6669  | -79.3313  | -179.3482 | 946.3831   | -96.1937  | -217.8517 |
| 12    | 946.3831   | -96.1937  | -217.8517 | 956.9186   | -116.1252 | -260.2258 |
| 13    | 956.9186   | -116.1252 | -260.2258 | 917.3279   | -137.7740 | -306.4107 |
| 14    | 917.3279   | -137.7740 | -306.4107 | 820.8792   | -160.9365 | -356.2167 |
| 15    | 820.8792   | -160.9365 | -356.2167 | 661.1771   | -177.5215 | -386.5224 |
| 16    | 661.1771   | -177.5215 | -386.5224 | 379.2850   | -196.8000 | -429.8021 |
| 17    | 379.2850   | -196.8000 | -429.8021 | 103.4850   | -219.7348 | -478.7314 |
| 18    | 103.4850   | -219.7348 | -478.7314 | -226.4491  | -241.7601 | -528.0367 |
| 19    | -226.4491  | -241.7601 | -528.0367 | -604.6621  | -263.3447 | -582.1174 |
| 20    | -604.6621  | -263.3447 | -582.1174 | -1061.2048 | -122.1998 | -317.3873 |
| 21    | -1061.2048 | -122.1998 | -317.3873 | -907.8484  | 27.5189   | -30.4100  |
| 22    | -907.8484  | 27.5189   | -30.4100  | -760.9190  | 24.7543   | -38.3199  |
| 23    | -760.9190  | 24.7543   | -38.3199  | -600.0582  | 21.0662   | -49.0140  |
| 24    | -600.0582  | 21.0662   | -49.0140  | -429.0005  | 16.3921   | -62.6402  |
| 25    | -429.0005  | 16.3921   | -62.6402  | -171.5297  | 7.3575    | -89.0688  |
| 26    | -171.5297  | 7.3575    | -89.0688  | 12.2738    | -0.0808   | -110.5602 |
| 27    | 12.2738    | -0.0808   | -110.5602 | 188.9850   | -8.6935   | -135.0466 |
| 28    | 188.9850   | -8.6935   | -135.0466 | 352.2365   | -18.5104  | -162.6356 |
| 29    | 352.2365   | -18.5104  | -162.6356 | 597.2963   | -35.5214  | -209.6888 |
| 30    | 597.2963   | -35.5214  | -209.6888 | 713.4861   | -48.4766  | -244.7765 |
| 31    | 713.4861   | -48.4766  | -244.7765 | 798.2166   | -63.0536  | -282.7335 |
| 32    | 798.2166   | -63.0536  | -282.7335 | 944.7495   | -80.3943  | -325.5937 |
| 33    | 944.7495   | -80.3943  | -325.5937 | 931.3585   | -106.3409 | -386.5819 |
| 34    | 931.3585   | -106.3409 | -386.5819 | 857.2793   | -126.2775 | -428.8283 |
| 35    | 857.2793   | -126.2775 | -428.8283 | 714.4661   | -147.6183 | -470.8075 |
| 36    | 714.4661   | -147.6183 | -470.8075 | 559.7570   | -174.5950 | -519.4978 |
| 37    | 559.7570   | -174.5950 | -519.4978 | 241.9020   | -206.5421 | -586.7378 |
| 38    | 241.9020   | -206.5421 | -586.7378 | -164.6195  | -231.9971 | -637.9960 |
| 39    | -164.6195  | -231.9971 | -637.9960 | -663.6466  | -258.3478 | -692.4474 |
| 40    | -663.6466  | -258.3478 | -692.4474 | -1257.2162 | -124.8790 | -389.7603 |
| 41    | -1257.2162 | -124.8790 | -389.7603 | -1144.6753 | 34.6987   | -36.0524  |
| 42    | -1144.6753 | 34.6987   | -36.0524  | -1010.6052 | 32.8693   | -43.9166  |
| 43    | -1010.6052 | 32.8693   | -43.9166  | -854.3610  | 29.9966   | -54.6795  |
| 44    | -854.3610  | 29.9966   | -54.6795  | -679.8625  | 25.9554   | -68.4063  |
| 45    | -679.8625  | 25.9554   | -68.4063  | -414.4874  | 17.4870   | -94.8818  |
| 46    | -414.4874  | 17.4870   | -94.8818  | -209.6329  | 10.1395   | -116.4330 |
| 47    | -209.6329  | 10.1395   | -116.4330 | -6.1706    | 1.3343    | -140.8403 |
| 48    | -6.1706    | 1.3343    | -140.8403 | 188.0856   | -8.9590   | -168.1647 |
| 49    | 188.0856   | -8.9590   | -168.1647 | 474.4127   | -27.2691  | -214.7298 |
| 50    | 474.4127   | -27.2691  | -214.7298 | 624.2223   | -41.4077  | -249.3756 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 51    | 624.2223   | -41.4077  | -249.3756 | 736.2535   | -57.0589  | -286.9280 |
| 52    | 736.2535   | -57.0589  | -286.9280 | 908.3622   | -75.8931  | -329.4979 |
| 53    | 908.3622   | -75.8931  | -329.4979 | 910.5340   | -102.7432 | -389.6736 |
| 54    | 910.5340   | -102.7432 | -389.6736 | 847.4268   | -123.4872 | -431.4942 |
| 55    | 847.4268   | -123.4872 | -431.4942 | 711.7115   | -145.5609 | -473.4730 |
| 56    | 711.7115   | -145.5609 | -473.4730 | 560.9800   | -173.4333 | -521.7178 |
| 57    | 560.9800   | -173.4333 | -521.7178 | 244.1260   | -205.8763 | -588.4614 |
| 58    | 244.1260   | -205.8763 | -588.4614 | -163.3111  | -231.7718 | -639.6636 |
| 59    | -163.3111  | -231.7718 | -639.6636 | -664.3748  | -258.4835 | -693.9218 |
| 60    | -664.3748  | -258.4835 | -693.9218 | -1261.1707 | -125.0545 | -390.3100 |
| 61    | -1261.1707 | -125.0545 | -390.3100 | -1151.5266 | 34.8741   | -36.0253  |
| 62    | -1151.5266 | 34.8741   | -36.0253  | -1018.4277 | 33.0902   | -44.0363  |
| 63    | -1018.4277 | 33.0902   | -44.0363  | -862.5413  | 30.2550   | -54.7887  |
| 64    | -862.5413  | 30.2550   | -54.7887  | -687.9089  | 26.2492   | -68.5002  |
| 65    | -687.9089  | 26.2492   | -68.5002  | -422.1096  | 17.8034   | -94.8911  |
| 66    | -422.1096  | 17.8034   | -94.8911  | -216.4467  | 10.4606   | -116.4521 |
| 67    | -216.4467  | 10.4606   | -116.4521 | -12.0988   | 1.6454    | -140.8636 |
| 68    | -12.0988   | 1.6454    | -140.8636 | 183.0468   | -8.6714   | -168.2179 |
| 69    | 183.0468   | -8.6714   | -168.2179 | 470.4362   | -27.0162  | -214.7702 |
| 70    | 470.4362   | -27.0162  | -214.7702 | 621.1052   | -41.1693  | -249.2996 |
| 71    | 621.1052   | -41.1693  | -249.2996 | 733.8754   | -56.8547  | -286.8088 |
| 72    | 733.8754   | -56.8547  | -286.8088 | 906.6984   | -75.7032  | -329.4747 |
| 73    | 906.6984   | -75.7032  | -329.4747 | 909.3179   | -102.5802 | -389.6743 |
| 74    | 909.3179   | -102.5802 | -389.6743 | 846.6049   | -123.3538 | -431.4580 |
| 75    | 846.6049   | -123.3538 | -431.4580 | 711.3836   | -145.4626 | -473.4532 |
| 76    | 711.3836   | -145.4626 | -473.4532 | 560.7640   | -173.3642 | -521.5424 |
| 77    | 560.7640   | -173.3642 | -521.5424 | 244.1603   | -205.8183 | -588.3374 |
| 78    | 244.1603   | -205.8183 | -588.3374 | -163.3892  | -231.7330 | -639.5930 |
| 79    | -163.3892  | -231.7330 | -639.5930 | -664.3779  | -258.4619 | -693.8638 |
| 80    | -664.3779  | -258.4619 | -693.8638 | -1261.3762 | -125.0296 | -390.3727 |
| 81    | -1261.3762 | -125.0296 | -390.3727 | -1151.9763 | 34.9211   | -36.0600  |
| 82    | -1151.9763 | 34.9211   | -36.0600  | -1018.8544 | 33.1391   | -43.8832  |
| 83    | -1018.8544 | 33.1391   | -43.8832  | -862.9797  | 30.2989   | -54.7701  |
| 84    | -862.9797  | 30.2989   | -54.7701  | -688.3512  | 26.2740   | -68.5179  |
| 85    | -688.3512  | 26.2740   | -68.5179  | -422.5201  | 17.8386   | -94.9642  |
| 86    | -422.5201  | 17.8386   | -94.9642  | -216.8896  | 10.4775   | -116.4672 |
| 87    | -216.8896  | 10.4775   | -116.4672 | -12.5133   | 1.6632    | -140.8824 |
| 88    | -12.5133   | 1.6632    | -140.8824 | 182.7451   | -8.6512   | -168.1841 |
| 89    | 182.7451   | -8.6512   | -168.1841 | 470.1859   | -27.0008  | -214.6315 |
| 90    | 470.1859   | -27.0008  | -214.6315 | 620.7719   | -41.1733  | -249.4083 |
| 91    | 620.7719   | -41.1733  | -249.4083 | 733.5459   | -56.8736  | -286.8712 |
| 92    | 733.5459   | -56.8736  | -286.8712 | 906.3334   | -75.7030  | -329.3408 |
| 93    | 906.3334   | -75.7030  | -329.3408 | 908.9777   | -102.5611 | -389.9003 |
| 94    | 908.9777   | -102.5611 | -389.9003 | 846.4373   | -123.3280 | -431.5660 |
| 95    | 846.4373   | -123.3280 | -431.5660 | 711.0802   | -145.4144 | -473.4098 |
| 96    | 711.0802   | -145.4144 | -473.4098 | 560.6573   | -173.3100 | -521.6002 |
| 97    | 560.6573   | -173.3100 | -521.6002 | 244.0899   | -205.7805 | -588.4052 |
| 98    | 244.0899   | -205.7805 | -588.4052 | -163.5325  | -231.6992 | -639.4980 |
| 99    | -163.5325  | -231.6992 | -639.4980 | -664.4237  | -258.4416 | -693.8354 |
| 100   | -664.4237  | -258.4416 | -693.8354 | -1261.2892 | -125.0192 | -390.4600 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|------------|-----------|-----------|
| 101   | -1261.2892 | -125.0192 | -390.4600 | -1151.8833 | 34.9263   | -35.9376  |
| 102   | -1151.8833 | 34.9263   | -35.9376  | -1018.7686 | 33.1381   | -43.7548  |
| 103   | -1018.7686 | 33.1381   | -43.7548  | -862.8916  | 30.3014   | -54.6833  |
| 104   | -862.8916  | 30.3014   | -54.6833  | -688.2276  | 26.2784   | -68.4315  |
| 105   | -688.2276  | 26.2784   | -68.4315  | -422.3962  | 17.8247   | -94.8953  |
| 106   | -422.3962  | 17.8247   | -94.8953  | -216.7377  | 10.4714   | -116.4364 |
| 107   | -216.7377  | 10.4714   | -116.4364 | -12.3716   | 1.6591    | -140.8383 |
| 108   | -12.3716   | 1.6591    | -140.8383 | 182.7868   | -8.6600   | -168.1833 |
| 109   | 182.7868   | -8.6600   | -168.1833 | 470.1573   | -27.0187  | -214.7236 |
| 110   | 470.1573   | -27.0187  | -214.7236 | 620.7573   | -41.1744  | -249.3469 |
| 111   | 620.7573   | -41.1744  | -249.3469 | 733.4491   | -56.8917  | -286.9086 |
| 112   | 733.4491   | -56.8917  | -286.9086 | 906.0937   | -75.7805  | -329.4250 |
| 113   | 906.0937   | -75.7805  | -329.4250 | 908.5224   | -102.6680 | -389.8096 |
| 114   | 908.5224   | -102.6680 | -389.8096 | 845.6504   | -123.4578 | -431.4677 |
| 115   | 845.6504   | -123.4578 | -431.4677 | 709.8339   | -145.5519 | -473.2973 |
| 116   | 709.8339   | -145.5519 | -473.2973 | 558.6640   | -173.4785 | -521.5757 |
| 117   | 558.6640   | -173.4785 | -521.5757 | 241.6712   | -205.9406 | -588.4892 |
| 118   | 241.6712   | -205.9406 | -588.4892 | -166.1014  | -231.8565 | -639.6572 |
| 119   | -166.1014  | -231.8565 | -639.6572 | -667.7076  | -258.5857 | -693.7081 |
| 120   | -667.7076  | -258.5857 | -693.7081 | -1265.0588 | -124.9231 | -390.3065 |
| 121   | -1265.0588 | -124.9231 | -390.3065 | -1154.5627 | 35.2634   | -36.0906  |
| 122   | -1154.5627 | 35.2634   | -36.0906  | -1020.5977 | 33.4707   | -43.9098  |
| 123   | -1020.5977 | 33.4707   | -43.9098  | -863.8954  | 30.5991   | -54.6936  |
| 124   | -863.8954  | 30.5991   | -54.6936  | -688.5482  | 26.5355   | -68.4317  |
| 125   | -688.5482  | 26.5355   | -68.4317  | -422.2603  | 18.0079   | -95.0031  |
| 126   | -422.2603  | 18.0079   | -95.0031  | -216.4691  | 10.5866   | -116.4982 |
| 127   | -216.4691  | 10.5866   | -116.4982 | -12.2915   | 1.6966    | -140.9163 |
| 128   | -12.2915   | 1.6966    | -140.9163 | 182.3179   | -8.6943   | -168.2473 |
| 129   | 182.3179   | -8.6943   | -168.2473 | 468.1965   | -27.1730  | -214.8449 |
| 130   | 468.1965   | -27.1730  | -214.8449 | 617.2726   | -41.4438  | -249.3960 |
| 131   | 617.2726   | -41.4438  | -249.3960 | 727.8411   | -57.2329  | -286.9180 |
| 132   | 727.8411   | -57.2329  | -286.9180 | 897.0742   | -76.2603  | -329.6396 |
| 133   | 897.0742   | -76.2603  | -329.6396 | 896.3954   | -103.2240 | -389.9951 |
| 134   | 896.3954   | -103.2240 | -389.9951 | 829.9451   | -124.1430 | -431.8255 |
| 135   | 829.9451   | -124.1430 | -431.8255 | 690.5162   | -146.3133 | -473.6453 |
| 136   | 690.5162   | -146.3133 | -473.6453 | 534.4529   | -174.3951 | -521.8190 |
| 137   | 534.4529   | -174.3951 | -521.8190 | 213.3886   | -206.9377 | -588.7395 |
| 138   | 213.3886   | -206.9377 | -588.7395 | -198.4025  | -232.8901 | -639.9113 |
| 139   | -198.4025  | -232.8901 | -639.9113 | -703.3564  | -259.6631 | -694.0927 |
| 140   | -703.3564  | -259.6631 | -694.0927 | -1303.6443 | -125.4437 | -393.9310 |
| 141   | -1303.6443 | -125.4437 | -393.9310 | -1225.9573 | 35.8364   | -41.0625  |
| 142   | -1225.9573 | 35.8364   | -41.0625  | -1119.6499 | 34.5432   | -48.4027  |
| 143   | -1119.6499 | 34.5432   | -48.4027  | -986.2311  | 32.2162   | -59.5429  |
| 144   | -986.2311  | 32.2162   | -59.5429  | -827.7405  | 28.7420   | -74.6499  |
| 145   | -827.7405  | 28.7420   | -74.6499  | -716.1747  | 26.5132   | -83.5591  |
| 146   | -716.1747  | 26.5132   | -83.5591  | -531.1672  | 21.0537   | -104.0975 |
| 147   | -531.1672  | 21.0537   | -104.0975 | -332.1061  | 14.1546   | -128.3709 |
| 148   | -332.1061  | 14.1546   | -128.3709 | -124.5400  | 5.7298    | -156.3165 |
| 149   | -124.5400  | 5.7298    | -156.3165 | 84.8927    | -4.3183   | -187.7900 |
| 150   | 84.8927    | -4.3183   | -187.7900 | 179.0656   | -9.9749   | -204.8492 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2 | Cortante2 | Torsor2   |
|-------|----------|-----------|-----------|----------|-----------|-----------|
| 151   | 179.0656 | -9.9749   | -204.8492 | 365.7914 | -22.6066  | -241.5882 |
| 152   | 365.7914 | -22.6066  | -241.5882 | 532.7279 | -37.0162  | -281.9324 |
| 153   | 532.7279 | -37.0162  | -281.9324 | 670.7902 | -53.2696  | -326.0031 |
| 154   | 670.7902 | -53.2696  | -326.0031 | 770.6218 | -71.3936  | -373.4540 |
| 155   | 770.6218 | -71.3936  | -373.4540 | 730.2091 | -81.1741  | -398.1732 |
| 156   | 730.2091 | -81.1741  | -398.1732 | 734.9380 | -102.1596 | -448.7567 |
| 157   | 734.9380 | -102.1596 | -448.7567 | 674.6247 | -125.0252 | -499.8096 |
| 158   | 674.6247 | -125.0252 | -499.8096 | 538.9282 | -149.8198 | -550.6345 |
| 159   | 538.9282 | -149.8198 | -550.6345 | 317.5173 | -176.4709 | -602.3461 |
| 160   | 317.5173 | -176.4709 | -602.3461 | -0.0447  | -190.4884 | -629.4503 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 1     | -0.0002  | -0.0003   | -0.1613  | 33.3258  | 17.8247   | 50.7692  |
| 2     | 33.3258  | 17.8247   | 50.7692  | 62.6436  | 15.3248   | 44.5284  |
| 3     | 62.6436  | 15.3248   | 44.5284  | 87.9673  | 12.8216   | 38.3022  |
| 4     | 87.9673  | 12.8216   | 38.3022  | 109.2827 | 10.3196   | 32.0625  |
| 5     | 109.2827 | 10.3196   | 32.0625  | 126.6030 | 8.4470    | 27.4011  |
| 6     | 126.6030 | 8.4470    | 27.4011  | 139.6848 | 6.5713    | 22.7378  |
| 7     | 139.6848 | 6.5713    | 22.7378  | 148.7642 | 4.0672    | 16.5389  |
| 8     | 148.7642 | 4.0672    | 16.5389  | 153.8306 | 1.5645    | 10.3085  |
| 9     | 153.8306 | 1.5645    | 10.3085  | 154.8939 | -0.9391   | 4.0873   |
| 10    | 154.8939 | -0.9391   | 4.0873   | 151.9460 | -2.8173   | -0.5430  |
| 11    | 151.9460 | -2.8173   | -0.5430  | 144.7592 | -4.6887   | -5.2075  |
| 12    | 144.7592 | -4.6887   | -5.2075  | 133.5753 | -7.1883   | -11.4305 |
| 13    | 133.5753 | -7.1883   | -11.4305 | 118.3900 | -9.6929   | -17.6593 |
| 14    | 118.3900 | -9.6929   | -17.6593 | 99.1967  | -12.1927  | -23.8715 |
| 15    | 99.1967  | -12.1927  | -23.8715 | 76.0067  | -14.0662  | -28.5579 |
| 16    | 76.0067  | -14.0662  | -28.5579 | 48.5676  | -15.9406  | -33.2360 |
| 17    | 48.5676  | -15.9406  | -33.2360 | 17.1446  | -18.4408  | -39.4657 |
| 18    | 17.1446  | -18.4408  | -39.4657 | -0.0083  | -0.0003   | -0.1613  |
| 19    | -0.0083  | -0.0003   | -0.1613  | -0.0087  | -0.0003   | -0.1613  |
| 20    | -0.0087  | -0.0003   | -0.1613  | -0.0092  | 0.0000    | -0.0840  |
| 21    | -0.0092  | 0.0000    | -0.0840  | -0.0086  | 0.0003    | -0.0068  |
| 22    | -0.0086  | 0.0003    | -0.0068  | -0.0080  | 0.0003    | -0.0068  |
| 23    | -0.0080  | 0.0003    | -0.0068  | -0.0074  | 0.0003    | -0.0068  |
| 24    | -0.0074  | 0.0003    | -0.0068  | -0.0069  | 0.0003    | -0.0068  |
| 25    | -0.0069  | 0.0003    | -0.0068  | 27.2401  | 16.7502   | 31.7624  |
| 26    | 27.2401  | 16.7502   | 31.7624  | 62.4074  | 14.2507   | 25.5361  |
| 27    | 62.4074  | 14.2507   | 25.5361  | 91.3345  | 11.7507   | 19.2992  |
| 28    | 91.3345  | 11.7507   | 19.2992  | 114.0182 | 8.6267    | 11.6281  |
| 29    | 114.0182 | 8.6267    | 11.6281  | 130.1421 | 5.5021    | 3.8690   |
| 30    | 130.1421 | 5.5021    | 3.8690   | 140.0201 | 3.0004    | -2.3689  |
| 31    | 140.0201 | 3.0004    | -2.3689  | 143.6497 | 0.4991    | -8.5774  |
| 32    | 143.6497 | 0.4991    | -8.5774  | 141.0297 | -2.6235   | -16.3258 |
| 33    | 141.0297 | -2.6235   | -16.3258 | 131.8519 | -5.7440   | -24.1427 |
| 34    | 131.8519 | -5.7440   | -24.1427 | 116.4411 | -8.2418   | -30.3604 |
| 35    | 116.4411 | -8.2418   | -30.3604 | 94.7946  | -10.7410  | -36.5488 |
| 36    | 94.7946  | -10.7410  | -36.5488 | 66.8883  | -13.8656  | -44.3467 |
| 37    | 66.8883  | -13.8656  | -44.3467 | 32.4170  | -16.9925  | -52.1606 |
| 38    | 32.4170  | -16.9925  | -52.1606 | 15.1576  | 2.8710    | -2.4287  |
| 39    | 15.1576  | 2.8710    | -2.4287  | 21.6190  | 2.8712    | -2.4240  |
| 40    | 21.6190  | 2.8712    | -2.4240  | 28.0814  | 1.0369    | -1.2816  |
| 41    | 28.0814  | 1.0369    | -1.2816  | 26.2882  | -0.7975   | -0.1414  |
| 42    | 26.2882  | -0.7975   | -0.1414  | 24.4935  | -0.7975   | -0.1326  |
| 43    | 24.4935  | -0.7975   | -0.1326  | 22.6992  | -0.7976   | -0.1253  |
| 44    | 22.6992  | -0.7976   | -0.1253  | 20.9043  | -0.7979   | -0.1222  |
| 45    | 20.9043  | -0.7979   | -0.1222  | 25.1140  | 16.8467   | 31.0641  |
| 46    | 25.1140  | 16.8467   | 31.0641  | 60.4998  | 14.3469   | 24.8267  |
| 47    | 60.4998  | 14.3469   | 24.8267  | 89.6514  | 11.8468   | 18.5938  |
| 48    | 89.6514  | 11.8468   | 18.5938  | 112.5503 | 8.7246    | 10.9339  |
| 49    | 112.5503 | 8.7246    | 10.9339  | 128.8921 | 5.5975    | 3.1342   |
| 50    | 128.8921 | 5.5975    | 3.1342   | 138.9836 | 3.0939    | -3.0785  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 51    | 138.9836 | 3.0939    | -3.0785  | 142.8155 | 0.5899    | -9.2902  |
| 52    | 142.8155 | 0.5899    | -9.2902  | 140.3987 | -2.5371   | -17.0644 |
| 53    | 140.3987 | -2.5371   | -17.0644 | 131.4210 | -5.6637   | -24.8148 |
| 54    | 131.4210 | -5.6637   | -24.8148 | 116.1853 | -8.1634   | -31.0316 |
| 55    | 116.1853 | -8.1634   | -31.0316 | 94.7054  | -10.6629  | -37.2715 |
| 56    | 94.7054  | -10.6629  | -37.2715 | 66.9812  | -13.7875  | -45.0659 |
| 57    | 66.9812  | -13.7875  | -45.0659 | 32.6805  | -16.9119  | -52.8637 |
| 58    | 32.6805  | -16.9119  | -52.8637 | 16.2746  | 3.0828    | -3.0954  |
| 59    | 16.2746  | 3.0828    | -3.0954  | 23.2135  | 3.0830    | -3.0852  |
| 60    | 23.2135  | 3.0830    | -3.0852  | 30.1514  | 1.1137    | -1.6301  |
| 61    | 30.1514  | 1.1137    | -1.6301  | 28.2262  | -0.8557   | -0.1736  |
| 62    | 28.2262  | -0.8557   | -0.1736  | 26.3015  | -0.8555   | -0.1602  |
| 63    | 26.3015  | -0.8555   | -0.1602  | 24.3764  | -0.8558   | -0.1521  |
| 64    | 24.3764  | -0.8558   | -0.1521  | 22.4504  | -0.8562   | -0.1489  |
| 65    | 22.4504  | -0.8562   | -0.1489  | 25.9319  | 16.8081   | 31.0308  |
| 66    | 25.9319  | 16.8081   | 31.0308  | 61.2400  | 14.3068   | 24.7999  |
| 67    | 61.2400  | 14.3068   | 24.7999  | 90.3018  | 11.8073   | 18.5646  |
| 68    | 90.3018  | 11.8073   | 18.5646  | 113.1165 | 8.6812    | 10.7608  |
| 69    | 113.1165 | 8.6812    | 10.7608  | 129.3649 | 5.5588    | 3.1067   |
| 70    | 129.3649 | 5.5588    | 3.1067   | 139.3676 | 3.0589    | -3.0819  |
| 71    | 139.3676 | 3.0589    | -3.0819  | 143.1255 | 0.5588    | -9.2943  |
| 72    | 143.1255 | 0.5588    | -9.2943  | 140.6324 | -2.5689   | -17.0890 |
| 73    | 140.6324 | -2.5689   | -17.0890 | 131.5747 | -5.6950   | -24.8410 |
| 74    | 131.5747 | -5.6950   | -24.8410 | 116.2677 | -8.1908   | -31.0587 |
| 75    | 116.2677 | -8.1908   | -31.0587 | 94.7327  | -10.6906  | -37.2980 |
| 76    | 94.7327  | -10.6906  | -37.2980 | 66.9313  | -13.8175  | -45.0771 |
| 77    | 66.9313  | -13.8175  | -45.0771 | 32.5751  | -16.9408  | -52.8826 |
| 78    | 32.5751  | -16.9408  | -52.8826 | 16.1558  | 3.0587    | -3.1277  |
| 79    | 16.1558  | 3.0587    | -3.1277  | 23.0399  | 3.0585    | -3.1154  |
| 80    | 23.0399  | 3.0585    | -3.1154  | 29.9218  | 1.1042    | -1.6434  |
| 81    | 29.9218  | 1.1042    | -1.6434  | 28.0093  | -0.8499   | -0.1738  |
| 82    | 28.0093  | -0.8499   | -0.1738  | 26.0968  | -0.8498   | -0.1652  |
| 83    | 26.0968  | -0.8498   | -0.1652  | 24.1854  | -0.8499   | -0.1539  |
| 84    | 24.1854  | -0.8499   | -0.1539  | 22.2738  | -0.8497   | -0.1494  |
| 85    | 22.2738  | -0.8497   | -0.1494  | 25.7169  | 16.8172   | 31.0374  |
| 86    | 25.7169  | 16.8172   | 31.0374  | 61.0342  | 14.3173   | 24.7850  |
| 87    | 61.0342  | 14.3173   | 24.7850  | 90.1272  | 11.8177   | 18.5499  |
| 88    | 90.1272  | 11.8177   | 18.5499  | 112.9570 | 8.6917    | 10.9239  |
| 89    | 112.9570 | 8.6917    | 10.9239  | 129.2270 | 5.5647    | 3.1398   |
| 90    | 129.2270 | 5.5647    | 3.1398   | 139.2431 | 3.0592    | -3.1143  |
| 91    | 139.2431 | 3.0592    | -3.1143  | 143.0017 | 0.5606    | -9.3006  |
| 92    | 143.0017 | 0.5606    | -9.3006  | 140.5233 | -2.5606   | -17.0745 |
| 93    | 140.5233 | -2.5606   | -17.0745 | 131.4868 | -5.6856   | -24.8748 |
| 94    | 131.4868 | -5.6856   | -24.8748 | 116.2130 | -8.1841   | -31.0698 |
| 95    | 116.2130 | -8.1841   | -31.0698 | 94.6897  | -10.6821  | -37.2916 |
| 96    | 94.6897  | -10.6821  | -37.2916 | 66.9258  | -13.8061  | -45.0861 |
| 97    | 66.9258  | -13.8061  | -45.0861 | 32.5931  | -16.9299  | -52.8888 |
| 98    | 32.5931  | -16.9299  | -52.8888 | 16.2042  | 3.0661    | -3.1339  |
| 99    | 16.2042  | 3.0661    | -3.1339  | 23.1036  | 3.0664    | -3.1233  |
| 100   | 23.1036  | 3.0664    | -3.1233  | 30.0046  | 1.1070    | -1.6444  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 101   | 30.0046  | 1.1070    | -1.6444  | 28.0863  | -0.8523   | -0.1768  |
| 102   | 28.0863  | -0.8523   | -0.1768  | 26.1690  | -0.8523   | -0.1687  |
| 103   | 26.1690  | -0.8523   | -0.1687  | 24.2520  | -0.8524   | -0.1563  |
| 104   | 24.2520  | -0.8524   | -0.1563  | 22.3340  | -0.8525   | -0.1520  |
| 105   | 22.3340  | -0.8525   | -0.1520  | 25.7821  | 16.8097   | 31.0364  |
| 106   | 25.7821  | 16.8097   | 31.0364  | 61.0967  | 14.3106   | 24.7975  |
| 107   | 61.0967  | 14.3106   | 24.7975  | 90.1530  | 11.8098   | 18.5651  |
| 108   | 90.1530  | 11.8098   | 18.5651  | 112.9693 | 8.6834    | 10.8888  |
| 109   | 112.9693 | 8.6834    | 10.8888  | 129.2213 | 5.5568    | 3.1110   |
| 110   | 129.2213 | 5.5568    | 3.1110   | 139.2271 | 3.0576    | -3.1037  |
| 111   | 139.2271 | 3.0576    | -3.1037  | 142.9879 | 0.5554    | -9.3136  |
| 112   | 142.9879 | 0.5554    | -9.3136  | 140.4853 | -2.5734   | -17.0861 |
| 113   | 140.4853 | -2.5734   | -17.0861 | 131.4171 | -5.7001   | -24.8630 |
| 114   | 131.4171 | -5.7001   | -24.8630 | 116.1087 | -8.1985   | -31.0561 |
| 115   | 116.1087 | -8.1985   | -31.0561 | 94.5406  | -10.6979  | -37.2788 |
| 116   | 94.5406  | -10.6979  | -37.2788 | 66.7242  | -13.8227  | -45.0839 |
| 117   | 66.7242  | -13.8227  | -45.0839 | 32.3574  | -16.9486  | -52.8967 |
| 118   | 32.3574  | -16.9486  | -52.8967 | 16.2575  | 3.0677    | -3.1249  |
| 119   | 16.2575  | 3.0677    | -3.1249  | 23.1609  | 3.0675    | -3.1199  |
| 120   | 23.1609  | 3.0675    | -3.1199  | 30.0644  | 1.1039    | -1.6470  |
| 121   | 30.0644  | 1.1039    | -1.6470  | 28.1303  | -0.8598   | -0.1738  |
| 122   | 28.1303  | -0.8598   | -0.1738  | 26.1957  | -0.8600   | -0.1654  |
| 123   | 26.1957  | -0.8600   | -0.1654  | 24.2610  | -0.8600   | -0.1572  |
| 124   | 24.2610  | -0.8600   | -0.1572  | 22.3260  | -0.8600   | -0.1534  |
| 125   | 22.3260  | -0.8600   | -0.1534  | 25.6003  | 16.7128   | 31.0168  |
| 126   | 25.6003  | 16.7128   | 31.0168  | 60.7058  | 14.2143   | 24.7677  |
| 127   | 60.7058  | 14.2143   | 24.7677  | 89.5459  | 11.7170   | 18.6670  |
| 128   | 89.5459  | 11.7170   | 18.6670  | 112.1559 | 8.5902    | 10.8786  |
| 129   | 112.1559 | 8.5902    | 10.8786  | 128.2068 | 5.4642    | 3.0790   |
| 130   | 128.2068 | 5.4642    | 3.0790   | 137.9987 | 2.9641    | -3.1113  |
| 131   | 137.9987 | 2.9641    | -3.1113  | 141.5435 | 0.4638    | -9.3249  |
| 132   | 141.5435 | 0.4638    | -9.3249  | 138.8358 | -2.6642   | -17.1224 |
| 133   | 138.8358 | -2.6642   | -17.1224 | 129.5609 | -5.7900   | -24.8948 |
| 134   | 129.5609 | -5.7900   | -24.8948 | 114.0441 | -8.2895   | -31.1110 |
| 135   | 114.0441 | -8.2895   | -31.1110 | 92.2830  | -10.7896  | -37.3233 |
| 136   | 92.2830  | -10.7896  | -37.3233 | 64.2742  | -13.9146  | -45.1143 |
| 137   | 64.2742  | -13.9146  | -45.1143 | 29.6941  | -17.0410  | -52.9263 |
| 138   | 29.6941  | -17.0410  | -52.9263 | 17.0652  | 3.0943    | -3.1251  |
| 139   | 17.0652  | 3.0943    | -3.1251  | 24.0270  | 3.0943    | -3.1186  |
| 140   | 24.0270  | 3.0943    | -3.1186  | 30.9913  | 1.1167    | -1.6581  |
| 141   | 30.9913  | 1.1167    | -1.6581  | 29.4417  | -0.8608   | -0.1955  |
| 142   | 29.4417  | -0.8608   | -0.1955  | 27.8923  | -0.8608   | -0.1953  |
| 143   | 27.8923  | -0.8608   | -0.1953  | 26.3428  | -0.8609   | -0.1899  |
| 144   | 26.3428  | -0.8609   | -0.1899  | 24.7922  | -0.8611   | -0.1793  |
| 145   | 24.7922  | -0.8611   | -0.1793  | 23.2430  | -0.8612   | -0.1756  |
| 146   | 23.2430  | -0.8612   | -0.1756  | 21.6931  | -0.8605   | -0.1707  |
| 147   | 21.6931  | -0.8605   | -0.1707  | 45.8489  | 12.7849   | 13.8106  |
| 148   | 45.8489  | 12.7849   | 13.8106  | 66.5993  | 10.2844   | 7.5778   |
| 149   | 66.5993  | 10.2844   | 7.5778   | 83.3606  | 7.7844    | 1.3379   |
| 150   | 83.3606  | 7.7844    | 1.3379   | 96.1244  | 6.5342    | -1.7690  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 96.1244  | 6.5342    | -1.7690  | 104.6395 | 4.0323    | -7.9846  |
| 152   | 104.6395 | 4.0323    | -7.9846  | 109.1469 | 1.5333    | -14.2206 |
| 153   | 109.1469 | 1.5333    | -14.2206 | 109.6629 | -0.9668   | -20.4767 |
| 154   | 109.6629 | -0.9668   | -20.4767 | 106.1755 | -3.4708   | -26.6908 |
| 155   | 106.1755 | -3.4708   | -26.6908 | 98.6955  | -4.7225   | -29.7565 |
| 156   | 98.6955  | -4.7225   | -29.7565 | 86.9401  | -7.2225   | -36.0089 |
| 157   | 86.9401  | -7.2225   | -36.0089 | 71.1939  | -9.7218   | -42.2677 |
| 158   | 71.1939  | -9.7218   | -42.2677 | 51.4595  | -12.2212  | -48.4983 |
| 159   | 51.4595  | -12.2212  | -48.4983 | 27.7365  | -14.7208  | -54.7378 |
| 160   | 27.7365  | -14.7208  | -54.7378 | 0.0002   | 3.0804    | -4.1781  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0049   | 16.2104   | 57.6700  | -0.0007   | -0.0003   | -0.1613  |
| 2     | -0.0007   | -0.0003   | -0.1613  | -0.0012   | -0.0003   | -0.1613  |
| 3     | -0.0012   | -0.0003   | -0.1613  | -0.0015   | -0.0003   | -0.1613  |
| 4     | -0.0015   | -0.0003   | -0.1613  | -0.0020   | -0.0003   | -0.1613  |
| 5     | -0.0020   | -0.0003   | -0.1613  | -0.0025   | -0.0003   | -0.1613  |
| 6     | -0.0025   | -0.0003   | -0.1613  | -0.0029   | -0.0003   | -0.1613  |
| 7     | -0.0029   | -0.0003   | -0.1613  | -0.0033   | -0.0003   | -0.1613  |
| 8     | -0.0033   | -0.0003   | -0.1613  | -0.0038   | -0.0003   | -0.1613  |
| 9     | -0.0038   | -0.0003   | -0.1613  | -0.0043   | -0.0003   | -0.1613  |
| 10    | -0.0043   | -0.0003   | -0.1613  | -0.0047   | -0.0003   | -0.1613  |
| 11    | -0.0047   | -0.0003   | -0.1613  | -0.0052   | -0.0003   | -0.1613  |
| 12    | -0.0052   | -0.0003   | -0.1613  | -0.0056   | -0.0003   | -0.1613  |
| 13    | -0.0056   | -0.0003   | -0.1613  | -0.0060   | -0.0003   | -0.1613  |
| 14    | -0.0060   | -0.0003   | -0.1613  | -0.5588   | -16.1442  | -20.4082 |
| 15    | -0.5588   | -16.1442  | -20.4082 | -30.8638  | -18.0191  | -25.0941 |
| 16    | -30.8638  | -18.0191  | -25.0941 | -65.4202  | -19.8943  | -29.8171 |
| 17    | -65.4202  | -19.8943  | -29.8171 | -103.9596 | -22.3944  | -36.0908 |
| 18    | -103.9596 | -22.3944  | -36.0908 | -146.5262 | -24.8942  | -42.3531 |
| 19    | -146.5262 | -24.8942  | -42.3531 | -193.0561 | -27.3941  | -48.6755 |
| 20    | -193.0561 | -27.3941  | -48.6755 | -243.6313 | 0.9285    | 7.2866   |
| 21    | -243.6313 | 0.9285    | 7.2866   | -176.9205 | 28.0013   | 60.1323  |
| 22    | -176.9205 | 28.0013   | 60.1323  | -116.4373 | 25.5010   | 53.8102  |
| 23    | -116.4373 | 25.5010   | 53.8102  | -81.7924  | 2.8727    | -2.2803  |
| 24    | -81.7924  | 2.8727    | -2.2803  | -75.3273  | 2.8735    | -2.2804  |
| 25    | -75.3273  | 2.8735    | -2.2804  | -68.8607  | 2.8740    | -2.3019  |
| 26    | -68.8607  | 2.8740    | -2.3019  | -62.3944  | 2.8729    | -2.3431  |
| 27    | -62.3944  | 2.8729    | -2.3431  | -55.9304  | 2.8726    | -2.3626  |
| 28    | -55.9304  | 2.8726    | -2.3626  | -49.4661  | 2.8735    | -2.3711  |
| 29    | -49.4661  | 2.8735    | -2.3711  | -42.9990  | 2.8730    | -2.3921  |
| 30    | -42.9990  | 2.8730    | -2.3921  | -36.5341  | 2.8720    | -2.3995  |
| 31    | -36.5341  | 2.8720    | -2.3995  | -30.0705  | 2.8732    | -2.4085  |
| 32    | -30.0705  | 2.8732    | -2.4085  | -23.6035  | 2.8734    | -2.4239  |
| 33    | -23.6035  | 2.8734    | -2.4239  | -17.1415  | 2.8707    | -2.5502  |
| 34    | -17.1415  | 2.8707    | -2.5502  | -10.6837  | 2.8700    | -2.5540  |
| 35    | -10.6837  | 2.8700    | -2.5540  | -4.2249   | 2.8698    | -2.5591  |
| 36    | -4.2249   | 2.8698    | -2.5591  | -35.8355  | -17.8231  | -41.5132 |
| 37    | -35.8355  | -17.8231  | -41.5132 | -79.2119  | -20.9482  | -49.3626 |
| 38    | -79.2119  | -20.9482  | -49.3626 | -128.8211 | -23.4482  | -55.6354 |
| 39    | -128.8211 | -23.4482  | -55.6354 | -184.7012 | -25.9482  | -61.9304 |
| 40    | -184.7012 | -25.9482  | -61.9304 | -246.8280 | 1.0739    | -1.2667  |
| 41    | -246.8280 | 1.0739    | -1.2667  | -179.8980 | 28.0958   | 59.4230  |
| 42    | -179.8980 | 28.0958   | 59.4230  | -119.2018 | 25.5958   | 53.1153  |
| 43    | -119.2018 | 25.5958   | 53.1153  | -87.7204  | 3.0803    | -2.9353  |
| 44    | -87.7204  | 3.0803    | -2.9353  | -80.7896  | 3.0807    | -2.9469  |
| 45    | -80.7896  | 3.0807    | -2.9469  | -73.8588  | 3.0802    | -2.9697  |
| 46    | -73.8588  | 3.0802    | -2.9697  | -66.9293  | 3.0789    | -3.0042  |
| 47    | -66.9293  | 3.0789    | -3.0042  | -60.0000  | 3.0778    | -3.0231  |
| 48    | -60.0000  | 3.0778    | -3.0231  | -53.0759  | 3.0781    | -3.0408  |
| 49    | -53.0759  | 3.0781    | -3.0408  | -46.1479  | 3.0797    | -3.0506  |
| 50    | -46.1479  | 3.0797    | -3.0506  | -39.2151  | 3.0803    | -3.0617  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | -39.2151  | 3.0803    | -3.0617  | -32.2836  | 3.0811    | -3.0742  |
| 52    | -32.2836  | 3.0811    | -3.0742  | -25.3472  | 3.0817    | -3.0820  |
| 53    | -25.3472  | 3.0817    | -3.0820  | -18.4122  | 3.0809    | -3.2204  |
| 54    | -18.4122  | 3.0809    | -3.2204  | -11.4753  | 3.0820    | -3.2252  |
| 55    | -11.4753  | 3.0820    | -3.2252  | -4.5415   | 3.0825    | -3.2270  |
| 56    | -4.5415   | 3.0825    | -3.2270  | -35.7226  | -17.7048  | -42.2291 |
| 57    | -35.7226  | -17.7048  | -42.2291 | -78.8437  | -20.8295  | -50.0578 |
| 58    | -78.8437  | -20.8295  | -50.0578 | -128.1926 | -23.3297  | -56.3322 |
| 59    | -128.1926 | -23.3297  | -56.3322 | -183.7840 | -25.8297  | -62.6667 |
| 60    | -183.7840 | -25.8297  | -62.6667 | -245.6308 | 1.1166    | -1.6269  |
| 61    | -245.6308 | 1.1166    | -1.6269  | -178.7570 | 28.0630   | 59.4152  |
| 62    | -178.7570 | 28.0630   | 59.4152  | -118.1464 | 25.5629   | 53.0840  |
| 63    | -118.1464 | 25.5629   | 53.0840  | -87.0709  | 3.0549    | -2.9762  |
| 64    | -87.0709  | 3.0549    | -2.9762  | -80.1971  | 3.0563    | -2.9879  |
| 65    | -80.1971  | 3.0563    | -2.9879  | -73.3194  | 3.0570    | -3.0008  |
| 66    | -73.3194  | 3.0570    | -3.0008  | -66.4368  | 3.0577    | -3.0349  |
| 67    | -66.4368  | 3.0577    | -3.0349  | -59.5555  | 3.0589    | -3.0559  |
| 68    | -59.5555  | 3.0589    | -3.0559  | -52.6706  | 3.0588    | -3.0626  |
| 69    | -52.6706  | 3.0588    | -3.0626  | -45.7903  | 3.0585    | -3.0779  |
| 70    | -45.7903  | 3.0585    | -3.0779  | -38.9085  | 3.0590    | -3.0982  |
| 71    | -38.9085  | 3.0590    | -3.0982  | -32.0260  | 3.0599    | -3.1104  |
| 72    | -32.0260  | 3.0599    | -3.1104  | -25.1436  | 3.0599    | -3.1147  |
| 73    | -25.1436  | 3.0599    | -3.1147  | -18.2571  | 3.0579    | -3.2519  |
| 74    | -18.2571  | 3.0579    | -3.2519  | -11.3745  | 3.0575    | -3.2568  |
| 75    | -11.3745  | 3.0575    | -3.2568  | -4.4977   | 3.0575    | -3.2579  |
| 76    | -4.4977   | 3.0575    | -3.2579  | -35.7403  | -17.7332  | -42.2618 |
| 77    | -35.7403  | -17.7332  | -42.2618 | -78.9061  | -20.8582  | -50.0795 |
| 78    | -78.9061  | -20.8582  | -50.0795 | -128.3309 | -23.3582  | -56.3636 |
| 79    | -128.3309 | -23.3582  | -56.3636 | -183.9757 | -25.8582  | -62.7164 |
| 80    | -183.9757 | -25.8582  | -62.7164 | -245.9059 | 1.1047    | -1.6716  |
| 81    | -245.9059 | 1.1047    | -1.6716  | -179.0379 | 28.0680   | 59.4001  |
| 82    | -179.0379 | 28.0680   | 59.4001  | -118.3876 | 25.5679   | 53.0975  |
| 83    | -118.3876 | 25.5679   | 53.0975  | -87.3145  | 3.0662    | -2.9750  |
| 84    | -87.3145  | 3.0662    | -2.9750  | -80.4167  | 3.0665    | -2.9904  |
| 85    | -80.4167  | 3.0665    | -2.9904  | -73.5182  | 3.0658    | -3.0128  |
| 86    | -73.5182  | 3.0658    | -3.0128  | -66.6201  | 3.0660    | -3.0372  |
| 87    | -66.6201  | 3.0660    | -3.0372  | -59.7201  | 3.0663    | -3.0470  |
| 88    | -59.7201  | 3.0663    | -3.0470  | -52.8202  | 3.0666    | -3.0823  |
| 89    | -52.8202  | 3.0666    | -3.0823  | -45.9194  | 3.0677    | -3.0991  |
| 90    | -45.9194  | 3.0677    | -3.0991  | -39.0154  | 3.0690    | -3.0996  |
| 91    | -39.0154  | 3.0690    | -3.0996  | -32.1067  | 3.0694    | -3.1152  |
| 92    | -32.1067  | 3.0694    | -3.1152  | -25.2001  | 3.0685    | -3.1264  |
| 93    | -25.2001  | 3.0685    | -3.1264  | -18.2990  | 3.0677    | -3.2555  |
| 94    | -18.2990  | 3.0677    | -3.2555  | -11.4000  | 3.0662    | -3.2622  |
| 95    | -11.4000  | 3.0662    | -3.2622  | -4.5000   | 3.0654    | -3.2650  |
| 96    | -4.5000   | 3.0654    | -3.2650  | -35.6962  | -17.7222  | -42.2621 |
| 97    | -35.6962  | -17.7222  | -42.2621 | -78.8408  | -20.8473  | -50.1008 |
| 98    | -78.8408  | -20.8473  | -50.1008 | -128.2582 | -23.3475  | -56.3657 |
| 99    | -128.2582 | -23.3475  | -56.3657 | -183.8719 | -25.8475  | -62.7057 |
| 100   | -183.8719 | -25.8475  | -62.7057 | -245.7661 | 1.1065    | -1.6983  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -245.7661 | 1.1065    | -1.6983  | -178.9034 | 28.0604   | 59.3983  |
| 102   | -178.9034 | 28.0604   | 59.3983  | -118.2856 | 25.5606   | 53.1068  |
| 103   | -118.2856 | 25.5606   | 53.1068  | -87.2384  | 3.0637    | -2.9669  |
| 104   | -87.2384  | 3.0637    | -2.9669  | -80.3429  | 3.0640    | -2.9820  |
| 105   | -80.3429  | 3.0640    | -2.9820  | -73.4478  | 3.0629    | -3.0054  |
| 106   | -73.4478  | 3.0629    | -3.0054  | -66.5536  | 3.0635    | -3.0379  |
| 107   | -66.5536  | 3.0635    | -3.0379  | -59.6589  | 3.0647    | -3.0573  |
| 108   | -59.6589  | 3.0647    | -3.0573  | -52.7614  | 3.0658    | -3.0669  |
| 109   | -52.7614  | 3.0658    | -3.0669  | -45.8613  | 3.0657    | -3.0812  |
| 110   | -45.8613  | 3.0657    | -3.0812  | -38.9655  | 3.0653    | -3.0957  |
| 111   | -38.9655  | 3.0653    | -3.0957  | -32.0675  | 3.0665    | -3.1062  |
| 112   | -32.0675  | 3.0665    | -3.1062  | -25.1654  | 3.0668    | -3.2439  |
| 113   | -25.1654  | 3.0668    | -3.2439  | -18.2631  | 3.0672    | -3.2497  |
| 114   | -18.2631  | 3.0672    | -3.2497  | -11.3605  | 3.0677    | -3.2580  |
| 115   | -11.3605  | 3.0677    | -3.2580  | -4.4557   | 3.0678    | -3.2605  |
| 116   | -4.4557   | 3.0678    | -3.2605  | -35.0038  | -17.7014  | -42.2411 |
| 117   | -35.0038  | -17.7014  | -42.2411 | -78.0982  | -20.8265  | -50.0730 |
| 118   | -78.0982  | -20.8265  | -50.0730 | -127.4362 | -23.3264  | -56.3813 |
| 119   | -127.4362 | -23.3264  | -56.3813 | -183.0309 | -25.8265  | -62.6767 |
| 120   | -183.0309 | -25.8265  | -62.6767 | -244.8867 | 1.0687    | -1.6572  |
| 121   | -244.8867 | 1.0687    | -1.6572  | -178.2113 | 27.9637   | 59.3617  |
| 122   | -178.2113 | 27.9637   | 59.3617  | -117.8094 | 25.4634   | 53.0692  |
| 123   | -117.8094 | 25.4634   | 53.0692  | -87.3588  | 3.0938    | -2.9651  |
| 124   | -87.3588  | 3.0938    | -2.9651  | -80.3979  | 3.0936    | -2.9783  |
| 125   | -80.3979  | 3.0936    | -2.9783  | -73.4339  | 3.0934    | -3.0157  |
| 126   | -73.4339  | 3.0934    | -3.0157  | -66.4714  | 3.0920    | -3.0360  |
| 127   | -66.4714  | 3.0920    | -3.0360  | -59.5184  | 3.0912    | -3.0542  |
| 128   | -59.5184  | 3.0912    | -3.0542  | -52.5604  | 3.0911    | -3.0736  |
| 129   | -52.5604  | 3.0911    | -3.0736  | -45.6024  | 3.0927    | -3.0809  |
| 130   | -45.6024  | 3.0927    | -3.0809  | -38.6426  | 3.0937    | -3.1003  |
| 131   | -38.6426  | 3.0937    | -3.1003  | -31.6795  | 3.0936    | -3.1121  |
| 132   | -31.6795  | 3.0936    | -3.1121  | -24.7185  | 3.0931    | -3.2431  |
| 133   | -24.7185  | 3.0931    | -3.2431  | -17.7554  | 3.0932    | -3.2505  |
| 134   | -17.7554  | 3.0932    | -3.2505  | -10.7925  | 3.0932    | -3.2555  |
| 135   | -10.7925  | 3.0932    | -3.2555  | -3.8305   | 3.0935    | -3.2580  |
| 136   | -3.8305   | 3.0935    | -3.2580  | -11.0227  | -16.7849  | -42.8378 |
| 137   | -11.0227  | -16.7849  | -42.8378 | -52.0567  | -19.9099  | -50.6652 |
| 138   | -52.0567  | -19.9099  | -50.6652 | -99.3467  | -22.4097  | -56.9435 |
| 139   | -99.3467  | -22.4097  | -56.9435 | -152.8649 | -24.9095  | -63.2390 |
| 140   | -152.8649 | -24.9095  | -63.2390 | -212.6649 | 0.1866    | -9.0507  |
| 141   | -212.6649 | 0.1866    | -9.0507  | -163.6837 | 26.5329   | 48.2565  |
| 142   | -163.6837 | 26.5329   | 48.2565  | -118.6696 | 24.0331   | 41.9919  |
| 143   | -118.6696 | 24.0331   | 41.9919  | -94.8152  | 3.0987    | -3.5917  |
| 144   | -94.8152  | 3.0987    | -3.5917  | -89.2339  | 3.0997    | -3.6293  |
| 145   | -89.2339  | 3.0997    | -3.6293  | -83.6552  | 3.0988    | -3.6425  |
| 146   | -83.6552  | 3.0988    | -3.6425  | -78.0788  | 3.0946    | -3.6598  |
| 147   | -78.0788  | 3.0946    | -3.6598  | -72.5086  | 3.0949    | -3.6741  |
| 148   | -72.5086  | 3.0949    | -3.6741  | -66.9358  | 3.0967    | -3.7006  |
| 149   | -66.9358  | 3.0967    | -3.7006  | -61.3641  | 3.0950    | -3.7151  |
| 150   | -61.3641  | 3.0950    | -3.7151  | -55.7924  | 3.0960    | -3.7273  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|---------|----------|-----------|----------|
| 151   | -55.7924 | 3.0960    | -3.7273 | -50.2144 | 3.0968    | -3.7481  |
| 152   | -50.2144 | 3.0968    | -3.7481 | -44.6395 | 3.0958    | -3.7573  |
| 153   | -44.6395 | 3.0958    | -3.7573 | -39.0666 | 3.0968    | -3.7573  |
| 154   | -39.0666 | 3.0968    | -3.7573 | -33.4878 | 3.0988    | -3.7702  |
| 155   | -33.4878 | 3.0988    | -3.7702 | -27.9055 | 3.0990    | -3.7879  |
| 156   | -27.9055 | 3.0990    | -3.7879 | -22.3244 | 3.0994    | -3.7893  |
| 157   | -22.3244 | 3.0994    | -3.7893 | -16.7443 | 3.1003    | -3.7885  |
| 158   | -16.7443 | 3.1003    | -3.7885 | -11.1619 | 3.1008    | -3.7945  |
| 159   | -11.1619 | 3.1008    | -3.7945 | -5.5807  | 3.1003    | -3.7975  |
| 160   | -5.5807  | 3.1003    | -3.7975 | -0.0048  | -15.9708  | -57.8594 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 1     | -0.0039   | 19.0748   | 53.8964 | 33.3258   | 17.8247   | 50.7692 |
| 2     | 33.3258   | 17.8247   | 50.7692 | 62.6436   | 15.3248   | 44.5284 |
| 3     | 62.6436   | 15.3248   | 44.5284 | 87.9673   | 12.8216   | 38.3022 |
| 4     | 87.9673   | 12.8216   | 38.3022 | 109.2827  | 10.3196   | 32.0625 |
| 5     | 109.2827  | 10.3196   | 32.0625 | 126.6030  | 8.4470    | 27.4011 |
| 6     | 126.6030  | 8.4470    | 27.4011 | 139.6767  | 6.5752    | 22.5820 |
| 7     | 139.6767  | 6.5752    | 22.5820 | 148.7572  | 4.0705    | 16.3849 |
| 8     | 148.7572  | 4.0705    | 16.3849 | 153.8224  | 1.5647    | 10.1529 |
| 9     | 153.8224  | 1.5647    | 10.1529 | -0.0043   | -0.0003   | -0.1613 |
| 10    | -0.0043   | -0.0003   | -0.1613 | -0.0047   | -0.0003   | -0.1613 |
| 11    | -0.0047   | -0.0003   | -0.1613 | -0.0052   | -0.0003   | -0.1613 |
| 12    | -0.0052   | -0.0003   | -0.1613 | -0.0056   | -0.0003   | -0.1613 |
| 13    | -0.0056   | -0.0003   | -0.1613 | -0.0060   | -0.0003   | -0.1613 |
| 14    | -0.0060   | -0.0003   | -0.1613 | -0.0065   | -0.0003   | -0.1613 |
| 15    | -0.0065   | -0.0003   | -0.1613 | -0.0070   | -0.0003   | -0.1613 |
| 16    | -0.0070   | -0.0003   | -0.1613 | -0.0074   | -0.0003   | -0.1613 |
| 17    | -0.0074   | -0.0003   | -0.1613 | -0.0078   | -0.0003   | -0.1613 |
| 18    | -0.0078   | -0.0003   | -0.1613 | -0.0083   | -0.0003   | -0.1613 |
| 19    | -0.0083   | -0.0003   | -0.1613 | -0.0087   | -0.0003   | -0.1613 |
| 20    | -0.0087   | -0.0003   | -0.1613 | -243.6313 | 0.9285    | 7.2866  |
| 21    | -243.6313 | 0.9285    | 7.2866  | -176.9205 | 28.0013   | 60.1323 |
| 22    | -176.9205 | 28.0013   | 60.1323 | -116.4373 | 25.5010   | 53.8102 |
| 23    | -116.4373 | 25.5010   | 53.8102 | -62.1993  | 23.0009   | 47.5196 |
| 24    | -62.1993  | 23.0009   | 47.5196 | -14.1954  | 19.8759   | 39.7004 |
| 25    | -14.1954  | 19.8759   | 39.7004 | 27.2356   | 16.7504   | 31.8899 |
| 26    | 27.2356   | 16.7504   | 31.8899 | 62.4074   | 14.2507   | 25.5361 |
| 27    | 62.4074   | 14.2507   | 25.5361 | 91.3345   | 11.7507   | 19.2992 |
| 28    | 91.3345   | 11.7507   | 19.2992 | 114.0182  | 8.6267    | 11.6281 |
| 29    | 114.0182  | 8.6267    | 11.6281 | 130.1421  | 5.5021    | 3.8690  |
| 30    | 130.1421  | 5.5021    | 3.8690  | 140.0152  | 3.0024    | -2.4967 |
| 31    | 140.0152  | 3.0024    | -2.4967 | -30.0705  | 2.8732    | -2.4085 |
| 32    | -30.0705  | 2.8732    | -2.4085 | -23.6035  | 2.8734    | -2.4239 |
| 33    | -23.6035  | 2.8734    | -2.4239 | -17.1409  | 2.8714    | -2.4237 |
| 34    | -17.1409  | 2.8714    | -2.4237 | -10.6806  | 2.8707    | -2.4279 |
| 35    | -10.6806  | 2.8707    | -2.4279 | -4.2199   | 2.8700    | -2.4325 |
| 36    | -4.2199   | 2.8700    | -2.4325 | 2.2364    | 2.8701    | -2.4343 |
| 37    | 2.2364    | 2.8701    | -2.4343 | 8.6985    | 2.8709    | -2.4304 |
| 38    | 8.6985    | 2.8709    | -2.4304 | 15.1576   | 2.8710    | -2.4287 |
| 39    | 15.1576   | 2.8710    | -2.4287 | 21.6190   | 2.8712    | -2.4240 |
| 40    | 21.6190   | 2.8712    | -2.4240 | -246.8280 | 1.0739    | -1.2667 |
| 41    | -246.8280 | 1.0739    | -1.2667 | -179.8980 | 28.0958   | 59.4230 |
| 42    | -179.8980 | 28.0958   | 59.4230 | -119.2018 | 25.5958   | 53.1153 |
| 43    | -119.2018 | 25.5958   | 53.1153 | -64.7355  | 23.0956   | 46.8305 |
| 44    | -64.7355  | 23.0956   | 46.8305 | -16.5308  | 19.9702   | 39.0036 |
| 45    | -16.5308  | 19.9702   | 39.0036 | 25.1140   | 16.8467   | 31.0641 |
| 46    | 25.1140   | 16.8467   | 31.0641 | 60.4963   | 14.3480   | 24.9538 |
| 47    | 60.4963   | 14.3480   | 24.9538 | 89.6499   | 11.8494   | 18.7214 |
| 48    | 89.6499   | 11.8494   | 18.7214 | 112.5503  | 8.7246    | 10.9339 |
| 49    | 112.5503  | 8.7246    | 10.9339 | 128.8921  | 5.5975    | 3.1342  |
| 50    | 128.8921  | 5.5975    | 3.1342  | 138.9836  | 3.0939    | -3.0785 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 51    | 138.9836  | 3.0939    | -3.0785 | -32.2836  | 3.0811    | -3.0742 |
| 52    | -32.2836  | 3.0811    | -3.0742 | -25.3472  | 3.0817    | -3.0820 |
| 53    | -25.3472  | 3.0817    | -3.0820 | -18.4114  | 3.0819    | -3.0928 |
| 54    | -18.4114  | 3.0819    | -3.0928 | -11.4729  | 3.0827    | -3.0975 |
| 55    | -11.4729  | 3.0827    | -3.0975 | -4.5377   | 3.0833    | -3.0996 |
| 56    | -4.5377   | 3.0833    | -3.0996 | 2.4000    | 3.0829    | -3.0986 |
| 57    | 2.4000    | 3.0829    | -3.0986 | 9.3390    | 3.0824    | -3.0978 |
| 58    | 9.3390    | 3.0824    | -3.0978 | 16.2746   | 3.0828    | -3.0954 |
| 59    | 16.2746   | 3.0828    | -3.0954 | 23.2135   | 3.0830    | -3.0852 |
| 60    | 23.2135   | 3.0830    | -3.0852 | -245.6308 | 1.1166    | -1.6269 |
| 61    | -245.6308 | 1.1166    | -1.6269 | -178.7570 | 28.0630   | 59.4152 |
| 62    | -178.7570 | 28.0630   | 59.4152 | -118.1464 | 25.5629   | 53.0840 |
| 63    | -118.1464 | 25.5629   | 53.0840 | -63.7596  | 23.0622   | 46.7993 |
| 64    | -63.7596  | 23.0622   | 46.7993 | -15.6331  | 19.9354   | 38.9715 |
| 65    | -15.6331  | 19.9354   | 38.9715 | 25.9262   | 16.8084   | 31.1578 |
| 66    | 25.9262   | 16.8084   | 31.1578 | 61.2400   | 14.3068   | 24.7999 |
| 67    | 61.2400   | 14.3068   | 24.7999 | 90.3018   | 11.8073   | 18.5646 |
| 68    | 90.3018   | 11.8073   | 18.5646 | 113.1159  | 8.6838    | 10.8885 |
| 69    | 113.1159  | 8.6838    | 10.8885 | 129.3649  | 5.5588    | 3.1067  |
| 70    | 129.3649  | 5.5588    | 3.1067  | 139.3676  | 3.0589    | -3.0819 |
| 71    | 139.3676  | 3.0589    | -3.0819 | -32.0260  | 3.0590    | -3.1104 |
| 72    | -32.0260  | 3.0590    | -3.1104 | -25.1436  | 3.0599    | -3.1147 |
| 73    | -25.1436  | 3.0599    | -3.1147 | -18.2561  | 3.0595    | -3.1245 |
| 74    | -18.2561  | 3.0595    | -3.1245 | -11.3720  | 3.0585    | -3.1296 |
| 75    | -11.3720  | 3.0585    | -3.1296 | -4.4932   | 3.0582    | -3.1303 |
| 76    | -4.4932   | 3.0582    | -3.1303 | 2.3919    | 3.0582    | -3.1308 |
| 77    | 2.3919    | 3.0582    | -3.1308 | 9.2726    | 3.0586    | -3.1314 |
| 78    | 9.2726    | 3.0586    | -3.1314 | 16.1558   | 3.0587    | -3.1277 |
| 79    | 16.1558   | 3.0587    | -3.1277 | 23.0399   | 3.0585    | -3.1154 |
| 80    | 23.0399   | 3.0585    | -3.1154 | -245.9059 | 1.1047    | -1.6716 |
| 81    | -245.9059 | 1.1047    | -1.6716 | -179.0379 | 28.0680   | 59.4001 |
| 82    | -179.0379 | 28.0680   | 59.4001 | -118.3876 | 25.5679   | 53.0975 |
| 83    | -118.3876 | 25.5679   | 53.0975 | -64.0049  | 23.0682   | 46.6785 |
| 84    | -64.0049  | 23.0682   | 46.6785 | -15.8705  | 19.9433   | 38.8419 |
| 85    | -15.8705  | 19.9433   | 38.8419 | 25.7129   | 16.8179   | 31.1646 |
| 86    | 25.7129   | 16.8179   | 31.1646 | 61.0325   | 14.3183   | 24.9120 |
| 87    | 61.0325   | 14.3183   | 24.9120 | 90.1272   | 11.8177   | 18.5499 |
| 88    | 90.1272   | 11.8177   | 18.5499 | 112.9570  | 8.6917    | 10.9239 |
| 89    | 112.9570  | 8.6917    | 10.9239 | 129.2270  | 5.5647    | 3.1398  |
| 90    | 129.2270  | 5.5647    | 3.1398  | -39.0154  | 3.0690    | -3.0996 |
| 91    | -39.0154  | 3.0690    | -3.0996 | -32.1067  | 3.0694    | -3.1152 |
| 92    | -32.1067  | 3.0694    | -3.1152 | -25.1997  | 3.0687    | -3.2541 |
| 93    | -25.1997  | 3.0687    | -3.2541 | -18.2990  | 3.0677    | -3.2555 |
| 94    | -18.2990  | 3.0677    | -3.2555 | -11.3972  | 3.0665    | -3.1348 |
| 95    | -11.3972  | 3.0665    | -3.1348 | -4.4965   | 3.0661    | -3.1375 |
| 96    | -4.4965   | 3.0661    | -3.1375 | 2.4023    | 3.0661    | -3.1376 |
| 97    | 2.4023    | 3.0661    | -3.1376 | 9.3029    | 3.0660    | -3.1351 |
| 98    | 9.3029    | 3.0660    | -3.1351 | 16.2042   | 3.0661    | -3.1339 |
| 99    | 16.2042   | 3.0661    | -3.1339 | 23.1036   | 3.0664    | -3.1233 |
| 100   | 23.1036   | 3.0664    | -3.1233 | 30.0046   | 1.1070    | -1.6444 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 101   | 30.0046   | 1.1070    | -1.6444 | -178.9034 | 28.0604   | 59.3983 |
| 102   | -178.9034 | 28.0604   | 59.3983 | -118.2856 | 25.5606   | 53.1068 |
| 103   | -118.2856 | 25.5606   | 53.1068 | -63.9279  | 23.0606   | 46.8030 |
| 104   | -63.9279  | 23.0606   | 46.8030 | -15.7906  | 19.9351   | 38.9743 |
| 105   | -15.7906  | 19.9351   | 38.9743 | 25.7793   | 16.8102   | 31.1637 |
| 106   | 25.7793   | 16.8102   | 31.1637 | 61.0967   | 14.3106   | 24.7975 |
| 107   | 61.0967   | 14.3106   | 24.7975 | 90.1530   | 11.8098   | 18.5651 |
| 108   | 90.1530   | 11.8098   | 18.5651 | 112.9693  | 8.6834    | 10.8888 |
| 109   | 112.9693  | 8.6834    | 10.8888 | 129.2213  | 5.5568    | 3.1110  |
| 110   | 129.2213  | 5.5568    | 3.1110  | -38.9606  | 3.0660    | -3.2239 |
| 111   | -38.9606  | 3.0660    | -3.2239 | -32.0653  | 3.0666    | -3.2339 |
| 112   | -32.0653  | 3.0666    | -3.2339 | -25.1653  | 3.0675    | -3.1165 |
| 113   | -25.1653  | 3.0675    | -3.1165 | -18.2622  | 3.0683    | -3.1222 |
| 114   | -18.2622  | 3.0683    | -3.1222 | -11.3576  | 3.0683    | -3.1298 |
| 115   | -11.3576  | 3.0683    | -3.1298 | -4.4521   | 3.0686    | -3.1329 |
| 116   | -4.4521   | 3.0686    | -3.1329 | 2.4523    | 3.0682    | -3.1333 |
| 117   | 2.4523    | 3.0682    | -3.1333 | 9.3528    | 3.0676    | -3.1319 |
| 118   | 9.3528    | 3.0676    | -3.1319 | 16.2575   | 3.0677    | -3.1249 |
| 119   | 16.2575   | 3.0677    | -3.1249 | 23.1609   | 3.0675    | -3.1199 |
| 120   | 23.1609   | 3.0675    | -3.1199 | 30.0644   | 1.1039    | -1.6470 |
| 121   | 30.0644   | 1.1039    | -1.6470 | -178.2113 | 27.9637   | 59.3617 |
| 122   | -178.2113 | 27.9637   | 59.3617 | -117.8094 | 25.4634   | 53.0692 |
| 123   | -117.8094 | 25.4634   | 53.0692 | -63.6606  | 22.9626   | 46.7779 |
| 124   | -63.6606  | 22.9626   | 46.7779 | -15.7534  | 19.8382   | 38.9564 |
| 125   | -15.7534  | 19.8382   | 38.9564 | 25.5965   | 16.7139   | 31.1432 |
| 126   | 25.5965   | 16.7139   | 31.1432 | 60.7011   | 14.2159   | 24.8937 |
| 127   | 60.7011   | 14.2159   | 24.8937 | 89.5459   | 11.7170   | 18.6670 |
| 128   | 89.5459   | 11.7170   | 18.6670 | 112.1533  | 8.5908    | 10.7524 |
| 129   | 112.1533  | 8.5908    | 10.7524 | 128.2043  | 5.4655    | 2.9509  |
| 130   | 128.2043  | 5.4655    | 2.9509  | -38.6426  | 3.0937    | -3.1003 |
| 131   | -38.6426  | 3.0937    | -3.1003 | -31.6795  | 3.0936    | -3.1121 |
| 132   | -31.6795  | 3.0936    | -3.1121 | -24.7183  | 3.0942    | -3.1159 |
| 133   | -24.7183  | 3.0942    | -3.1159 | -17.7547  | 3.0939    | -3.1230 |
| 134   | -17.7547  | 3.0939    | -3.1230 | -10.7896  | 3.0944    | -3.1277 |
| 135   | -10.7896  | 3.0944    | -3.1277 | -3.8259   | 3.0947    | -3.1302 |
| 136   | -3.8259   | 3.0947    | -3.1302 | 3.1360    | 3.0948    | -3.1314 |
| 137   | 3.1360    | 3.0948    | -3.1314 | 10.1004   | 3.0949    | -3.1297 |
| 138   | 10.1004   | 3.0949    | -3.1297 | 17.0652   | 3.0943    | -3.1251 |
| 139   | 17.0652   | 3.0943    | -3.1251 | 24.0270   | 3.0943    | -3.1186 |
| 140   | 24.0270   | 3.0943    | -3.1186 | 30.9913   | 1.1167    | -1.6581 |
| 141   | 30.9913   | 1.1167    | -1.6581 | -163.6837 | 26.5329   | 48.2565 |
| 142   | -163.6837 | 26.5329   | 48.2565 | -118.6696 | 24.0331   | 41.9919 |
| 143   | -118.6696 | 24.0331   | 41.9919 | -77.6763  | 21.5329   | 35.7290 |
| 144   | -77.6763  | 21.5329   | 35.7290 | -40.6636  | 19.0336   | 29.4418 |
| 145   | -40.6636  | 19.0336   | 29.4418 | -7.6687   | 17.7836   | 26.3140 |
| 146   | -7.6687   | 17.7836   | 26.3140 | 21.0864   | 15.2840   | 20.0571 |
| 147   | 21.0864   | 15.2840   | 20.0571 | 45.8489   | 12.7849   | 13.8106 |
| 148   | 45.8489   | 12.7849   | 13.8106 | 66.5993   | 10.2844   | 7.5778  |
| 149   | 66.5993   | 10.2844   | 7.5778  | 83.3606   | 7.7844    | 1.3379  |
| 150   | 83.3606   | 7.7844    | 1.3379  | 96.1244   | 6.5342    | -1.7690 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1 | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
| 151   | 96.1244  | 6.5342    | -1.7690 | 104.6395 | 4.0323    | -7.9846 |
| 152   | 104.6395 | 4.0323    | -7.9846 | -44.6395 | 3.0958    | -3.7573 |
| 153   | -44.6395 | 3.0958    | -3.7573 | -39.0666 | 3.0968    | -3.7573 |
| 154   | -39.0666 | 3.0968    | -3.7573 | -33.4818 | 3.0994    | -3.9253 |
| 155   | -33.4818 | 3.0994    | -3.9253 | -27.9007 | 3.0995    | -3.9437 |
| 156   | -27.9007 | 3.0995    | -3.9437 | -22.3244 | 3.0994    | -3.7893 |
| 157   | -22.3244 | 3.0994    | -3.7893 | -16.7443 | 3.1003    | -3.7885 |
| 158   | -16.7443 | 3.1003    | -3.7885 | -11.1619 | 3.1008    | -3.7945 |
| 159   | -11.1619 | 3.1008    | -3.7945 | -5.5807  | 3.1003    | -3.7975 |
| 160   | -5.5807  | 3.1003    | -3.7975 | -0.0006  | 3.0993    | -3.7984 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -0.0002   | -0.0003   | -0.1613  | 1.1704    | -0.0439   | -0.4029  |
| 2     | 1.1704    | -0.0439   | -0.4029  | 6.5582    | -0.2613   | -1.1260  |
| 3     | 6.5582    | -0.2613   | -1.1260  | 15.2302   | -0.6511   | -2.1641  |
| 4     | 15.2302   | -0.6511   | -2.1641  | 26.2653   | -1.2124   | -3.5191  |
| 5     | 26.2653   | -1.2124   | -3.5191  | 30.9861   | -1.5565   | -4.3103  |
| 6     | 30.9861   | -1.5565   | -4.3103  | 43.1445   | -2.3692   | -6.1328  |
| 7     | 43.1445   | -2.3692   | -6.1328  | 55.3022   | -3.3479   | -8.2587  |
| 8     | 55.3022   | -3.3479   | -8.2587  | 66.6133   | -4.4897   | -10.7024 |
| 9     | 66.6133   | -4.4897   | -10.7024 | 76.2883   | -5.7890   | -13.4611 |
| 10    | 76.2883   | -5.7890   | -13.4611 | 80.6705   | -6.7688   | 3.0037   |
| 11    | 80.6705   | -6.7688   | 3.0037   | 66.3618   | -8.6433   | -1.6698  |
| 12    | 66.3618   | -8.6433   | -1.6698  | 48.0562   | -11.1434  | -7.9093  |
| 13    | 48.0562   | -11.1434  | -7.9093  | 25.7610   | -13.6439  | -14.1659 |
| 14    | 25.7610   | -13.6439  | -14.1659 | -0.5501   | -16.1443  | -20.4151 |
| 15    | -0.5501   | -16.1443  | -20.4151 | -30.8638  | -18.0191  | -25.0941 |
| 16    | -30.8638  | -18.0191  | -25.0941 | -65.4202  | -19.8943  | -29.8171 |
| 17    | -65.4202  | -19.8943  | -29.8171 | -103.9596 | -22.3944  | -36.0908 |
| 18    | -103.9596 | -22.3944  | -36.0908 | -146.5262 | -24.8942  | -42.3531 |
| 19    | -146.5262 | -24.8942  | -42.3531 | -193.0561 | -27.3941  | -48.6755 |
| 20    | -193.0561 | -27.3941  | -48.6755 | -101.1566 | -10.9087  | -28.7284 |
| 21    | -101.1566 | -10.9087  | -28.7284 | -0.0086   | 0.0003    | -0.0068  |
| 22    | -0.0086   | 0.0003    | -0.0068  | -0.0080   | 0.0003    | -0.0068  |
| 23    | -0.0080   | 0.0003    | -0.0068  | -0.0074   | 0.0003    | -0.0068  |
| 24    | -0.0074   | 0.0003    | -0.0068  | -0.0069   | 0.0003    | -0.0068  |
| 25    | -0.0069   | 0.0003    | -0.0068  | -0.0063   | 0.0003    | -0.0069  |
| 26    | -0.0063   | 0.0003    | -0.0069  | -0.0057   | 0.0003    | -0.0069  |
| 27    | -0.0057   | 0.0003    | -0.0069  | -0.0051   | 0.0003    | -0.0069  |
| 28    | -0.0051   | 0.0003    | -0.0069  | 15.3400   | -0.7287   | -14.1681 |
| 29    | 15.3400   | -0.7287   | -14.1681 | 39.0653   | -2.2441   | -18.1649 |
| 30    | 39.0653   | -2.2441   | -18.1649 | 51.5628   | -3.4192   | -21.1529 |
| 31    | 51.5628   | -3.4192   | -21.1529 | 60.9890   | -4.7281   | -24.3930 |
| 32    | 60.9890   | -4.7281   | -24.3930 | 73.9186   | -6.5759   | -13.3974 |
| 33    | 73.9186   | -6.5759   | -13.3974 | 55.8375   | -9.6992   | -21.2103 |
| 34    | 55.8375   | -9.6992   | -21.2103 | 31.5250   | -12.1983  | -27.4548 |
| 35    | 31.5250   | -12.1983  | -27.4548 | 0.9747    | -14.6981  | -33.6997 |
| 36    | 0.9747    | -14.6981  | -33.6997 | -35.8355  | -17.8231  | -41.5132 |
| 37    | -35.8355  | -17.8231  | -41.5132 | -79.2119  | -20.9482  | -49.3626 |
| 38    | -79.2119  | -20.9482  | -49.3626 | -128.8211 | -23.4482  | -55.6354 |
| 39    | -128.8211 | -23.4482  | -55.6354 | -184.7012 | -25.9482  | -61.9304 |
| 40    | -184.7012 | -25.9482  | -61.9304 | -108.4935 | -10.7076  | -36.9631 |
| 41    | -108.4935 | -10.7076  | -36.9631 | 26.2882   | -0.7975   | -0.1414  |
| 42    | 26.2882   | -0.7975   | -0.1414  | 24.4935   | -0.7975   | -0.1326  |
| 43    | 24.4935   | -0.7975   | -0.1326  | 22.6992   | -0.7976   | -0.1253  |
| 44    | 22.6992   | -0.7976   | -0.1253  | 20.9043   | -0.7979   | -0.1222  |
| 45    | 20.9043   | -0.7979   | -0.1222  | 19.1096   | -0.7976   | -0.1161  |
| 46    | 19.1096   | -0.7976   | -0.1161  | 17.3159   | -0.7972   | -0.1075  |
| 47    | 17.3159   | -0.7972   | -0.1075  | 15.5219   | -0.7971   | -0.1024  |
| 48    | 15.5219   | -0.7971   | -0.1024  | 13.7289   | -0.7973   | -0.0978  |
| 49    | 13.7289   | -0.7973   | -0.0978  | 36.9222   | -2.0992   | -18.8631 |
| 50    | 36.9222   | -2.0992   | -18.8631 | 49.8638   | -3.2825   | -21.8507 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 51    | 49.8638   | -3.2825   | -21.8507 | 59.6855   | -4.5985   | -25.0902 |
| 52    | 59.6855   | -4.5985   | -25.0902 | 72.9557   | -6.4543   | -14.1193 |
| 53    | 72.9557   | -6.4543   | -14.1193 | 55.1596   | -9.5796   | -21.9060 |
| 54    | 55.1596   | -9.5796   | -21.9060 | 31.1083   | -12.0790  | -28.1475 |
| 55    | 31.1083   | -12.0790  | -28.1475 | 0.8139    | -14.5796  | -34.3980 |
| 56    | 0.8139    | -14.5796  | -34.3980 | -35.7226  | -17.7048  | -42.2291 |
| 57    | -35.7226  | -17.7048  | -42.2291 | -78.8437  | -20.8295  | -50.0578 |
| 58    | -78.8437  | -20.8295  | -50.0578 | -128.1926 | -23.3297  | -56.3322 |
| 59    | -128.1926 | -23.3297  | -56.3322 | -183.7840 | -25.8297  | -62.6667 |
| 60    | -183.7840 | -25.8297  | -62.6667 | -107.6880 | -10.6803  | -37.3314 |
| 61    | -107.6880 | -10.6803  | -37.3314 | 28.2262   | -0.8557   | -0.1736  |
| 62    | 28.2262   | -0.8557   | -0.1736  | 26.3015   | -0.8555   | -0.1602  |
| 63    | 26.3015   | -0.8555   | -0.1602  | 24.3764   | -0.8558   | -0.1521  |
| 64    | 24.3764   | -0.8558   | -0.1521  | 22.4504   | -0.8562   | -0.1489  |
| 65    | 22.4504   | -0.8562   | -0.1489  | 20.5160   | -0.8565   | -0.1506  |
| 66    | 20.5160   | -0.8565   | -0.1506  | 18.5960   | -0.8569   | -0.1359  |
| 67    | 18.5960   | -0.8569   | -0.1359  | 16.6681   | -0.8570   | -0.1298  |
| 68    | 16.6681   | -0.8570   | -0.1298  | 14.7397   | -0.8570   | -0.1276  |
| 69    | 14.7397   | -0.8570   | -0.1276  | 37.3492   | -2.1289   | -18.8946 |
| 70    | 37.3492   | -2.1289   | -18.8946 | 50.2337   | -3.3128   | -21.8729 |
| 71    | 50.2337   | -3.3128   | -21.8729 | 59.9911   | -4.6298   | -25.1083 |
| 72    | 59.9911   | -4.6298   | -25.1083 | 73.2117   | -6.4839   | -14.1544 |
| 73    | 73.2117   | -6.4839   | -14.1544 | 55.3469   | -9.6090   | -21.9445 |
| 74    | 55.3469   | -9.6090   | -21.9445 | 31.2295   | -12.1087  | -28.1831 |
| 75    | 31.2295   | -12.1087  | -28.1831 | 0.8745    | -14.6086  | -34.4334 |
| 76    | 0.8745    | -14.6086  | -34.4334 | -35.7403  | -17.7332  | -42.2618 |
| 77    | -35.7403  | -17.7332  | -42.2618 | -78.9061  | -20.8582  | -50.0795 |
| 78    | -78.9061  | -20.8582  | -50.0795 | -128.3309 | -23.3582  | -56.3636 |
| 79    | -128.3309 | -23.3582  | -56.3636 | -183.9757 | -25.8582  | -62.7164 |
| 80    | -183.9757 | -25.8582  | -62.7164 | -107.9995 | -10.6885  | -37.3523 |
| 81    | -107.9995 | -10.6885  | -37.3523 | 28.0093   | -0.8499   | -0.1738  |
| 82    | 28.0093   | -0.8499   | -0.1738  | 26.0968   | -0.8498   | -0.1652  |
| 83    | 26.0968   | -0.8498   | -0.1652  | 24.1854   | -0.8499   | -0.1539  |
| 84    | 24.1854   | -0.8499   | -0.1539  | 22.2738   | -0.8497   | -0.1494  |
| 85    | 22.2738   | -0.8497   | -0.1494  | 20.3617   | -0.8498   | -0.1433  |
| 86    | 20.3617   | -0.8498   | -0.1433  | 18.4492   | -0.8499   | -0.1367  |
| 87    | 18.4492   | -0.8499   | -0.1367  | 16.5374   | -0.8498   | -0.1340  |
| 88    | 16.5374   | -0.8498   | -0.1340  | 14.6255   | -0.8503   | -0.1241  |
| 89    | 14.6255   | -0.8503   | -0.1241  | 37.2211   | -2.1200   | -18.8853 |
| 90    | 37.2211   | -2.1200   | -18.8853 | 50.1140   | -3.3052   | -21.8836 |
| 91    | 50.1140   | -3.3052   | -21.8836 | 59.8870   | -4.6230   | -25.1155 |
| 92    | 59.8870   | -4.6230   | -25.1155 | 73.1432   | -6.4738   | -14.1465 |
| 93    | 73.1432   | -6.4738   | -14.1465 | 55.2983   | -9.5984   | -21.9555 |
| 94    | 55.2983   | -9.5984   | -21.9555 | 31.2168   | -12.0987  | -28.1875 |
| 95    | 31.2168   | -12.0987  | -28.1875 | 0.8779    | -14.5978  | -34.4374 |
| 96    | 0.8779    | -14.5978  | -34.4374 | -35.6962  | -17.7222  | -42.2621 |
| 97    | -35.6962  | -17.7222  | -42.2621 | -78.8408  | -20.8473  | -50.1008 |
| 98    | -78.8408  | -20.8473  | -50.1008 | -128.2582 | -23.3475  | -56.3657 |
| 99    | -128.2582 | -23.3475  | -56.3657 | -183.8719 | -25.8475  | -62.7057 |
| 100   | -183.8719 | -25.8475  | -62.7057 | -107.9079 | -10.6846  | -37.3611 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 101   | -107.9079 | -10.6846  | -37.3611 | 28.0863   | -0.8523   | -0.1768  |
| 102   | 28.0863   | -0.8523   | -0.1768  | 26.1690   | -0.8523   | -0.1687  |
| 103   | 26.1690   | -0.8523   | -0.1687  | 24.2520   | -0.8524   | -0.1563  |
| 104   | 24.2520   | -0.8524   | -0.1563  | 22.3340   | -0.8525   | -0.1520  |
| 105   | 22.3340   | -0.8525   | -0.1520  | 20.4158   | -0.8523   | -0.1455  |
| 106   | 20.4158   | -0.8523   | -0.1455  | 18.4978   | -0.8524   | -0.1365  |
| 107   | 18.4978   | -0.8524   | -0.1365  | 16.5807   | -0.8526   | -0.1312  |
| 108   | 16.5807   | -0.8526   | -0.1312  | 14.6618   | -0.8528   | -0.1285  |
| 109   | 14.6618   | -0.8528   | -0.1285  | 37.2552   | -2.1234   | -18.8924 |
| 110   | 37.2552   | -2.1234   | -18.8924 | 50.1423   | -3.3079   | -21.8774 |
| 111   | 50.1423   | -3.3079   | -21.8774 | 59.9032   | -4.6259   | -25.1189 |
| 112   | 59.9032   | -4.6259   | -25.1189 | 73.6546   | -6.4510   | -14.1455 |
| 113   | 73.6546   | -6.4510   | -14.1455 | 55.8596   | -9.5767   | -21.9415 |
| 114   | 55.8596   | -9.5767   | -21.9415 | 31.8253   | -12.0773  | -28.1731 |
| 115   | 31.8253   | -12.0773  | -28.1731 | 1.5324    | -14.5765  | -34.4226 |
| 116   | 1.5324    | -14.5765  | -34.4226 | -35.0038  | -17.7014  | -42.2411 |
| 117   | -35.0038  | -17.7014  | -42.2411 | -78.0982  | -20.8265  | -50.0730 |
| 118   | -78.0982  | -20.8265  | -50.0730 | -127.4362 | -23.3264  | -56.3813 |
| 119   | -127.4362 | -23.3264  | -56.3813 | -183.0309 | -25.8265  | -62.6767 |
| 120   | -183.0309 | -25.8265  | -62.6767 | -108.2400 | -10.6772  | -37.3475 |
| 121   | -108.2400 | -10.6772  | -37.3475 | 28.1303   | -0.8598   | -0.1738  |
| 122   | 28.1303   | -0.8598   | -0.1738  | 26.1957   | -0.8600   | -0.1654  |
| 123   | 26.1957   | -0.8600   | -0.1654  | 24.2610   | -0.8600   | -0.1572  |
| 124   | 24.2610   | -0.8600   | -0.1572  | 22.3260   | -0.8600   | -0.1534  |
| 125   | 22.3260   | -0.8600   | -0.1534  | 20.3911   | -0.8598   | -0.1432  |
| 126   | 20.3911   | -0.8598   | -0.1432  | 18.4565   | -0.8593   | -0.1375  |
| 127   | 18.4565   | -0.8593   | -0.1375  | 16.5178   | -0.8588   | -0.1380  |
| 128   | 16.5178   | -0.8588   | -0.1380  | 14.5850   | -0.8589   | -0.1324  |
| 129   | 14.5850   | -0.8589   | -0.1324  | 37.0946   | -2.1357   | -18.9030 |
| 130   | 37.0946   | -2.1357   | -18.9030 | 49.8588   | -3.3286   | -21.8830 |
| 131   | 49.8588   | -3.3286   | -21.8830 | 59.4443   | -4.6534   | -25.1199 |
| 132   | 59.4443   | -4.6534   | -25.1199 | 74.0061   | -6.2628   | -28.9195 |
| 133   | 74.0061   | -6.2628   | -28.9195 | 73.6443   | -8.6597   | -22.5510 |
| 134   | 73.6443   | -8.6597   | -22.5510 | 51.6645   | -11.1595  | -28.7853 |
| 135   | 51.6645   | -11.1595  | -28.7853 | 23.4464   | -13.6600  | -35.0257 |
| 136   | 23.4464   | -13.6600  | -35.0257 | -11.0227  | -16.7849  | -42.8378 |
| 137   | -11.0227  | -16.7849  | -42.8378 | -52.0567  | -19.9099  | -50.6652 |
| 138   | -52.0567  | -19.9099  | -50.6652 | -99.3467  | -22.4097  | -56.9435 |
| 139   | -99.3467  | -22.4097  | -56.9435 | -152.8649 | -24.9095  | -63.2390 |
| 140   | -152.8649 | -24.9095  | -63.2390 | -111.5284 | -10.7212  | -37.7069 |
| 141   | -111.5284 | -10.7212  | -37.7069 | 29.4417   | -0.8608   | -0.1955  |
| 142   | 29.4417   | -0.8608   | -0.1955  | 27.8923   | -0.8608   | -0.1953  |
| 143   | 27.8923   | -0.8608   | -0.1953  | 26.3428   | -0.8609   | -0.1899  |
| 144   | 26.3428   | -0.8609   | -0.1899  | 24.7922   | -0.8611   | -0.1793  |
| 145   | 24.7922   | -0.8611   | -0.1793  | 23.2430   | -0.8612   | -0.1756  |
| 146   | 23.2430   | -0.8612   | -0.1756  | 21.6840   | -0.8607   | -0.1772  |
| 147   | 21.6840   | -0.8607   | -0.1772  | 20.1448   | -0.8598   | -0.1671  |
| 148   | 20.1448   | -0.8598   | -0.1671  | 18.5975   | -0.8599   | -0.1596  |
| 149   | 18.5975   | -0.8599   | -0.1596  | 17.0487   | -0.8597   | -0.1557  |
| 150   | 17.0487   | -0.8597   | -0.1557  | 15.4948   | -0.8595   | -0.1588  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2 | Cortante2 | Torsor2  |
|-------|----------|-----------|----------|----------|-----------|----------|
| 151   | 15.4948  | -0.8595   | -0.1588  | 28.3676  | -1.7534   | -21.2874 |
| 152   | 28.3676  | -1.7534   | -21.2874 | 42.5466  | -2.9564   | -24.7641 |
| 153   | 42.5466  | -2.9564   | -24.7641 | 54.3637  | -4.3178   | -28.5635 |
| 154   | 54.3637  | -4.3178   | -28.5635 | 63.0322  | -5.8406   | -32.6568 |
| 155   | 63.0322  | -5.8406   | -32.6568 | 59.9385  | -6.6635   | -34.7910 |
| 156   | 59.9385  | -6.6635   | -34.7910 | 60.6789  | -8.4339   | -39.3662 |
| 157   | 60.6789  | -8.4339   | -39.3662 | 55.9661  | -10.3715  | -44.2677 |
| 158   | 55.9661  | -10.3715  | -44.2677 | 44.9021  | -12.4827  | -49.4615 |
| 159   | 44.9021  | -12.4827  | -49.4615 | 26.5651  | -14.7649  | -54.9795 |
| 160   | 26.5651  | -14.7649  | -54.9795 | -0.0048  | -15.9708  | -57.8594 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 1     | -0.0046   | 15.9079   | 57.6835 | 27.6407   | 14.6664   | 54.5560 |
| 2     | 27.6407   | 14.6664   | 54.5560 | 51.2560   | 12.1604   | 48.3126 |
| 3     | 51.2560   | 12.1604   | 48.3126 | 70.9108   | 9.6647    | 42.0814 |
| 4     | 70.9108   | 9.6647    | 42.0814 | 86.4911   | 7.1565    | 35.8390 |
| 5     | 86.4911   | 7.1565    | 35.8390 | 98.1069   | 5.2817    | 31.1698 |
| 6     | 98.1069   | 5.2817    | 31.1698 | 105.8110  | 3.4388    | 26.4999 |
| 7     | 105.8110  | 3.4388    | 26.4999 | 109.6648  | 0.9682    | 20.2871 |
| 8     | 109.6648  | 0.9682    | 20.2871 | 108.2323  | -1.5977   | 14.0511 |
| 9     | 108.2323  | -1.5977   | 14.0511 | 104.6723  | -4.0337   | 7.8180  |
| 10    | 104.6723  | -4.0337   | 7.8180  | 96.1623   | -5.9112   | 3.1680  |
| 11    | 96.1623   | -5.9112   | 3.1680  | -0.0052   | -0.0003   | -0.1613 |
| 12    | -0.0052   | -0.0003   | -0.1613 | -0.0056   | -0.0003   | -0.1613 |
| 13    | -0.0056   | -0.0003   | -0.1613 | -0.0060   | -0.0003   | -0.1613 |
| 14    | -0.0060   | -0.0003   | -0.1613 | -0.0065   | -0.0003   | -0.1613 |
| 15    | -0.0065   | -0.0003   | -0.1613 | -0.0070   | -0.0003   | -0.1613 |
| 16    | -0.0070   | -0.0003   | -0.1613 | -0.0074   | -0.0003   | -0.1613 |
| 17    | -0.0074   | -0.0003   | -0.1613 | -0.0078   | -0.0003   | -0.1613 |
| 18    | -0.0078   | -0.0003   | -0.1613 | -0.0083   | -0.0003   | -0.1613 |
| 19    | -0.0083   | -0.0003   | -0.1613 | -0.0087   | -0.0003   | -0.1613 |
| 20    | -0.0087   | -0.0003   | -0.1613 | -211.9924 | -0.2118   | 8.9511  |
| 21    | -211.9924 | -0.2118   | 8.9511  | -152.3926 | 24.8428   | 63.2513 |
| 22    | -152.3926 | 24.8428   | 63.2513 | -99.0438  | 22.3471   | 56.9389 |
| 23    | -99.0438  | 22.3471   | 56.9389 | -51.8931  | 19.8440   | 50.6532 |
| 24    | -51.8931  | 19.8440   | 50.6532 | -10.9909  | 16.7175   | 42.8343 |
| 25    | -10.9909  | 16.7175   | 42.8343 | 23.3332   | 13.5918   | 35.0228 |
| 26    | 23.3332   | 13.5918   | 35.0228 | 51.4266   | 11.1005   | 28.7913 |
| 27    | 51.4266   | 11.1005   | 28.7913 | 73.2142   | 8.5921    | 22.5521 |
| 28    | 73.2142   | 8.5921    | 22.5521 | 88.9208   | 5.4837    | 14.7486 |
| 29    | 88.9208   | 5.4837    | 14.7486 | 97.8301   | 2.3443    | 6.9760  |
| 30    | 97.8301   | 2.3443    | 6.9760  | 100.6579  | -0.1506   | 0.7343  |
| 31    | 100.6579  | -0.1506   | 0.7343  | -0.0027   | 0.0003    | -0.0069 |
| 32    | -0.0027   | 0.0003    | -0.0069 | -0.0021   | 0.0003    | -0.0069 |
| 33    | -0.0021   | 0.0003    | -0.0069 | -0.0015   | 0.0003    | -0.0069 |
| 34    | -0.0015   | 0.0003    | -0.0069 | -0.0010   | 0.0003    | -0.0069 |
| 35    | -0.0010   | 0.0003    | -0.0069 | -0.0004   | 0.0003    | -0.0069 |
| 36    | -0.0004   | 0.0003    | -0.0069 | 0.0002    | 0.0003    | -0.0069 |
| 37    | 0.0002    | 0.0003    | -0.0069 | 0.0008    | 0.0003    | -0.0069 |
| 38    | 0.0008    | 0.0003    | -0.0069 | 0.0014    | 0.0003    | -0.0069 |
| 39    | 0.0014    | 0.0003    | -0.0069 | 0.0020    | 0.0003    | -0.0069 |
| 40    | 0.0020    | 0.0003    | -0.0069 | -216.0990 | -0.0542   | 0.3820  |
| 41    | -216.0990 | -0.0542   | 0.3820  | -156.2213 | 24.9608   | 62.5429 |
| 42    | -156.2213 | 24.9608   | 62.5429 | -102.5797 | 22.4609   | 56.2423 |
| 43    | -102.5797 | 22.4609   | 56.2423 | -55.1715  | 19.9608   | 49.9620 |
| 44    | -55.1715  | 19.9608   | 49.9620 | -14.0196  | 16.8360   | 42.1359 |
| 45    | -14.0196  | 16.8360   | 42.1359 | 20.5683   | 13.7118   | 34.3234 |
| 46    | 20.5683   | 13.7118   | 34.3234 | 48.9054   | 11.2133   | 28.0830 |
| 47    | 48.9054   | 11.2133   | 28.0830 | 70.9974   | 8.7123    | 21.8460 |
| 48    | 70.9974   | 8.7123    | 21.8460 | 86.8392   | 5.5864    | 14.0517 |
| 49    | 86.8392   | 5.5864    | 14.0517 | 96.2410   | 2.4713    | 6.2477  |
| 50    | 96.2410   | 2.4713    | 6.2477  | 99.1772   | -0.0394   | 0.0233  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|---------|-----------|-----------|---------|
| 51    | 99.1772   | -0.0394   | 0.0233  | 0.0008    | -0.0001   | -0.0003 |
| 52    | 0.0008    | -0.0001   | -0.0003 | 0.0006    | -0.0001   | -0.0003 |
| 53    | 0.0006    | -0.0001   | -0.0003 | 0.0004    | -0.0001   | -0.0003 |
| 54    | 0.0004    | -0.0001   | -0.0003 | 0.0003    | -0.0001   | -0.0003 |
| 55    | 0.0003    | -0.0001   | -0.0003 | 0.0001    | -0.0001   | -0.0003 |
| 56    | 0.0001    | -0.0001   | -0.0003 | -0.0001   | -0.0001   | -0.0003 |
| 57    | -0.0001   | -0.0001   | -0.0003 | -0.0002   | -0.0001   | -0.0003 |
| 58    | -0.0002   | -0.0001   | -0.0003 | -0.0004   | -0.0001   | -0.0003 |
| 59    | -0.0004   | -0.0001   | -0.0003 | -0.0006   | -0.0001   | -0.0003 |
| 60    | -0.0006   | -0.0001   | -0.0003 | -215.0154 | -0.0138   | 0.0175  |
| 61    | -215.0154 | -0.0138   | 0.0175  | -155.1893 | 24.9331   | 62.5275 |
| 62    | -155.1893 | 24.9331   | 62.5275 | -101.6200 | 22.4325   | 56.2066 |
| 63    | -101.6200 | 22.4325   | 56.2066 | -54.2789  | 19.9322   | 49.9263 |
| 64    | -54.2789  | 19.9322   | 49.9263 | -13.1943  | 16.8065   | 42.1000 |
| 65    | -13.1943  | 16.8065   | 42.1000 | 21.3363   | 13.6861   | 34.2851 |
| 66    | 21.3363   | 13.6861   | 34.2851 | 49.6199   | 11.1863   | 28.0501 |
| 67    | 49.6199   | 11.1863   | 28.0501 | 71.6955   | 8.6918    | 21.8109 |
| 68    | 71.6955   | 8.6918    | 21.8109 | 87.4325   | 5.5592    | 14.0038 |
| 69    | 87.4325   | 5.5592    | 14.0038 | 96.6530   | 2.4335    | 6.2136  |
| 70    | 96.6530   | 2.4335    | 6.2136  | 99.5995   | -0.0688   | 0.0070  |
| 71    | 99.5995   | -0.0688   | 0.0070  | -0.0002   | 0.0000    | 0.0000  |
| 72    | -0.0002   | 0.0000    | 0.0000  | -0.0002   | 0.0000    | 0.0000  |
| 73    | -0.0002   | 0.0000    | 0.0000  | -0.0001   | 0.0000    | 0.0000  |
| 74    | -0.0001   | 0.0000    | 0.0000  | -0.0001   | 0.0000    | 0.0000  |
| 75    | -0.0001   | 0.0000    | 0.0000  | 0.0000    | 0.0000    | 0.0000  |
| 76    | 0.0000    | 0.0000    | 0.0000  | 0.0000    | 0.0000    | 0.0000  |
| 77    | 0.0000    | 0.0000    | 0.0000  | 0.0001    | 0.0000    | 0.0000  |
| 78    | 0.0001    | 0.0000    | 0.0000  | 0.0001    | 0.0000    | 0.0000  |
| 79    | 0.0001    | 0.0000    | 0.0000  | 0.0002    | 0.0000    | 0.0000  |
| 80    | 0.0002    | 0.0000    | 0.0000  | 0.0002    | 0.0000    | 0.0000  |
| 81    | 0.0002    | 0.0000    | 0.0000  | -156.0063 | 25.0101   | 62.5124 |
| 82    | -156.0063 | 25.0101   | 62.5124 | -102.2430 | 22.5108   | 56.2160 |
| 83    | -102.2430 | 22.5108   | 56.2160 | -54.7467  | 20.0107   | 49.9295 |
| 84    | -54.7467  | 20.0107   | 49.9295 | -13.4890  | 16.8858   | 42.0958 |
| 85    | -13.4890  | 16.8858   | 42.0958 | 21.2194   | 13.7601   | 34.2884 |
| 86    | 21.2194   | 13.7601   | 34.2884 | 49.6588   | 11.2598   | 28.0359 |
| 87    | 49.6588   | 11.2598   | 28.0359 | 71.8818   | 8.7624    | 21.7965 |
| 88    | 71.8818   | 8.7624    | 21.7965 | 87.8372   | 5.6363    | 14.0286 |
| 89    | 87.8372   | 5.6363    | 14.0286 | 97.2084   | 2.5087    | 6.2371  |
| 90    | 97.2084   | 2.5087    | 6.2371  | 0.6796    | -0.0535   | 0.0006  |
| 91    | 0.6796    | -0.0535   | 0.0006  | 0.6130    | -0.0587   | 0.0009  |
| 92    | 0.6130    | -0.0587   | 0.0009  | 0.5073    | -0.0619   | 0.0012  |
| 93    | 0.5073    | -0.0619   | 0.0012  | 0.3622    | -0.0609   | 0.0014  |
| 94    | 0.3622    | -0.0609   | 0.0012  | 0.2252    | -0.0609   | 0.0014  |
| 95    | 0.2252    | -0.0609   | 0.0014  | 0.0868    | -0.0599   | 0.0014  |
| 96    | 0.0868    | -0.0599   | 0.0014  | -0.0487   | -0.0609   | 0.0014  |
| 97    | -0.0487   | -0.0609   | 0.0014  | -0.1877   | -0.0615   | 0.0014  |
| 98    | -0.1877   | -0.0615   | 0.0014  | -0.3175   | -0.0599   | 0.0013  |
| 99    | -0.3175   | -0.0599   | 0.0013  | -0.4596   | -0.0609   | 0.0011  |
| 100   | -0.4596   | -0.0609   | 0.0011  | -0.5966   | -0.0220   | 0.0009  |

## 4 PRETENSADO

### 4.1 TRAZADO

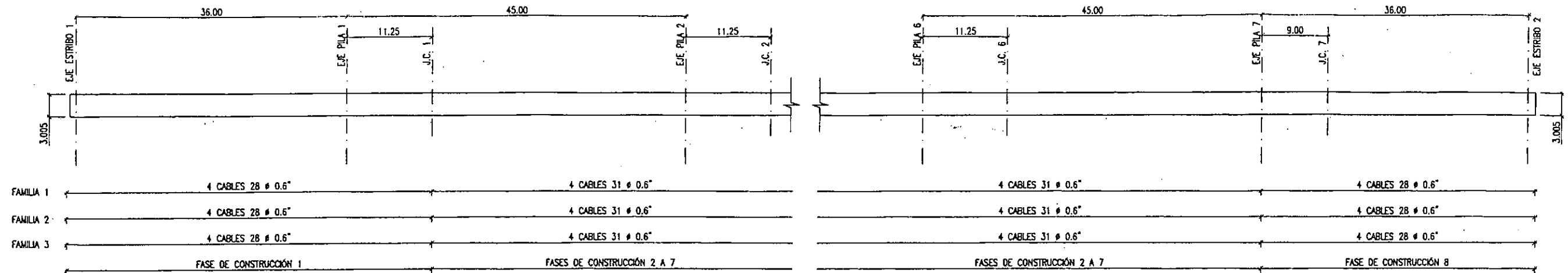
El trazado del pretensado en alzado se define en los planos del proyecto mediante una sucesión de tramos formados por recta y parábolas con continuidad en la pendiente. En planta el trazado puede ser recto o curvo, permitiéndose variaciones del radio de curvatura.

Los 2 extremos del trazado son anclajes de tipo activo. En todas las fases de construcción está previsto el tesado desde un único extremo: el frente de avance o junta de construcción.

A continuación se muestran los esquemas de pretensado contemplados en el cálculo.

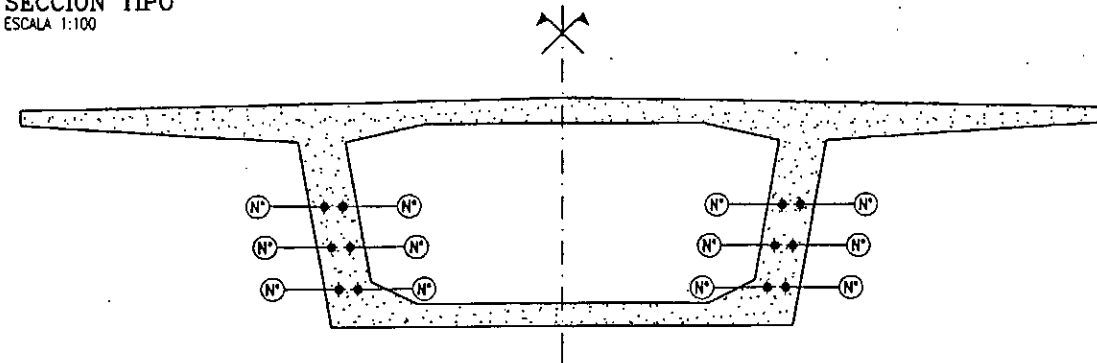
# SECCIÓN LONGITUDINAL

ESCALA 1:300



## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARÁN PARALELOS  
AL EJE DEL TABLERO.

### DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6", VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm<sup>2</sup>. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm<sup>2</sup>
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm<sup>2</sup>
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{py,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p \text{ max} \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p \text{ max}$
  - $P_{1000} \leq 0.02$

### ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

#### ETAPA 1

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm<sup>2</sup>.

Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 93.6                                   | 205               |
| 2 a 6 | 93.6                                   | 196               |
| 7     | 93.6                                   | 185               |
| 8     | 93.6                                   | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm<sup>2</sup> y los coeficientes de rozamiento

$$\mu = 0.21 \quad \frac{K}{M} = 0.006$$

#### ETAPA 2 (Tzado Fino)

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm<sup>2</sup>.

Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (a estribo 2 en la fase 8), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm<sup>2</sup>. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 144                                    | 309               |
| 2 a 6 | 144                                    | 296               |
| 7     | 144                                    | 280               |
| 8     | 144                                    | 191               |

$P_0$  = Fuerza en anclaje (T/cable)  
 $Alarg$  = Alargamiento Final (mm)

#### INYECCIÓN

La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditivo expansivo y una presión mínima de 6 atmósferas.

### NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

#### HORMIGONES

| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | 7    |
|-----------------------------|----------------|-------------|------|
| TABLERO                     | HP-50/B/20/IIa | ESTADÍSTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/IIa | ESTADÍSTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/IIa | ESTADÍSTICO | 1.50 |
| PILOTES                     | HA-25/F/20/IIa | ESTADÍSTICO | 1.50 |
| NIVELACIÓN                  | HM-15          | -           | 1.50 |

#### ACEROS

| ACEROS                     | TIPO      | CONTROL | 7    |
|----------------------------|-----------|---------|------|
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

#### EJECUCIÓN DE LA OBRA

TOODS LOS ELEMENTOS CONTROL INTENSO.  
COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.

RECUBRIMIENTO NOMINAL DE LAS ARMADURAS:

- TABLERO: 35mm.
- ALZADOS: 30mm.
- ENCEPADOS: 30mm.
- PILOTES: 70mm.

| CÓDIGO | DIBUJADO | REVISADO | FECHA      | Nº. REVIS. |
|--------|----------|----------|------------|------------|
| 29211  |          |          | 15/01/2003 | 0          |



TÍTULO  
L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTIERA FRANCESA  
TRAMO: LLEIDA - MARTORELL  
SUBTRAMO XI-A. PLATAFORMA

U.T.E. L'ANOIA



ESCALA NORMAL

1:300  
DIN A-3  
Numérica

0 3.75 7.50  
Gráfica

FECHA

ABRIL 2003

TÍTULO DEL PLANO

VIADUCTO DE ANOIA  
TABLERO. PRETENSADO GENERAL

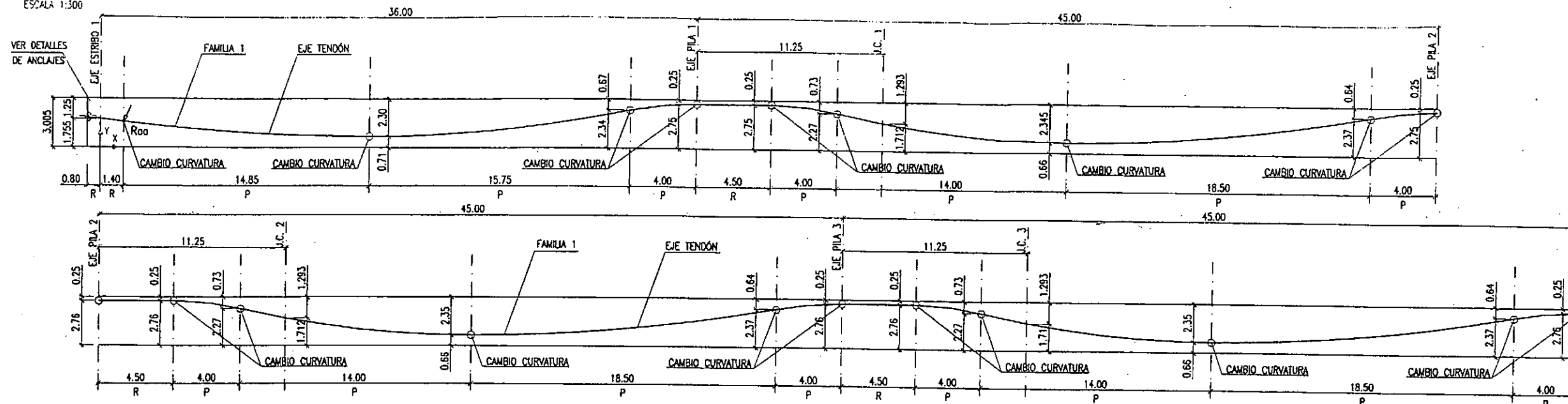
No. DE PLANO

2.9.2.5

Hoja 1 de

# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARABOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA 8  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 1 TRAMO 1 |       |       |       |       |       |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xv/Lv                           | 0.000 | 0.050 | 0.100 | 0.150 | 0.200 | 0.250 | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 0.950  | 1.000  |
| X                               | 0.000 | 1.800 | 3.600 | 5.400 | 7.200 | 9.000 | 10.800 | 12.600 | 14.400 | 16.200 | 18.000 | 19.800 | 21.600 | 23.400 | 25.200 | 27.000 | 28.800 | 30.600 | 32.400 | 34.200 | 36.000 |
| Y                               | 1.755 | 1.541 | 1.346 | 1.177 | 1.033 | 0.916 | 0.824  | 0.758  | 0.719  | 0.705  | 0.725  | 0.788  | 0.894  | 1.042  | 1.233  | 1.467  | 1.743  | 2.062  | 2.418  | 2.671  | 2.755  |

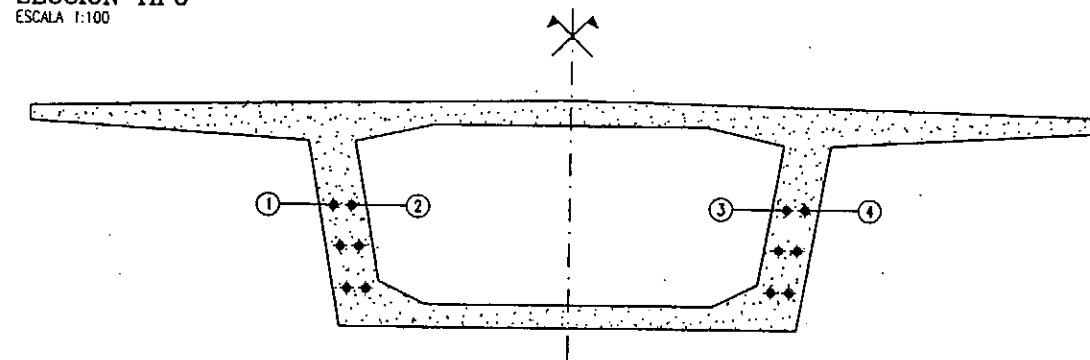
| TRAZADO DE LA FAMILIA 1 TRAMO 2 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xv/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 0.950  | 1.000  |
| X                               | 36.000 | 38.250 | 40.500 | 42.750 | 45.000 | 47.250 | 49.500 | 51.750 | 54.000 | 56.250 | 58.500 | 60.750 | 63.000 | 65.250 | 67.500 | 69.750 | 72.000 | 74.250 | 76.500 | 78.750 | 81.000 |
| Y                               | 2.755  | 2.755  | 2.755  | 2.608  | 2.175  | 1.712  | 1.333  | 1.039  | 0.828  | 0.702  | 0.660  | 0.685  | 0.762  | 0.889  | 1.068  | 1.297  | 1.577  | 1.909  | 2.291  | 2.637  | 2.755  |

| TRAZADO DE LA FAMILIA 1 TRAMO 3 |        |        |        |        |        |        |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 81.000 | 83.250 | 85.500 | 87.750 | 90.000 | 92.250 | 94.500 | 96.750 | 99.000 | 101.250 | 103.500 | 105.750 | 108.000 | 110.250 | 112.500 | 114.750 | 117.000 | 119.250 | 121.500 | 123.750 | 126.000 |
| Y                               | 2.755  | 2.755  | 2.755  | 2.608  | 2.175  | 1.712  | 1.333  | 1.039  | 0.828  | 0.702   | 0.660   | 0.685   | 0.762   | 0.889   | 1.068   | 1.297   | 1.577   | 1.909   | 2.291   | 2.637   | 2.755   |

| TRAZADO DE LA FAMILIA 1 TRAMO 4 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 126.000 | 128.250 | 130.500 | 132.750 | 135.000 | 137.250 | 139.500 | 141.750 | 144.000 | 146.250 | 148.500 | 150.750 | 153.000 | 155.250 | 157.500 | 159.750 | 162.000 | 164.250 | 166.500 | 168.750 | 171.000 |
| Y                               | 2.755   | 2.755   | 2.755   | 2.608   | 2.175   | 1.712   | 1.333   | 1.039   | 0.828   | 0.702   | 0.660   | 0.685   | 0.762   | 0.889   | 1.068   | 1.297   | 1.577   | 1.909   | 2.291   | 2.637   | 2.755   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARÁN PARALELOS  
AL EJE DEL TABLERO.

## NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

### HORMIGONES

| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | γ    |
|-----------------------------|----------------|-------------|------|
| TABLERO                     | HP-50/B/20/11a | ESTADÍSTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/11a | ESTADÍSTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/11a | ESTADÍSTICO | 1.50 |
| PILOTES                     | HA-25/F/20/11a | ESTADÍSTICO | 1.50 |
| NIVELACIÓN                  | HN-15          | -           | 1.50 |

### ACEROS

| ACEROS                     | TIPO      | CONTROL | γ    |
|----------------------------|-----------|---------|------|
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

### EJECUCIÓN DE LA OBRA

TODOS LOS ELEMENTOS CONTROL INTENSO.  
COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
RECUBRIMIENTO NOMINAL DE LAS ARMADURAS:  
-TABLERO: 35mm.  
-ALZADOS: 30mm.  
-ENCEPADOS: 30mm.  
-PILOTES: 70mm

## DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6". VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:  
- Diámetro Vaina = 120 mm  
- Placas de anclaje Tipo CR-42 o similar de 400x400 mm<sup>2</sup>. (Todos los anclajes son activos)  
Cable 28 # 0.6":  
- Área de acero = 3920 mm<sup>2</sup>  
- Carga de rotura = 744.8 T  
Cable 31 # 0.6":  
- Área de acero = 4340 mm<sup>2</sup>  
- Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:  
f<sub>py</sub> ≥ 17.100 Kp/cm<sup>2</sup>  
f<sub>p</sub> max ≥ 19.000 Kp/cm<sup>2</sup>  
Relajación a 1000 h. y 20°C bajo una tensión = 0.7 f<sub>p</sub> max  
p<sub>1000</sub> ≤ 0.02

## ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

### ETAPA 1

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm<sup>2</sup>. Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 93.6                                   | 205               |
| 2 a 6 | 93.6                                   | 196               |
| 7     | 93.6                                   | 185               |
| 8     | 93.6                                   | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm<sup>2</sup> y los coeficientes de rozamiento

$$\mu = 0.21 \quad \frac{K}{\mu} = 0.006$$

### ETAPA 2 (Tesoado Fino)

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm<sup>2</sup>.

Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase 8), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm<sup>2</sup>. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 144                                    | 309               |
| 2 a 6 | 144                                    | 296               |
| 7     | 144                                    | 280               |
| 8     | 144                                    | 191               |

P<sub>a</sub> = Fuerza en anclaje (T/cable)  
Alarg = Alargamiento Final (mm)

INYECCIÓN La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditivo expansivo y una presión mínima de 6 atmosferas.

| CODIGO | DIBUJADO | REVISADO | FECHA      | Nº. REVIS. |
|--------|----------|----------|------------|------------|
| 29211  |          |          | 15/01/2003 | 0          |

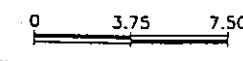


TÍTULO  
L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTIERA FRANCESA  
TRAMO: LLEIDA - MARTORELL  
SUBTRAMO XI-A. PLATAFORMA

U.T.E. L'ANOIA



ESCALA NORMAL  
1:300  
DIN A-3  
Numérica



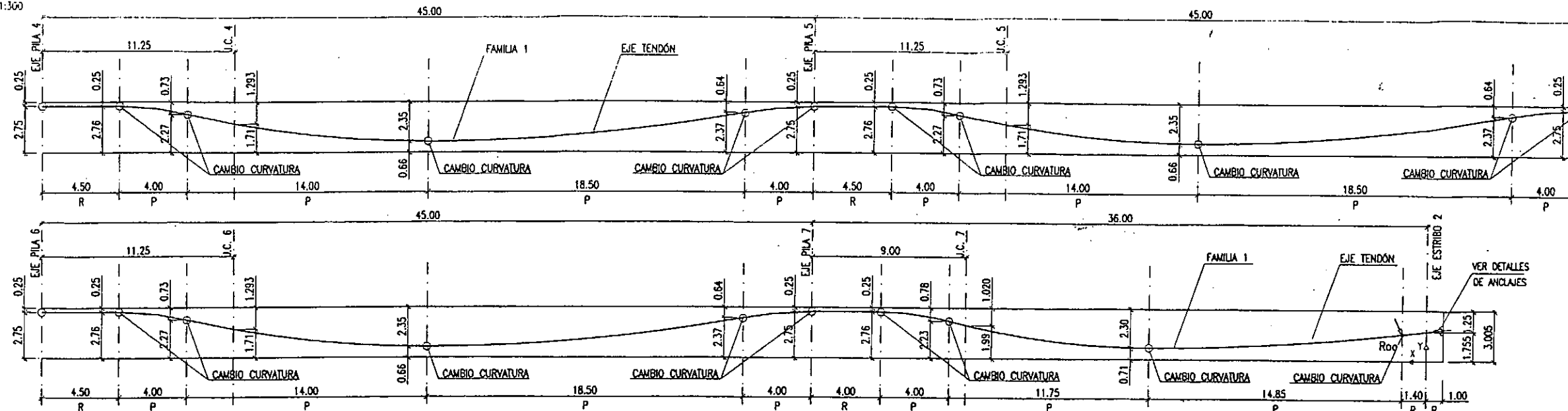
FECHA  
ABRIL 2003

TÍTULO DEL PLANO  
VIADUCTO DE ANOIA  
TABLERO. PRETENSADO (II)

No. DE PLANO  
2.9.2.5  
Hoja 2 de

# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARABOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA 8  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 1 TRAMO 5 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 171.000 | 173.250 | 175.500 | 177.750 | 180.000 | 182.250 | 184.500 | 186.750 | 189.000 | 191.250 | 193.500 | 195.750 | 198.000 | 200.250 | 202.500 | 204.750 | 207.000 | 209.250 | 211.500 | 213.750 | 216.000 |
| Y                               | 2.755   | 2.755   | 2.755   | 2.608   | 2.175   | 1.712   | 1.333   | 1.039   | 0.828   | 0.702   | 0.660   | 0.685   | 0.762   | 0.889   | 1.068   | 1.297   | 1.577   | 1.909   | 2.291   | 2.637   | 2.755   |

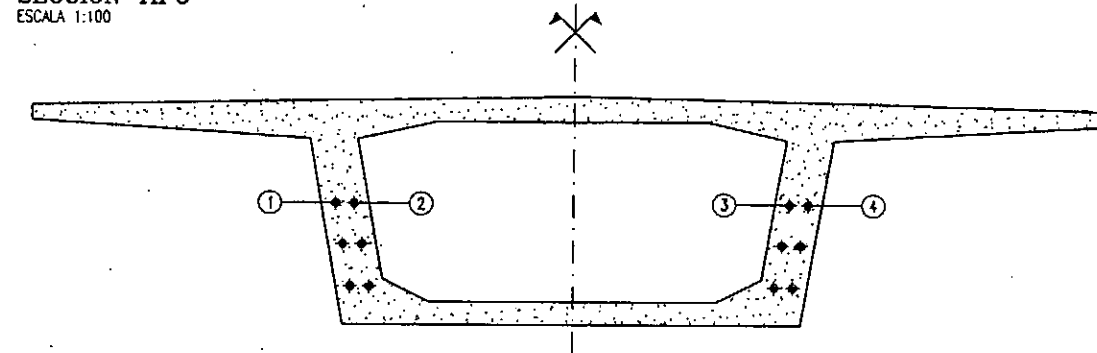
| TRAZADO DE LA FAMILIA 1 TRAMO 6 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 216.000 | 218.250 | 220.500 | 222.750 | 225.000 | 227.250 | 229.500 | 231.750 | 234.000 | 236.250 | 238.500 | 240.750 | 243.000 | 245.250 | 247.500 | 249.750 | 252.000 | 254.250 | 256.500 | 258.750 | 261.000 |
| Y                               | 2.755   | 2.755   | 2.755   | 2.608   | 2.175   | 1.712   | 1.333   | 1.039   | 0.828   | 0.702   | 0.660   | 0.685   | 0.762   | 0.889   | 1.068   | 1.297   | 1.577   | 1.909   | 2.291   | 2.637   | 2.755   |

| TRAZADO DE LA FAMILIA 1 TRAMO 7 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 261.000 | 263.250 | 265.500 | 267.750 | 270.000 | 272.250 | 274.500 | 276.750 | 279.000 | 281.250 | 283.500 | 285.750 | 288.000 | 290.250 | 292.500 | 294.750 | 297.000 | 299.250 | 301.500 | 303.750 | 306.000 |
| Y                               | 2.755   | 2.755   | 2.755   | 2.608   | 2.175   | 1.712   | 1.333   | 1.039   | 0.828   | 0.702   | 0.660   | 0.685   | 0.762   | 0.889   | 1.068   | 1.297   | 1.577   | 1.909   | 2.291   | 2.637   | 2.755   |

| TRAZADO DE LA FAMILIA 1 TRAMO 8 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 306.000 | 307.800 | 309.600 | 311.400 | 313.200 | 315.000 | 316.800 | 318.600 | 320.400 | 322.200 | 324.000 | 325.800 | 327.600 | 329.400 | 331.200 | 333.000 | 334.800 | 336.600 | 338.400 | 340.200 | 342.000 |
| Y                               | 2.755   | 2.755   | 2.755   | 2.691   | 2.422   | 1.985   | 1.592   | 1.271   | 1.022   | 0.845   | 0.739   | 0.705   | 0.719   | 0.758   | 0.824   | 0.916   | 1.033   | 1.177   | 1.346   | 1.541   | 1.755   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARÁN PARALELOS  
AL EJE DEL TABLERO.

NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES                  |                |             |      |
|-----------------------------|----------------|-------------|------|
| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | γ    |
| TABLERO                     | HP-50/B/20/1/a | ESTADÍSTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/1/a | ESTADÍSTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/1/a | ESTADÍSTICO | 1.50 |
| PILOTES                     | HA-25/F/20/1/a | ESTADÍSTICO | 1.50 |
| NIVELACIÓN                  | HM-15          | -           | 1.50 |

| ACEROS                     |           |         |      |
|----------------------------|-----------|---------|------|
| ACEROS                     | TIPO      | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

### EJECUCIÓN DE LA OBRA

TODOS LOS ELEMENTOS CONTROL INTENSO.  
 COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
 RECUBRIMIENTO NOMINAL DE LAS ARMADURAS:  
 -TABLERO: 35mm.  
 -ALZADOS: 30mm.  
 -ENCEPADOS: 30mm.  
 -PILOTES: 70mm

### DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6", VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm2. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm2
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm2
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{p,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p \text{ max } \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p \text{ max}$
  - $P_{1000} \leq 0.02$

### ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

**ETAPA 1**  
 Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm2. Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 93.6                      | 205               |
| 2 a 6 | 93.6                      | 196               |
| 7     | 93.6                      | 185               |
| 8     | 93.6                      | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm2 y los coeficientes de rozamiento  
 $\mu = 0.21$   $\frac{K}{M} = 0.006$

### ETAPA 2 (Tasado Fino)

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm2. Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase B), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm2. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 144                       | 309               |
| 2 a 6 | 144                       | 296               |
| 7     | 144                       | 280               |
| 8     | 144                       | 191               |

$P_0$  = Fuerza en anclaje (T/cable)  
 $\Delta l_{arg}$  = Alargamiento Final (mm)

**INYECCIÓN**  
 La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditivo expansivo y una presión mínima de 6 atmosferas.

| CÓDIGO | DIBUJADO | REVISADO | FECHA      | Nº REV. | D |
|--------|----------|----------|------------|---------|---|
| 29211  |          |          | 15/01/2003 |         |   |

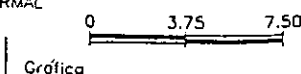


TÍTULO  
 L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA  
 TRAMO: LLEIDA - MARTORELL  
 SUBTRAMO XI-A. PLATAFORMA

U.T.E. L'ANOIA



ESCALA NORMAL  
 1:300  
 DIN A-3  
 Numérica



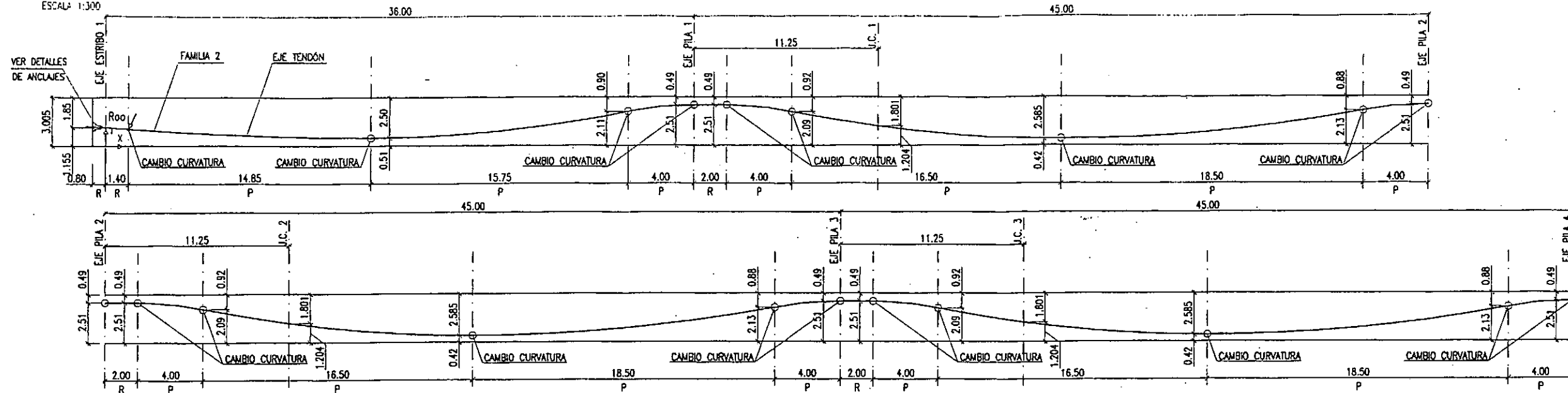
FECHA  
 ABRIL 2003

TÍTULO DEL PLANO  
 VIADUCTO DE ANOIA  
 TABLERO. PRETENSADO (IV)

No. DE PLANO  
 2.9.2.5  
 Hoja 3 de

# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARABOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA 8  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 2 TRAMO 1 |       |       |       |       |       |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xv/Lv                           | 0.000 | 0.050 | 0.100 | 0.150 | 0.200 | 0.250 | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 0.950  | 1.000  |
| X                               | 0.000 | 1.800 | 3.600 | 5.400 | 7.200 | 9.000 | 10.800 | 12.600 | 14.400 | 16.200 | 18.000 | 19.800 | 21.600 | 23.400 | 25.200 | 27.000 | 28.800 | 30.600 | 32.400 | 34.200 | 36.000 |
| Y                               | 1.155 | 1.023 | 0.902 | 0.797 | 0.708 | 0.635 | 0.579  | 0.538  | 0.513  | 0.505  | 0.525  | 0.586  | 0.690  | 0.835  | 1.023  | 1.252  | 1.523  | 1.836  | 2.185  | 2.433  | 2.515  |

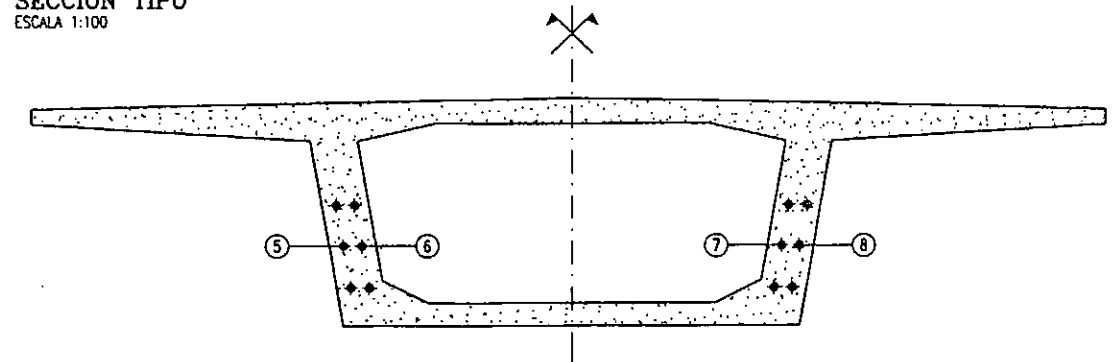
| TRAZADO DE LA FAMILIA 2 TRAMO 2 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xv/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 0.950  | 1.000  |
| X                               | 36.000 | 38.250 | 40.500 | 42.750 | 45.000 | 47.250 | 49.500 | 51.750 | 54.000 | 56.250 | 58.500 | 60.750 | 63.000 | 65.250 | 67.500 | 69.750 | 72.000 | 74.250 | 76.500 | 78.750 | 81.000 |
| Y                               | 2.515  | 2.513  | 2.355  | 1.956  | 1.549  | 1.204  | 0.922  | 0.702  | 0.545  | 0.451  | 0.420  | 0.445  | 0.522  | 0.649  | 0.828  | 1.057  | 1.337  | 1.669  | 2.051  | 2.397  | 2.515  |

| TRAZADO DE LA FAMILIA 2 TRAMO 3 |        |        |        |        |        |        |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 81.000 | 83.250 | 85.500 | 87.750 | 90.000 | 92.250 | 94.500 | 96.750 | 99.000 | 101.250 | 103.500 | 105.750 | 108.000 | 110.250 | 112.500 | 114.750 | 117.000 | 119.250 | 121.500 | 123.750 | 126.000 |
| Y                               | 2.515  | 2.513  | 2.355  | 1.956  | 1.549  | 1.204  | 0.922  | 0.702  | 0.545  | 0.451   | 0.420   | 0.445   | 0.522   | 0.649   | 0.828   | 1.057   | 1.337   | 1.669   | 2.051   | 2.397   | 2.515   |

| TRAZADO DE LA FAMILIA 2 TRAMO 4 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 126.000 | 128.250 | 130.500 | 132.750 | 135.000 | 137.250 | 139.500 | 141.750 | 144.000 | 146.250 | 148.500 | 150.750 | 153.000 | 155.250 | 157.500 | 159.750 | 162.000 | 164.250 | 166.500 | 168.750 | 171.000 |
| Y                               | 2.515   | 2.513   | 2.355   | 1.956   | 1.549   | 1.204   | 0.922   | 0.702   | 0.545   | 0.451   | 0.420   | 0.445   | 0.522   | 0.649   | 0.828   | 1.057   | 1.337   | 1.669   | 2.051   | 2.397   | 2.515   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARAN PARALELOS  
AL EJE DEL TABLERO.

## NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES                  |                |             |      |
|-----------------------------|----------------|-------------|------|
| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | γ    |
| TABLERO                     | HP-50/B/20/IIa | ESTADISTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/IIa | ESTADISTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/IIa | ESTADISTICO | 1.50 |
| PILOTES                     | HA-25/F/20/IIa | ESTADISTICO | 1.50 |
| NIVELACION                  | HM-15          | -           | 1.50 |

| ACEROS                     |           |         |      |
|----------------------------|-----------|---------|------|
| ACEROS                     | TIPO      | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

## EJECUCIÓN DE LA OBRA

TODOS LOS ELEMENTOS CONTROL INTENSO.  
 COEFICIENTES DE MAYORACION DE LAS ACCIONES SEGUN EHE.  
 RECURRIMIENTO NOMINAL DE LAS ARMADURAS:  
 -TABLERO: 35mm.  
 -ALZADOS: 30mm.  
 -ENCEPADOS: 30mm.  
 -PILOTES: 70mm

## DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6", VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGUN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm<sup>2</sup>. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm<sup>2</sup>
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm<sup>2</sup>
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{p,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p \text{ max} \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p \text{ max}$
  - $R_{1000} \leq 0.02$

## ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARA EN 2 ETAPAS

### ETAPA 1

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm<sup>2</sup>.  
 Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 93.6                                   | 205               |
| 2 a 6 | 93.6                                   | 196               |
| 7     | 93.6                                   | 185               |
| 8     | 93.6                                   | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm<sup>2</sup> y los coeficientes de rozamiento

$$\mu = 0.21 \quad \frac{k}{A} = 0.006$$

### ETAPA 2 (Tesado Fino)

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm<sup>2</sup>.  
 Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase B), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm<sup>2</sup>. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 144                                    | 309               |
| 2 a 6 | 144                                    | 296               |
| 7     | 144                                    | 280               |
| 8     | 144                                    | 191               |

$P_0$  = Fuerza en anclaje (T/cable)  
 $\text{Alarg} = \text{Alargamiento Final (mm)}$

### INYECCIÓN

La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditivo expansivo y una presión mínima de 6 atmosferas.

| CODIGO | DIBUJADO | REVISADO | FECHA      | N.º REVIS. |
|--------|----------|----------|------------|------------|
| 29211  |          |          | 15/01/2003 | 0          |



TÍTULO  
 L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA  
 TRAMO: LLEIDA - MARTORELL  
 SUBTRAMO XI-A. PLATAFORMA

U.T.E. L'ANDIA



ESCALA NORMAL  
 1:300  
 DIN A-3  
 Numérica Gráfica

0 3.75 7.50

FECHA  
 ABRIL 2003

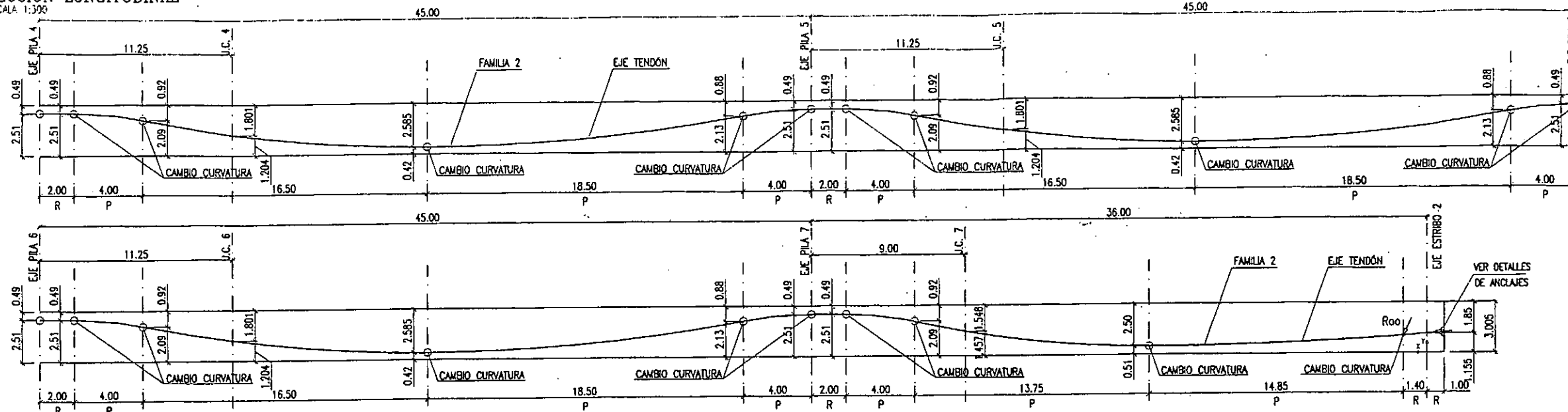
TÍTULO DEL PLANO  
 VIADUCTO DE ANOIA  
 TABLERO. PRETENSADO (V)

No. DE PLANO  
 2.9.2.5  
 Hoja 4 de



# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARÁBOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA 8  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 2 TRAMO 5 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 171.000 | 173.250 | 175.500 | 177.750 | 180.000 | 182.250 | 184.500 | 186.750 | 189.000 | 191.250 | 193.500 | 195.750 | 198.000 | 200.250 | 202.500 | 204.750 | 207.000 | 209.250 | 211.500 | 213.750 | 216.000 |
| Y                               | 2.515   | 2.513   | 2.355   | 1.956   | 1.549   | 1.204   | 0.922   | 0.702   | 0.545   | 0.451   | 0.420   | 0.445   | 0.522   | 0.649   | 0.828   | 1.057   | 1.337   | 1.669   | 2.051   | 2.397   | 2.515   |

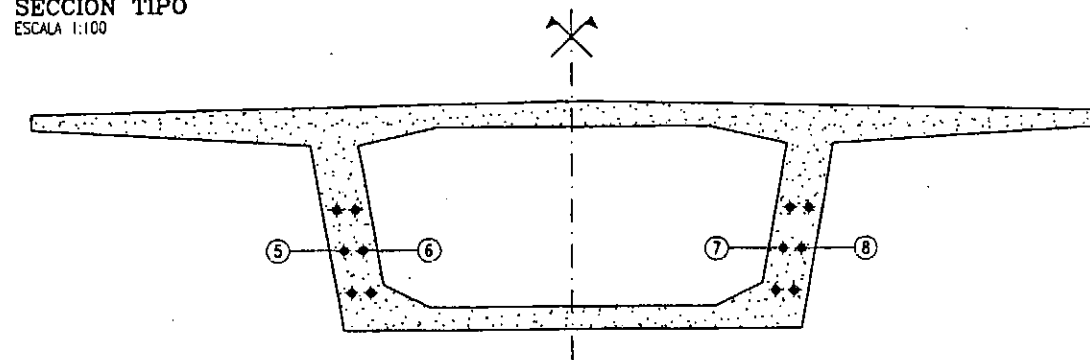
| TRAZADO DE LA FAMILIA 2 TRAMO 6 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 216.000 | 218.250 | 220.500 | 222.750 | 225.000 | 227.250 | 229.500 | 231.750 | 234.000 | 236.250 | 238.500 | 240.750 | 243.000 | 245.250 | 247.500 | 249.750 | 252.000 | 254.250 | 256.500 | 258.750 | 261.000 |
| Y                               | 2.515   | 2.513   | 2.355   | 1.956   | 1.549   | 1.204   | 0.922   | 0.702   | 0.545   | 0.451   | 0.420   | 0.445   | 0.522   | 0.649   | 0.828   | 1.057   | 1.337   | 1.669   | 2.051   | 2.397   | 2.515   |

| TRAZADO DE LA FAMILIA 2 TRAMO 7 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 261.000 | 263.250 | 265.500 | 267.750 | 270.000 | 272.250 | 274.500 | 276.750 | 279.000 | 281.250 | 283.500 | 285.750 | 288.000 | 290.250 | 292.500 | 294.750 | 297.000 | 299.250 | 301.500 | 303.750 | 306.000 |
| Y                               | 2.515   | 2.513   | 2.355   | 1.956   | 1.549   | 1.204   | 0.922   | 0.702   | 0.545   | 0.451   | 0.420   | 0.445   | 0.522   | 0.649   | 0.828   | 1.057   | 1.337   | 1.669   | 2.051   | 2.397   | 2.515   |

| TRAZADO DE LA FAMILIA 2 TRAMO 8 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 0.950   | 1.000   |
| X                               | 306.000 | 307.800 | 309.600 | 311.400 | 313.200 | 315.000 | 316.800 | 318.600 | 320.400 | 322.200 | 324.000 | 325.800 | 327.600 | 329.400 | 331.200 | 333.000 | 334.800 | 336.600 | 338.400 | 340.200 | 342.000 |
| Y                               | 2.515   | 2.515   | 2.443   | 2.188   | 1.802   | 1.457   | 1.165   | 0.926   | 0.741   | 0.609   | 0.530   | 0.505   | 0.513   | 0.538   | 0.579   | 0.635   | 0.708   | 0.797   | 0.902   | 1.023   | 1.155   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARÁN PARALELOS  
AL EJE DEL TABLERO.

## NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES                  |                |             |      |
|-----------------------------|----------------|-------------|------|
| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | γ    |
| TABLERO                     | HP-50/B/20/IIa | ESTADÍSTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/IIa | ESTADÍSTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/IIa | ESTADÍSTICO | 1.50 |
| PILOTES                     | HA-25/F/20/IIa | ESTADÍSTICO | 1.50 |
| NIVELACIÓN                  | HM-15          | -           | 1.50 |

| ACEROS                     |           |         |      |
|----------------------------|-----------|---------|------|
| ACEROS                     | TIPO      | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

## EJECUCIÓN DE LA OBRA

TOODS LOS ELEMENTOS CONTROL INTENSO.  
COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
RECUBRIMIENTO NOMINAL DE LAS ARMADURAS:  
-TABLERO: 35mm.  
-ALZADOS: 30mm.  
-ENCEPADOS: 30mm.  
-PILOTES: 70mm

## DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6", VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm<sup>2</sup>. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm<sup>2</sup>
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm<sup>2</sup>
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{py,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p, \text{ max} \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p, \text{ max}$
  - $\rho_{1000} \leq 0.02$

## ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

### ETAPA 1

Quando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm<sup>2</sup>. Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 93.6                                   | 205               |
| 2 a 6 | 93.6                                   | 196               |
| 7     | 93.6                                   | 185               |
| 8     | 93.6                                   | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm<sup>2</sup> y los coeficientes de rozamiento  $\mu = 0.21$   $\frac{K}{M} = 0.006$

### ETAPA 2 (Tesoado Fina)

Quando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm<sup>2</sup>.

Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase 8), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm<sup>2</sup>. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm <sup>2</sup> ) | Alargamiento (mm) |
|-------|----------------------------------------|-------------------|
| 1     | 144                                    | 309               |
| 2 a 6 | 144                                    | 296               |
| 7     | 144                                    | 280               |
| 8     | 144                                    | 191               |

$P_0$  = Fuerza en anclaje (T/cable)  
 $\Delta l_{arg}$  = Alargamiento Final (mm)

INYECCIÓN: La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditivo expansivo y una presión mínima de 6 atmosferas.

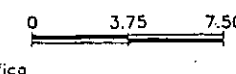
| CÓDIGO | DIBUJADO | REVISADO | N.º REVIS |
|--------|----------|----------|-----------|
| 292.11 |          |          | 0         |



TÍTULO  
L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA  
TRAMO: LLEIDA - MARTORELL  
SUBTRAMO XI-A. PLATAFORMA



ESCALA NORMAL  
1:300  
DIN A-3  
Numérica



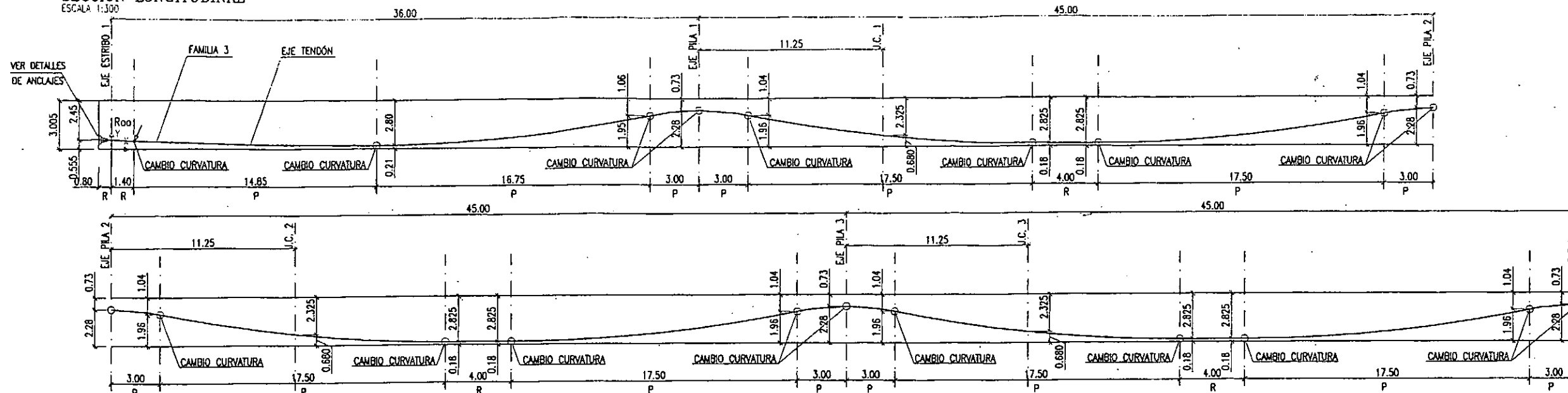
FECHA  
ABRIL 2003

TÍTULO DEL PLANO  
VIADUCTO DE ANOIA  
TABLERO. PRETENSADO (VI)

No. DE PLANO  
2.9.2.5  
Hoja 5 de

# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARÁBOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA B  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 3 TRAMO 1 |       |       |       |       |       |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xy/Lv                           | 0.000 | 0.050 | 0.100 | 0.150 | 0.200 | 0.250 | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 1.000  |
| X                               | 0.000 | 1.800 | 3.600 | 5.400 | 7.200 | 9.000 | 10.800 | 12.600 | 14.400 | 16.200 | 18.000 | 19.800 | 21.600 | 23.400 | 25.200 | 27.000 | 28.800 | 30.600 | 32.400 | 34.200 |
| Y                               | 0.555 | 0.484 | 0.419 | 0.362 | 0.314 | 0.275 | 0.245  | 0.223  | 0.210  | 0.205  | 0.224  | 0.284  | 0.384  | 0.525  | 0.706  | 0.928  | 1.191  | 1.494  | 1.837  | 2.162  |

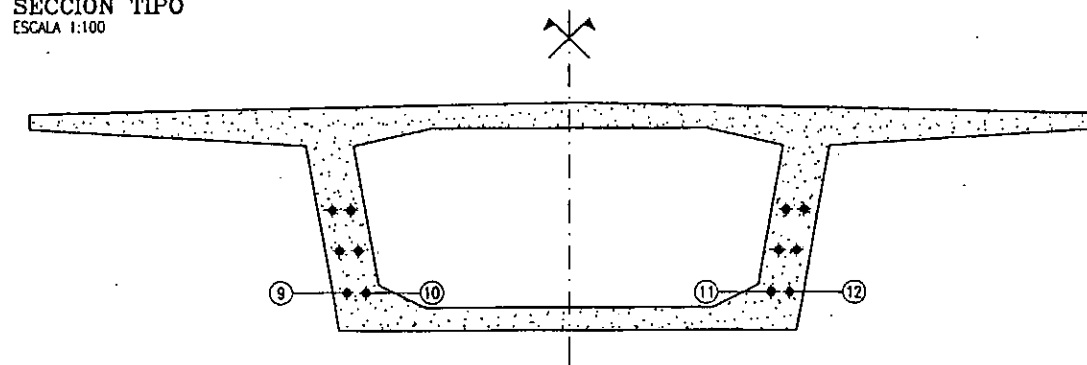
| TRAZADO DE LA FAMILIA 3 TRAMO 2 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Xy/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450  | 0.500  | 0.550  | 0.600  | 0.650  | 0.700  | 0.750  | 0.800  | 0.850  | 0.900  | 1.000  |
| X                               | 36.000 | 38.250 | 40.500 | 42.750 | 45.000 | 47.250 | 49.500 | 51.750 | 54.000 | 56.250 | 58.500 | 60.750 | 63.000 | 65.250 | 67.500 | 69.750 | 72.000 | 74.250 | 76.500 | 78.750 |
| Y                               | 2.275  | 2.103  | 1.875  | 1.675  | 1.484  | 1.314  | 1.166  | 1.039  | 0.932  | 0.844  | 0.773  | 0.718  | 0.678  | 0.643  | 0.612  | 0.585  | 0.561  | 0.539  | 0.518  | 0.498  |

| TRAZADO DE LA FAMILIA 3 TRAMO 3 |        |        |        |        |        |        |        |        |        |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xy/Lv                           | 0.000  | 0.050  | 0.100  | 0.150  | 0.200  | 0.250  | 0.300  | 0.350  | 0.400  | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 1.000   |
| X                               | 81.000 | 83.250 | 85.500 | 87.750 | 90.000 | 92.250 | 94.500 | 96.750 | 99.000 | 101.250 | 103.500 | 105.750 | 108.000 | 110.250 | 112.500 | 114.750 | 117.000 | 119.250 | 121.500 | 123.750 |
| Y                               | 2.275  | 2.103  | 1.875  | 1.675  | 1.484  | 1.314  | 1.166  | 1.039  | 0.932  | 0.844   | 0.773   | 0.718   | 0.678   | 0.643   | 0.612   | 0.585   | 0.561   | 0.539   | 0.518   | 0.498   |

| TRAZADO DE LA FAMILIA 3 TRAMO 4 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xy/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   | 1.000   |
| X                               | 126.000 | 128.250 | 130.500 | 132.750 | 135.000 | 137.250 | 139.500 | 141.750 | 144.000 | 146.250 | 148.500 | 150.750 | 153.000 | 155.250 | 157.500 | 159.750 | 162.000 | 164.250 | 166.500 | 168.750 |
| Y                               | 2.275   | 2.103   | 1.875   | 1.675   | 1.484   | 1.314   | 1.166   | 1.039   | 0.932   | 0.844   | 0.773   | 0.718   | 0.678   | 0.643   | 0.612   | 0.585   | 0.561   | 0.539   | 0.518   | 0.498   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARAN PARALELOS  
AL EJE DEL TABLERO.

## NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES                  |                |             |      |
|-----------------------------|----------------|-------------|------|
| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | γ    |
| TABLERO                     | HP-50/B/20/IIa | ESTADISTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/IIa | ESTADISTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/IIa | ESTADISTICO | 1.50 |
| PILOTES                     | HA-25/F/20/IIa | ESTADISTICO | 1.50 |
| NIVELACION                  | HW-15          | -           | 1.50 |

| ACEROS                     |           |         |      |
|----------------------------|-----------|---------|------|
| ACEROS                     | TIPO      | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1880 S7 | NORMAL  | 1.15 |

## EJECUCIÓN DE LA OBRA

TODOS LOS ELEMENTOS CONTROL INTENSO.  
 COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
 RECURRIMIENTO NOMINAL DE LAS ARMADURAS:  
 -TABLERO: 35mm.  
 -ALZADOS: 30mm.  
 -ENCEPADOS: 30mm.  
 -PILOTES: 70mm

## DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6". VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm2. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm2
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm2
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{p,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p \text{ max} \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p \text{ max}$
  - $P_{1000} \leq 0.02$

## ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

**ETAPA 1** Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm2. Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 93.6                      | 205               |
| 2 a 6 | 93.6                      | 196               |
| 7     | 93.6                      | 185               |
| 8     | 93.6                      | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm2 y los coeficientes de rozamiento

$$\mu = 0.21 \quad \frac{K}{A} = 0.006$$

## ETAPA 2 (Tesado Fino)

Quando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm2.

Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase B), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm2. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 144                       | 309               |
| 2 a 6 | 144                       | 296               |
| 7     | 144                       | 280               |
| 8     | 144                       | 191               |

$P_0$  = Fuerza en anclaje (T/cable)  
 $Alarg$  = Alargamiento Final (mm)

**INYECCIÓN** La inyección se efectuará con mortero de cemento tipo I/35 A, con aditivo expansivo y una presión mínima de 6 atmosferas.

| CÓDIGO | DIBUJADO | REVISADO | FECHA      | Nº REVIS. |
|--------|----------|----------|------------|-----------|
| 29211  |          |          | 15/01/2003 | 0         |



TÍTULO  
 L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA  
 TRAMO: LLEIDA - MARTORELL  
 SUBTRAMO XI-A. PLATAFORMA



ESCALA NORMAL  
 1:300  
 DIN A-3  
 Numérica

0 3.75 7.50  
 Gráfica

FECHA  
 ABRIL 2003

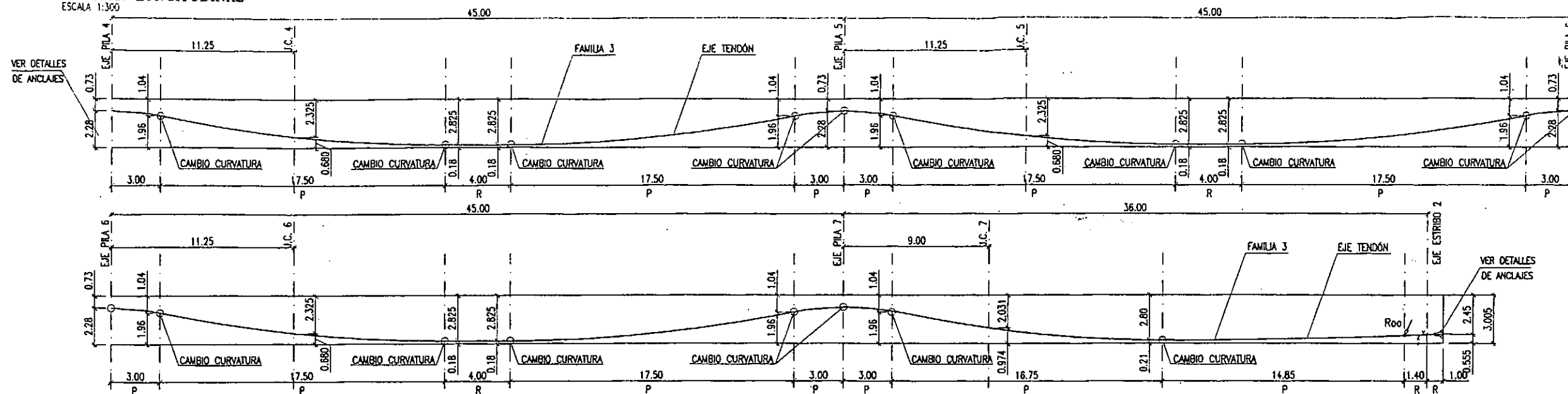
TÍTULO DEL PLANO  
 VIADUCTO DE ANOIA  
 TABLERO. PRETENSADO (VII)

Nº. DE PLANO  
 2.9.2.5  
 Hoja 6 de



# SECCIÓN LONGITUDINAL

ESCALA 1:300



R: RECTA  
P: PARABOLA  
J.C.: JUNTA DE CONSTRUCCIÓN

NOTA:  
VER DETALLE DE ANCLAJE EN HOJA 8  
DEL PLANO 2.9.2.5

| TRAZADO DE LA FAMILIA 3 TRAMO 5 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   |
| X                               | 171.000 | 173.250 | 175.500 | 177.750 | 180.000 | 182.250 | 184.500 | 186.750 | 189.000 | 191.250 | 193.500 | 195.750 | 198.000 | 200.250 | 202.500 | 204.750 | 207.000 | 209.250 | 211.500 |
| Y                               | 2.275   | 2.103   | 1.675   | 1.284   | 0.952   | 0.680   | 0.466   | 0.312   | 0.216   | 0.180   | 0.180   | 0.180   | 0.216   | 0.312   | 0.466   | 0.680   | 0.952   | 1.284   | 1.675   |

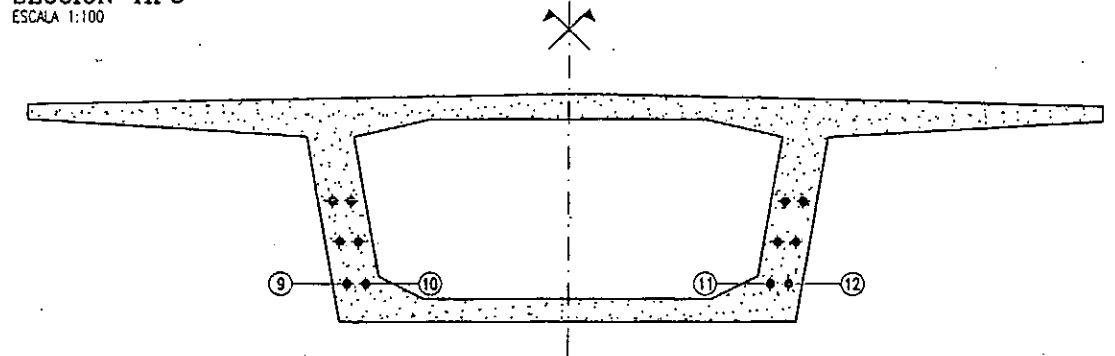
| TRAZADO DE LA FAMILIA 3 TRAMO 6 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   |
| X                               | 216.000 | 218.250 | 220.500 | 222.750 | 225.000 | 227.250 | 229.500 | 231.750 | 234.000 | 236.250 | 238.500 | 240.750 | 243.000 | 245.250 | 247.500 | 249.750 | 252.000 | 254.250 | 256.500 |
| Y                               | 2.275   | 2.103   | 1.675   | 1.284   | 0.952   | 0.680   | 0.466   | 0.312   | 0.216   | 0.180   | 0.180   | 0.180   | 0.216   | 0.312   | 0.466   | 0.680   | 0.952   | 1.284   | 1.675   |

| TRAZADO DE LA FAMILIA 3 TRAMO 7 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   |
| X                               | 261.000 | 263.250 | 265.500 | 267.750 | 270.000 | 272.250 | 274.500 | 276.750 | 279.000 | 281.250 | 283.500 | 285.750 | 288.000 | 290.250 | 292.500 | 294.750 | 297.000 | 299.250 | 301.500 |
| Y                               | 2.275   | 2.103   | 1.675   | 1.284   | 0.952   | 0.680   | 0.466   | 0.312   | 0.216   | 0.180   | 0.180   | 0.180   | 0.216   | 0.312   | 0.466   | 0.680   | 0.952   | 1.284   | 1.675   |

| TRAZADO DE LA FAMILIA 3 TRAMO 8 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Xv/Lv                           | 0.000   | 0.050   | 0.100   | 0.150   | 0.200   | 0.250   | 0.300   | 0.350   | 0.400   | 0.450   | 0.500   | 0.550   | 0.600   | 0.650   | 0.700   | 0.750   | 0.800   | 0.850   | 0.900   |
| X                               | 306.000 | 307.800 | 309.600 | 311.400 | 313.200 | 315.000 | 316.800 | 318.600 | 320.400 | 322.200 | 324.000 | 325.800 | 327.600 | 329.400 | 331.200 | 333.000 | 334.800 | 336.600 | 338.400 |
| Y                               | 2.275   | 2.190   | 1.935   | 1.575   | 1.253   | 0.974   | 0.738   | 0.545   | 0.395   | 0.289   | 0.225   | 0.205   | 0.210   | 0.223   | 0.245   | 0.275   | 0.314   | 0.362   | 0.419   |

## SECCION TIPO

ESCALA 1:100



NOTA:  
LOS CABLES SE COLOCARÁN PARALELOS  
AL EJE DEL TABLERO.

## NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES                  |                |             |      |
|-----------------------------|----------------|-------------|------|
| ELEMENTO ESTRUCTURAL        | TIPO           | CONTROL     | 7    |
| TABLERO                     | HP-50/B/20/IIa | ESTADÍSTICO | 1.50 |
| ALZADOS DE PILAS Y ESTRIBOS | HA-30/B/20/IIa | ESTADÍSTICO | 1.50 |
| ENCEPADOS                   | HA-25/B/20/IIa | ESTADÍSTICO | 1.50 |
| PILOTES                     | HA-25/F/20/IIa | ESTADÍSTICO | 1.50 |
| NIVELACIÓN                  | HM-15          | -           | 1.50 |

| ACEROS                     |           |         |      |
|----------------------------|-----------|---------|------|
| ACEROS                     | TIPO      | CONTROL | 7    |
| ACERO PARA ARMAR CORRUGADO | B 500 S   | NORMAL  | 1.15 |
| ACERO PARA TESAR           | Y 1860 S7 | NORMAL  | 1.15 |

## EJECUCIÓN DE LA OBRA

TODOS LOS ELEMENTOS CONTROL INTENSO.  
COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
RECUBRIMIENTO NOMINAL DE LAS ARMADURAS:  
-TABLERO: 35mm.  
-ALZADOS: 30mm.  
-ENCEPADOS: 30mm.  
-PILOTES: 70mm.

## DEFINICIÓN DEL POSTENSADO

- EL POSTENSADO ESTÁ DEFINIDO POR 16 TENDONES DE 28 A 31 TORONES DE DIÁMETRO 0.6", VER DEFINICIÓN EN SECCIÓN LONGITUDINAL (SEGÚN ESPECIFICACIONES DE NORMATIVA UNE 36-098-93)
- LAS CARACTERÍSTICAS DE CADA TENDÓN SON:
  - Diámetro Vaina = 120 mm
  - Placas de anclaje Tipo CR-42 o similar de 400x400 mm2. (Todos los anclajes son activos)
  - Cable 28 # 0.6":
    - Área de acero = 3920 mm2
    - Carga de rotura = 744.8 T
  - Cable 31 # 0.6":
    - Área de acero = 4340 mm2
    - Carga de rotura = 824.6 T
- CARACTERÍSTICAS DEL ACERO:
  - $f_{py,k} \geq 17.100 \text{ Kp/cm}^2$
  - $f_p, \max \geq 19.000 \text{ Kp/cm}^2$
  - Relajación a 1000 h. y 20°C bajo una tensión = 0.7  $f_p \max$
  - $P_{1000} \leq 0.02$

## ETAPAS DEL TESADO

PARA CADA FASE DE CONSTRUCCIÓN EL TESADO SE REALIZARÁ EN 2 ETAPAS

### ETAPA 1

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 280 Kp/cm2. Se tesarán todos los cables desde los anclajes ubicados en la Junta de Construcción, de forma simétrica respecto al eje vertical del tablero, con las siguientes fuerzas:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 93.6                      | 205               |
| 2 a 6 | 93.6                      | 196               |
| 7     | 93.6                      | 185               |
| 8     | 93.6                      | 128               |

En el cálculo de los alargamientos se ha considerado un módulo de deformación de los cables de 19000 Kp/mm2 y los coeficientes de rozamiento

$$\mu = 0.21 \quad \frac{K}{M} = 0.006$$

### ETAPA 2 (Tesado Fino)

Cuando el hormigón haya alcanzado una resistencia característica a compresión superior de 425 Kp/cm2.

Se tesarán todos los cables desde los anclajes activos ubicados en la Junta de Construcción (o estribo 2 en la fase 8), de forma simétrica respecto al eje vertical del tablero, con una tensión unitaria en anclaje de 144 Kp/mm2. Los valores de las fuerzas en anclaje y alargamientos totales previstos son:

| FASE  | Tensión Unitaria (Kp/mm2) | Alargamiento (mm) |
|-------|---------------------------|-------------------|
| 1     | 144                       | 309               |
| 2 a 6 | 144                       | 296               |
| 7     | 144                       | 280               |
| 8     | 144                       | 191               |

$P_a$  = Fuerza en anclaje (T/cable)  
 $Alarg$  = Alargamiento Final (mm)

INYECCIÓN La inyección se efectuará con mortero de cemento tipo 1/35 A, con aditiva expansiva y una presión mínima de 6 atmósferas.

| CODIGO | DIBUJADO | REVISADO | FECHA      | Nº. REVIS. |
|--------|----------|----------|------------|------------|
| 29211  |          |          | 15/01/2003 | 0          |



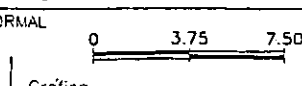
TÍTULO  
L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA  
TRAMO: LLEIDA - MARTORELL  
SUBTRAMO XI-A. PLATAFORMA

U.T.E. L'ANDIA



ESCALA NORMAL

1:300  
DIN A-3  
Numérica



FECHA

ABRIL 2003

TÍTULO DEL PLANO

VIADUCTO DE ANDIA  
TABLERO. PRETENSADO (VIII)

No. DE PLANO

2.9.2.5

Hoja 7 de

Pag. 1

Referencia del Proyecto:

VIADUCTO S/RÍO ANOIA (TRAZADO FAMILIA 1)

Pag. 3

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
 A = 0.00000 B = -0.11898 C = -1.25000  
 Origen = 0.00 Final = 1.40  
 Parametros de la parabola = 2  
 A = 0.00401 B = -0.13020 C = -1.24215  
 Origen = 1.40 Final = 16.25  
 Parametros de la parabola = 4  
 A = 0.00659 B = -0.21419 C = -0.55974  
 Origen = 16.25 Final = 32.00  
 Parametros de la parabola = 5  
 A = -0.02595 B = 1.86835 C = -33.88038  
 Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.50  
 Parametros de la parabola = 2  
 A = -0.02910 B = 0.26188 C = -0.83922  
 Origen = 4.50 Final = 8.50  
 Parametros de la parabola = 3  
 A = 0.00831 B = -0.37411 C = 1.86371  
 Origen = 8.50 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = 0.20297  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.38750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 8

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.25000  
 Origen = 0.00 Final = 4.00  
 Parametros de la parabola = 2  
 A = -0.03254 B = 0.26032 C = -0.77063  
 Origen = 4.00 Final = 8.00  
 Parametros de la parabola = 3  
 A = 0.01108 B = -0.43755 C = 2.02085  
 Origen = 8.00 Final = 19.75  
 Parametros de la parabola = 5  
 A = 0.00401 B = -0.15824 C = -0.73738  
 Origen = 19.75 Final = 34.60  
 Parametros de la parabola = 6  
 A = 0.00000 B = 0.11898 C = -5.53329  
 Origen = 34.60 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I  | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|---------|--------|-------|--------|----------|----------|---------|
| 1  | 0.000   | -1.250 | 1.755 | -0.098 | 0.0000   | 6.2036   | 0.0000  |
| 2  | 1.800   | -1.464 | 1.541 | -0.311 | 0.0032   | 6.2004   | 0.0080  |
| 3  | 3.600   | -1.659 | 1.346 | -0.507 | 0.0176   | 6.1860   | 0.0080  |
| 4  | 5.400   | -1.828 | 1.177 | -0.676 | 0.0321   | 6.1716   | 0.0080  |
| 5  | 7.200   | -1.972 | 1.033 | -0.819 | 0.0465   | 6.1571   | 0.0080  |
| 6  | 9.000   | -2.089 | 0.916 | -0.937 | 0.0609   | 6.1427   | 0.0080  |
| 7  | 10.800  | -2.181 | 0.824 | -1.029 | 0.0753   | 6.1283   | 0.0080  |
| 8  | 12.600  | -2.247 | 0.758 | -1.094 | 0.0898   | 6.1139   | 0.0080  |
| 9  | 14.400  | -2.286 | 0.719 | -1.134 | 0.1042   | 6.0994   | 0.0080  |
| 10 | 16.200  | -2.300 | 0.705 | -1.148 | 0.1186   | 6.0850   | 0.0080  |
| 11 | 18.000  | -2.280 | 0.725 | -1.127 | 0.1421   | 6.0615   | 0.0132  |
| 12 | 19.800  | -2.217 | 0.788 | -1.065 | 0.1658   | 6.0378   | 0.0132  |
| 13 | 21.600  | -2.111 | 0.894 | -0.959 | 0.1895   | 6.0141   | 0.0132  |
| 14 | 23.400  | -1.963 | 1.042 | -0.811 | 0.2132   | 5.9904   | 0.0132  |
| 15 | 25.200  | -1.772 | 1.233 | -0.620 | 0.2370   | 5.9666   | 0.0132  |
| 16 | 27.000  | -1.538 | 1.467 | -0.386 | 0.2607   | 5.9429   | 0.0132  |
| 17 | 28.800  | -1.262 | 1.743 | -0.110 | 0.2844   | 5.9192   | 0.0132  |
| 18 | 30.600  | -0.943 | 2.062 | 0.209  | 0.3081   | 5.8955   | 0.0132  |
| 19 | 32.400  | -0.586 | 2.419 | 0.732  | 0.3475   | 5.8561   | -0.0519 |
| 20 | 34.200  | -0.334 | 2.671 | 0.984  | 0.4408   | 5.7628   | -0.0519 |
| 21 | 36.000  | -0.250 | 2.755 | 1.068  | 0.5342   | 5.6694   | 0.0000  |
| 22 | 38.250  | -0.250 | 2.755 | 1.068  | 0.5342   | 5.6694   | 0.0000  |
| 23 | 40.500  | -0.250 | 2.755 | 0.902  | 0.5342   | 5.6694   | -0.0582 |
| 24 | 42.750  | -0.397 | 2.608 | 0.755  | 0.6652   | 5.5384   | -0.0582 |
| 25 | 45.000  | -0.830 | 2.175 | 0.323  | 0.7753   | 5.4283   | 0.0166  |
| 26 | 47.250  | -1.293 | 1.712 | -0.140 | 0.8128   | 5.3908   | 0.0166  |
| 27 | 49.500  | -1.672 | 1.333 | -0.519 | 0.8502   | 5.3534   | 0.0166  |
| 28 | 51.750  | -1.966 | 1.039 | -0.814 | 0.8875   | 5.3161   | 0.0166  |
| 29 | 54.000  | -2.177 | 0.828 | -1.024 | 0.9251   | 5.2785   | 0.0166  |
| 30 | 56.250  | -2.303 | 0.702 | -1.151 | 0.9624   | 5.2412   | 0.0166  |
| 31 | 58.500  | -2.345 | 0.660 | -1.193 | 0.9999   | 5.2037   | 0.0166  |
| 32 | 60.750  | -2.320 | 0.685 | -1.167 | 1.0223   | 5.1813   | 0.0101  |
| 33 | 63.000  | -2.243 | 0.762 | -1.091 | 1.0452   | 5.1584   | 0.0101  |
| 34 | 65.250  | -2.116 | 0.889 | -0.963 | 1.0678   | 5.1359   | 0.0101  |
| 35 | 67.500  | -1.937 | 1.068 | -0.785 | 1.0904   | 5.1132   | 0.0101  |
| 36 | 69.750  | -1.708 | 1.297 | -0.556 | 1.1131   | 5.0905   | 0.0101  |
| 37 | 72.000  | -1.428 | 1.577 | -0.275 | 1.1360   | 5.0676   | 0.0101  |
| 38 | 74.250  | -1.096 | 1.909 | 0.056  | 1.1585   | 5.0451   | 0.0101  |
| 39 | 76.500  | -0.714 | 2.291 | 0.604  | 1.1811   | 5.0225   | 0.0101  |
| 40 | 78.750  | -0.368 | 2.637 | 0.950  | 1.2675   | 4.9361   | -0.0466 |
| 41 | 81.000  | -0.250 | 2.755 | 1.068  | 1.3724   | 4.8312   | 0.0000  |
| 42 | 83.250  | -0.250 | 2.755 | 1.068  | 1.3724   | 4.8312   | 0.0000  |
| 43 | 85.500  | -0.250 | 2.755 | 0.902  | 1.3725   | 4.8311   | -0.0582 |
| 44 | 87.750  | -0.397 | 2.608 | 0.755  | 1.5034   | 4.7002   | -0.0582 |
| 45 | 90.000  | -0.830 | 2.175 | 0.323  | 1.6136   | 4.5900   | 0.0166  |
| 46 | 92.250  | -1.293 | 1.712 | -0.140 | 1.6510   | 4.5526   | 0.0166  |
| 47 | 94.500  | -1.672 | 1.333 | -0.519 | 1.6884   | 4.5152   | 0.0166  |
| 48 | 96.750  | -1.966 | 1.039 | -0.814 | 1.7258   | 4.4778   | 0.0166  |
| 49 | 99.000  | -2.177 | 0.828 | -1.024 | 1.7633   | 4.4403   | 0.0166  |
| 50 | 101.250 | -2.303 | 0.702 | -1.151 | 1.8006   | 4.4030   | 0.0166  |
| 51 | 103.500 | -2.345 | 0.660 | -1.193 | 1.8382   | 4.3654   | 0.0166  |
| 52 | 105.750 | -2.320 | 0.685 | -1.167 | 1.8606   | 4.3431   | 0.0101  |
| 53 | 108.000 | -2.243 | 0.762 | -1.091 | 1.8835   | 4.3202   | 0.0101  |
| 54 | 110.250 | -2.116 | 0.889 | -0.963 | 1.9060   | 4.2976   | 0.0101  |
| 55 | 112.500 | -1.937 | 1.068 | -0.785 | 1.9287   | 4.2749   | 0.0101  |

## DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 56  | 114.750 | -1.708 | 1.297 | -0.556 | 1.9513   | 4.2523   | 0.0101  |
| 57  | 117.000 | -1.428 | 1.577 | -0.275 | 1.9742   | 4.2294   | 0.0101  |
| 58  | 119.250 | -1.096 | 1.909 | 0.056  | 1.9968   | 4.2068   | 0.0101  |
| 59  | 121.500 | -0.714 | 2.291 | 0.604  | 2.0193   | 4.1843   | 0.0101  |
| 60  | 123.750 | -0.368 | 2.637 | 0.950  | 2.1057   | 4.0979   | -0.0466 |
| 61  | 126.000 | -0.250 | 2.755 | 1.068  | 2.2107   | 3.9929   | 0.0000  |
| 62  | 128.250 | -0.250 | 2.755 | 1.068  | 2.2107   | 3.9929   | 0.0000  |
| 63  | 130.500 | -0.250 | 2.755 | 0.902  | 2.2107   | 3.9929   | -0.0582 |
| 64  | 132.750 | -0.397 | 2.608 | 0.755  | 2.3417   | 3.8619   | -0.0582 |
| 65  | 135.000 | -0.830 | 2.175 | 0.323  | 2.4518   | 3.7518   | 0.0166  |
| 66  | 137.250 | -1.293 | 1.712 | -0.140 | 2.4893   | 3.7144   | 0.0166  |
| 67  | 139.500 | -1.672 | 1.333 | -0.519 | 2.5267   | 3.6770   | 0.0166  |
| 68  | 141.750 | -1.966 | 1.039 | -0.814 | 2.5640   | 3.6396   | 0.0166  |
| 69  | 144.000 | -2.177 | 0.828 | -1.024 | 2.6016   | 3.6020   | 0.0166  |
| 70  | 146.250 | -2.303 | 0.702 | -1.151 | 2.6389   | 3.5648   | 0.0166  |
| 71  | 148.500 | -2.345 | 0.660 | -1.193 | 2.6764   | 3.5272   | 0.0166  |
| 72  | 150.750 | -2.320 | 0.685 | -1.167 | 2.6988   | 3.5048   | 0.0101  |
| 73  | 153.000 | -2.243 | 0.762 | -1.091 | 2.7217   | 3.4819   | 0.0101  |
| 74  | 155.250 | -2.116 | 0.889 | -0.963 | 2.7442   | 3.4594   | 0.0101  |
| 75  | 157.500 | -1.937 | 1.068 | -0.785 | 2.7669   | 3.4367   | 0.0101  |
| 76  | 159.750 | -1.708 | 1.297 | -0.556 | 2.7896   | 3.4141   | 0.0101  |
| 77  | 162.000 | -1.428 | 1.577 | -0.275 | 2.8125   | 3.3911   | 0.0101  |
| 78  | 164.250 | -1.096 | 1.909 | 0.056  | 2.8350   | 3.3686   | 0.0101  |
| 79  | 166.500 | -0.714 | 2.291 | 0.604  | 2.8576   | 3.3460   | 0.0101  |
| 80  | 168.750 | -0.368 | 2.637 | 0.950  | 2.9440   | 3.2596   | -0.0466 |
| 81  | 171.000 | -0.250 | 2.755 | 1.068  | 3.0489   | 3.1547   | 0.0000  |
| 82  | 173.250 | -0.250 | 2.755 | 1.068  | 3.0489   | 3.1547   | 0.0000  |
| 83  | 175.500 | -0.250 | 2.755 | 0.902  | 3.0490   | 3.1547   | -0.0582 |
| 84  | 177.750 | -0.397 | 2.608 | 0.755  | 3.1799   | 3.0237   | -0.0582 |
| 85  | 180.000 | -0.830 | 2.175 | 0.323  | 3.2901   | 2.9135   | 0.0166  |
| 86  | 182.250 | -1.293 | 1.712 | -0.140 | 3.3275   | 2.8761   | 0.0166  |
| 87  | 184.500 | -1.672 | 1.333 | -0.519 | 3.3649   | 2.8387   | 0.0166  |
| 88  | 186.750 | -1.966 | 1.039 | -0.814 | 3.4022   | 2.8014   | 0.0166  |
| 89  | 189.000 | -2.177 | 0.828 | -1.024 | 3.4398   | 2.7638   | 0.0166  |
| 90  | 191.250 | -2.303 | 0.702 | -1.151 | 3.4771   | 2.7265   | 0.0166  |
| 91  | 193.500 | -2.345 | 0.660 | -1.193 | 3.5147   | 2.6889   | 0.0166  |
| 92  | 195.750 | -2.320 | 0.685 | -1.167 | 3.5370   | 2.6666   | 0.0101  |
| 93  | 198.000 | -2.243 | 0.762 | -1.091 | 3.5599   | 2.6437   | 0.0101  |
| 94  | 200.250 | -2.116 | 0.889 | -0.963 | 3.5825   | 2.6211   | 0.0101  |
| 95  | 202.500 | -1.937 | 1.068 | -0.785 | 3.6052   | 2.5985   | 0.0101  |
| 96  | 204.750 | -1.708 | 1.297 | -0.556 | 3.6278   | 2.5758   | 0.0101  |
| 97  | 207.000 | -1.428 | 1.577 | -0.275 | 3.6507   | 2.5529   | 0.0101  |
| 98  | 209.250 | -1.096 | 1.909 | 0.056  | 3.6733   | 2.5304   | 0.0101  |
| 99  | 211.500 | -0.714 | 2.291 | 0.604  | 3.6958   | 2.5078   | 0.0101  |
| 100 | 213.750 | -0.368 | 2.637 | 0.950  | 3.7822   | 2.4214   | -0.0466 |
| 101 | 216.000 | -0.250 | 2.755 | 1.068  | 3.8872   | 2.3164   | 0.0000  |
| 102 | 218.250 | -0.250 | 2.755 | 1.068  | 3.8872   | 2.3164   | 0.0000  |
| 103 | 220.500 | -0.250 | 2.755 | 0.902  | 3.8872   | 2.3164   | -0.0582 |
| 104 | 222.750 | -0.397 | 2.608 | 0.755  | 4.0182   | 2.1855   | -0.0582 |
| 105 | 225.000 | -0.830 | 2.175 | 0.323  | 4.1283   | 2.0753   | 0.0166  |
| 106 | 227.250 | -1.293 | 1.712 | -0.140 | 4.1657   | 2.0379   | 0.0166  |
| 107 | 229.500 | -1.672 | 1.333 | -0.519 | 4.2031   | 2.0005   | 0.0166  |
| 108 | 231.750 | -1.966 | 1.039 | -0.814 | 4.2405   | 1.9631   | 0.0166  |
| 109 | 234.000 | -2.177 | 0.828 | -1.024 | 4.2781   | 1.9256   | 0.0166  |
| 110 | 236.250 | -2.303 | 0.702 | -1.151 | 4.3153   | 1.8883   | 0.0166  |

## DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 111 | 238.500 | -2.345 | 0.660 | -1.193 | 4.3529   | 1.8507   | 0.0166  |
| 112 | 240.750 | -2.320 | 0.685 | -1.167 | 4.3753   | 1.8283   | 0.0101  |
| 113 | 243.000 | -2.243 | 0.762 | -1.091 | 4.3982   | 1.8054   | 0.0101  |
| 114 | 245.250 | -2.116 | 0.889 | -0.963 | 4.4207   | 1.7829   | 0.0101  |
| 115 | 247.500 | -1.937 | 1.068 | -0.785 | 4.4434   | 1.7602   | 0.0101  |
| 116 | 249.750 | -1.708 | 1.297 | -0.556 | 4.4660   | 1.7376   | 0.0101  |
| 117 | 252.000 | -1.428 | 1.577 | -0.275 | 4.4890   | 1.7147   | 0.0101  |
| 118 | 254.250 | -1.096 | 1.909 | 0.056  | 4.5115   | 1.6921   | 0.0101  |
| 119 | 256.500 | -0.714 | 2.291 | 0.604  | 4.5341   | 1.6696   | 0.0101  |
| 120 | 258.750 | -0.368 | 2.637 | 0.950  | 4.6205   | 1.5832   | -0.0466 |
| 121 | 261.000 | -0.250 | 2.755 | 1.068  | 4.7254   | 1.4782   | 0.0000  |
| 122 | 263.250 | -0.250 | 2.755 | 1.068  | 4.7254   | 1.4782   | 0.0000  |
| 123 | 265.500 | -0.250 | 2.755 | 0.902  | 4.7254   | 1.4782   | -0.0582 |
| 124 | 267.750 | -0.397 | 2.608 | 0.755  | 4.8564   | 1.3472   | -0.0582 |
| 125 | 270.000 | -0.830 | 2.175 | 0.323  | 4.9666   | 1.2371   | 0.0166  |
| 126 | 272.250 | -1.293 | 1.712 | -0.140 | 5.0040   | 1.1996   | 0.0166  |
| 127 | 274.500 | -1.672 | 1.333 | -0.519 | 5.0414   | 1.1622   | 0.0166  |
| 128 | 276.750 | -1.966 | 1.039 | -0.814 | 5.0787   | 1.1249   | 0.0166  |
| 129 | 279.000 | -2.177 | 0.828 | -1.024 | 5.1163   | 1.0873   | 0.0166  |
| 130 | 281.250 | -2.303 | 0.702 | -1.151 | 5.1536   | 1.0500   | 0.0166  |
| 131 | 283.500 | -2.345 | 0.660 | -1.193 | 5.1911   | 1.0125   | 0.0166  |
| 132 | 285.750 | -2.320 | 0.685 | -1.167 | 5.2135   | 0.9901   | 0.0101  |
| 133 | 288.000 | -2.243 | 0.762 | -1.091 | 5.2364   | 0.9672   | 0.0101  |
| 134 | 290.250 | -2.116 | 0.889 | -0.963 | 5.2590   | 0.9446   | 0.0101  |
| 135 | 292.500 | -1.937 | 1.068 | -0.785 | 5.2816   | 0.9220   | 0.0101  |
| 136 | 294.750 | -1.708 | 1.297 | -0.556 | 5.3043   | 0.8993   | 0.0101  |
| 137 | 297.000 | -1.428 | 1.577 | -0.275 | 5.3272   | 0.8764   | 0.0101  |
| 138 | 299.250 | -1.096 | 1.909 | 0.056  | 5.3497   | 0.8539   | 0.0101  |
| 139 | 301.500 | -0.714 | 2.291 | 0.604  | 5.3723   | 0.8313   | 0.0101  |
| 140 | 303.750 | -0.368 | 2.637 | 0.950  | 5.4587   | 0.7449   | -0.0466 |
| 141 | 306.000 | -0.250 | 2.755 | 1.068  | 5.5637   | 0.6400   | 0.0000  |
| 142 | 307.800 | -0.250 | 2.755 | 1.068  | 5.5637   | 0.6400   | 0.0000  |
| 143 | 309.600 | -0.250 | 2.755 | 0.902  | 5.5637   | 0.6400   | 0.0000  |
| 144 | 311.400 | -0.314 | 2.691 | 0.839  | 5.6548   | 0.5488   | -0.0651 |
| 145 | 313.200 | -0.583 | 2.422 | 0.569  | 5.7720   | 0.4316   | -0.0651 |
| 146 | 315.000 | -1.020 | 1.985 | 0.133  | 5.8462   | 0.3574   | 0.0222  |
| 147 | 316.800 | -1.413 | 1.592 | -0.260 | 5.8860   | 0.3176   | 0.0222  |
| 148 | 318.600 | -1.734 | 1.271 | -0.581 | 5.9259   | 0.2777   | 0.0222  |
| 149 | 320.400 | -1.983 | 1.022 | -0.831 | 5.9658   | 0.2378   | 0.0222  |
| 150 | 322.200 | -2.160 | 0.845 | -1.008 | 6.0056   | 0.1980   | 0.0222  |
| 151 | 324.000 | -2.266 | 0.739 | -1.114 | 6.0457   | 0.1579   | 0.0222  |
| 152 | 325.800 | -2.300 | 0.705 | -1.148 | 6.0846   | 0.1190   | 0.0080  |
| 153 | 327.600 | -2.286 | 0.719 | -1.134 | 6.0992   | 0.1044   | 0.0080  |
| 154 | 329.400 | -2.247 | 0.758 | -1.094 | 6.1135   | 0.0901   | 0.0080  |
| 155 | 331.200 | -2.181 | 0.824 | -1.029 | 6.1279   | 0.0757   | 0.0080  |
| 156 | 333.000 | -2.089 | 0.916 | -0.937 | 6.1423   | 0.0613   | 0.0080  |
| 157 | 334.800 | -1.972 | 1.033 | -0.819 | 6.1570   | 0.0467   | 0.0080  |
| 158 | 336.600 | -1.828 | 1.177 | -0.676 | 6.1712   | 0.0324   | 0.0080  |
| 159 | 338.400 | -1.659 | 1.346 | -0.507 | 6.1856   | 0.0180   | 0.0080  |
| 160 | 340.200 | -1.464 | 1.541 | -0.311 | 6.2002   | 0.0034   | 0.0080  |
| 161 | 342.000 | -1.250 | 1.755 | -0.098 | 6.2036   | 0.0000   | 0.0000  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 1 161  
 NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 1 8  
 PENDIENTE INICIAL DEL TRAZADO = -0.11898  
 PENDIENTE FINAL DEL TRAZADO = 0.11898

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Referencia del Proyecto:

VIADUCTO S/RÍO ANOIA (TRAZADO FAMILIA 2)

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DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
 A = 0.00000 B = -0.07365 C = -1.85000  
 Origen = 0.00 Final = 1.40  
 Parametros de la parabola = 2  
 A = 0.00248 B = -0.08060 C = -1.84514  
 Origen = 1.40 Final = 16.25  
 Parametros de la parabola = 4  
 A = 0.00646 B = -0.21001 C = -0.79370  
 Origen = 16.25 Final = 32.00  
 Parametros de la parabola = 5  
 A = -0.02544 B = 1.83190 C = -33.46418  
 Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02555 B = 0.10220 C = -0.59220  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00619 B = -0.27871 C = 0.55053  
 Origen = 6.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 8

Parametros de la parabola = 1  
 A = 0.00000 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 2.00  
 Parametros de la parabola = 2  
 A = -0.02831 B = 0.11324 C = -0.60324  
 Origen = 2.00 Final = 6.00  
 Parametros de la parabola = 3  
 A = 0.00824 B = -0.32531 C = 0.71240  
 Origen = 6.00 Final = 19.75  
 Parametros de la parabola = 5  
 A = 0.00248 B = -0.09796 C = -1.53267  
 Origen = 19.75 Final = 34.60  
 Parametros de la parabola = 6  
 A = 0.00000 B = 0.07365 C = -4.50156  
 Origen = 34.60 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1

| I  | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|---------|--------|-------|--------|----------|----------|---------|
| 1  | 0.000   | -1.850 | 1.155 | -0.698 | 0.0000   | 5.6961   | 0.0000  |
| 2  | 1.800   | -1.982 | 1.023 | -0.830 | 0.0020   | 5.6941   | 0.0050  |
| 3  | 3.600   | -2.103 | 0.902 | -0.951 | 0.0109   | 5.6852   | 0.0050  |
| 4  | 5.400   | -2.208 | 0.797 | -1.056 | 0.0198   | 5.6762   | 0.0050  |
| 5  | 7.200   | -2.297 | 0.708 | -1.144 | 0.0288   | 5.6673   | 0.0050  |
| 6  | 9.000   | -2.370 | 0.635 | -1.217 | 0.0377   | 5.6584   | 0.0050  |
| 7  | 10.800  | -2.426 | 0.579 | -1.274 | 0.0466   | 5.6494   | 0.0050  |
| 8  | 12.600  | -2.467 | 0.538 | -1.315 | 0.0556   | 5.6405   | 0.0050  |
| 9  | 14.400  | -2.492 | 0.513 | -1.339 | 0.0645   | 5.6316   | 0.0050  |
| 10 | 16.200  | -2.500 | 0.505 | -1.348 | 0.0734   | 5.6227   | 0.0050  |
| 11 | 18.000  | -2.480 | 0.525 | -1.328 | 0.0963   | 5.5998   | 0.0129  |
| 12 | 19.800  | -2.419 | 0.586 | -1.266 | 0.1195   | 5.5765   | 0.0129  |
| 13 | 21.600  | -2.315 | 0.690 | -1.163 | 0.1428   | 5.5533   | 0.0129  |
| 14 | 23.400  | -2.170 | 0.835 | -1.017 | 0.1661   | 5.5300   | 0.0129  |
| 15 | 25.200  | -1.982 | 1.023 | -0.830 | 0.1893   | 5.5067   | 0.0129  |
| 16 | 27.000  | -1.753 | 1.252 | -0.601 | 0.2126   | 5.4835   | 0.0129  |
| 17 | 28.800  | -1.482 | 1.523 | -0.330 | 0.2358   | 5.4602   | 0.0129  |
| 18 | 30.600  | -1.169 | 1.836 | -0.017 | 0.2591   | 5.4369   | 0.0129  |
| 19 | 32.400  | -0.820 | 2.185 | 0.498  | 0.2977   | 5.3984   | -0.0509 |
| 20 | 34.200  | -0.572 | 2.433 | 0.746  | 0.3892   | 5.3069   | -0.0509 |
| 21 | 36.000  | -0.490 | 2.515 | 0.828  | 0.4808   | 5.2153   | 0.0000  |
| 22 | 38.250  | -0.492 | 2.513 | 0.826  | 0.4936   | 5.2025   | -0.0511 |
| 23 | 40.500  | -0.650 | 2.355 | 0.503  | 0.6086   | 5.0875   | -0.0511 |
| 24 | 42.750  | -1.049 | 1.956 | 0.104  | 0.6945   | 5.0016   | 0.0124  |
| 25 | 45.000  | -1.456 | 1.549 | -0.304 | 0.7224   | 4.9737   | 0.0124  |
| 26 | 47.250  | -1.801 | 1.204 | -0.649 | 0.7503   | 4.9458   | 0.0124  |
| 27 | 49.500  | -2.083 | 0.922 | -0.931 | 0.7781   | 4.9180   | 0.0124  |
| 28 | 51.750  | -2.303 | 0.702 | -1.150 | 0.8060   | 4.8901   | 0.0124  |
| 29 | 54.000  | -2.460 | 0.545 | -1.307 | 0.8339   | 4.8622   | 0.0124  |
| 30 | 56.250  | -2.554 | 0.451 | -1.401 | 0.8617   | 4.8344   | 0.0124  |
| 31 | 58.500  | -2.585 | 0.420 | -1.433 | 0.8897   | 4.8064   | 0.0124  |
| 32 | 60.750  | -2.560 | 0.445 | -1.407 | 0.9122   | 4.7839   | 0.0101  |
| 33 | 63.000  | -2.483 | 0.522 | -1.331 | 0.9350   | 4.7611   | 0.0101  |
| 34 | 65.250  | -2.356 | 0.649 | -1.203 | 0.9576   | 4.7385   | 0.0101  |
| 35 | 67.500  | -2.177 | 0.828 | -1.025 | 0.9802   | 4.7159   | 0.0101  |
| 36 | 69.750  | -1.948 | 1.057 | -0.796 | 1.0029   | 4.6932   | 0.0101  |
| 37 | 72.000  | -1.668 | 1.337 | -0.515 | 1.0257   | 4.6703   | 0.0101  |
| 38 | 74.250  | -1.336 | 1.669 | -0.184 | 1.0481   | 4.6479   | 0.0101  |
| 39 | 76.500  | -0.954 | 2.051 | 0.364  | 1.0708   | 4.6253   | 0.0101  |
| 40 | 78.750  | -0.608 | 2.397 | 0.710  | 1.1573   | 4.5388   | -0.0466 |
| 41 | 81.000  | -0.490 | 2.515 | 0.828  | 1.2622   | 4.4339   | 0.0000  |
| 42 | 83.250  | -0.492 | 2.513 | 0.826  | 1.2750   | 4.4211   | -0.0511 |
| 43 | 85.500  | -0.650 | 2.355 | 0.503  | 1.3900   | 4.3061   | -0.0511 |
| 44 | 87.750  | -1.049 | 1.956 | 0.104  | 1.4759   | 4.2202   | 0.0124  |
| 45 | 90.000  | -1.456 | 1.549 | -0.304 | 1.5038   | 4.1923   | 0.0124  |
| 46 | 92.250  | -1.801 | 1.204 | -0.649 | 1.5317   | 4.1644   | 0.0124  |
| 47 | 94.500  | -2.083 | 0.922 | -0.931 | 1.5595   | 4.1366   | 0.0124  |
| 48 | 96.750  | -2.303 | 0.702 | -1.150 | 1.5874   | 4.1087   | 0.0124  |
| 49 | 99.000  | -2.460 | 0.545 | -1.307 | 1.6153   | 4.0808   | 0.0124  |
| 50 | 101.250 | -2.554 | 0.451 | -1.401 | 1.6431   | 4.0530   | 0.0124  |
| 51 | 103.500 | -2.585 | 0.420 | -1.433 | 1.6711   | 4.0250   | 0.0124  |
| 52 | 105.750 | -2.560 | 0.445 | -1.407 | 1.6936   | 4.0025   | 0.0101  |
| 53 | 108.000 | -2.483 | 0.522 | -1.331 | 1.7164   | 3.9797   | 0.0101  |
| 54 | 110.250 | -2.356 | 0.649 | -1.203 | 1.7390   | 3.9571   | 0.0101  |
| 55 | 112.500 | -2.177 | 0.828 | -1.025 | 1.7616   | 3.9345   | 0.0101  |



DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 56  | 114.750 | -1.948 | 1.057 | -0.796 | 1.7843   | 3.9118   | 0.0101  |
| 57  | 117.000 | -1.668 | 1.337 | -0.515 | 1.8071   | 3.8889   | 0.0101  |
| 58  | 119.250 | -1.336 | 1.669 | -0.184 | 1.8296   | 3.8665   | 0.0101  |
| 59  | 121.500 | -0.954 | 2.051 | 0.364  | 1.8522   | 3.8439   | 0.0101  |
| 60  | 123.750 | -0.608 | 2.397 | 0.710  | 1.9387   | 3.7574   | -0.0466 |
| 61  | 126.000 | -0.490 | 2.515 | 0.828  | 2.0436   | 3.6525   | 0.0000  |
| 62  | 128.250 | -0.492 | 2.513 | 0.826  | 2.0564   | 3.6397   | -0.0511 |
| 63  | 130.500 | -0.650 | 2.355 | 0.503  | 2.1714   | 3.5247   | -0.0511 |
| 64  | 132.750 | -1.049 | 1.956 | 0.104  | 2.2573   | 3.4388   | 0.0124  |
| 65  | 135.000 | -1.456 | 1.549 | -0.304 | 2.2852   | 3.4109   | 0.0124  |
| 66  | 137.250 | -1.801 | 1.204 | -0.649 | 2.3131   | 3.3830   | 0.0124  |
| 67  | 139.500 | -2.083 | 0.922 | -0.931 | 2.3409   | 3.3552   | 0.0124  |
| 68  | 141.750 | -2.303 | 0.702 | -1.150 | 2.3688   | 3.3273   | 0.0124  |
| 69  | 144.000 | -2.460 | 0.545 | -1.307 | 2.3967   | 3.2994   | 0.0124  |
| 70  | 146.250 | -2.554 | 0.451 | -1.401 | 2.4245   | 3.2716   | 0.0124  |
| 71  | 148.500 | -2.585 | 0.420 | -1.433 | 2.4525   | 3.2436   | 0.0124  |
| 72  | 150.750 | -2.560 | 0.445 | -1.407 | 2.4750   | 3.2211   | 0.0101  |
| 73  | 153.000 | -2.483 | 0.522 | -1.331 | 2.4978   | 3.1983   | 0.0101  |
| 74  | 155.250 | -2.356 | 0.649 | -1.203 | 2.5204   | 3.1757   | 0.0101  |
| 75  | 157.500 | -2.177 | 0.828 | -1.025 | 2.5430   | 3.1531   | 0.0101  |
| 76  | 159.750 | -1.948 | 1.057 | -0.796 | 2.5657   | 3.1303   | 0.0101  |
| 77  | 162.000 | -1.668 | 1.337 | -0.515 | 2.5885   | 3.1075   | 0.0101  |
| 78  | 164.250 | -1.336 | 1.669 | -0.184 | 2.6110   | 3.0851   | 0.0101  |
| 79  | 166.500 | -0.954 | 2.051 | 0.364  | 2.6336   | 3.0625   | 0.0101  |
| 80  | 168.750 | -0.608 | 2.397 | 0.710  | 2.7201   | 2.9760   | -0.0466 |
| 81  | 171.000 | -0.490 | 2.515 | 0.828  | 2.8250   | 2.8711   | 0.0000  |
| 82  | 173.250 | -0.492 | 2.513 | 0.826  | 2.8378   | 2.8583   | -0.0511 |
| 83  | 175.500 | -0.650 | 2.355 | 0.503  | 2.9528   | 2.7433   | -0.0511 |
| 84  | 177.750 | -1.049 | 1.956 | 0.104  | 3.0387   | 2.6574   | 0.0124  |
| 85  | 180.000 | -1.456 | 1.549 | -0.304 | 3.0666   | 2.6295   | 0.0124  |
| 86  | 182.250 | -1.801 | 1.204 | -0.649 | 3.0945   | 2.6016   | 0.0124  |
| 87  | 184.500 | -2.083 | 0.922 | -0.931 | 3.1223   | 2.5738   | 0.0124  |
| 88  | 186.750 | -2.303 | 0.702 | -1.150 | 3.1502   | 2.5459   | 0.0124  |
| 89  | 189.000 | -2.460 | 0.545 | -1.307 | 3.1781   | 2.5180   | 0.0124  |
| 90  | 191.250 | -2.554 | 0.451 | -1.401 | 3.2059   | 2.4902   | 0.0124  |
| 91  | 193.500 | -2.585 | 0.420 | -1.433 | 3.2339   | 2.4622   | 0.0124  |
| 92  | 195.750 | -2.560 | 0.445 | -1.407 | 3.2564   | 2.4397   | 0.0101  |
| 93  | 198.000 | -2.483 | 0.522 | -1.331 | 3.2792   | 2.4169   | 0.0101  |
| 94  | 200.250 | -2.356 | 0.649 | -1.203 | 3.3018   | 2.3943   | 0.0101  |
| 95  | 202.500 | -2.177 | 0.828 | -1.025 | 3.3244   | 2.3716   | 0.0101  |
| 96  | 204.750 | -1.948 | 1.057 | -0.796 | 3.3471   | 2.3489   | 0.0101  |
| 97  | 207.000 | -1.668 | 1.337 | -0.515 | 3.3699   | 2.3261   | 0.0101  |
| 98  | 209.250 | -1.336 | 1.669 | -0.184 | 3.3924   | 2.3037   | 0.0101  |
| 99  | 211.500 | -0.954 | 2.051 | 0.364  | 3.4150   | 2.2811   | 0.0101  |
| 100 | 213.750 | -0.608 | 2.397 | 0.710  | 3.5015   | 2.1946   | -0.0466 |
| 101 | 216.000 | -0.490 | 2.515 | 0.828  | 3.6064   | 2.0897   | 0.0000  |
| 102 | 218.250 | -0.492 | 2.513 | 0.826  | 3.6192   | 2.0769   | -0.0511 |
| 103 | 220.500 | -0.650 | 2.355 | 0.503  | 3.7342   | 1.9619   | -0.0511 |
| 104 | 222.750 | -1.049 | 1.956 | 0.104  | 3.8201   | 1.8760   | 0.0124  |
| 105 | 225.000 | -1.456 | 1.549 | -0.304 | 3.8480   | 1.8481   | 0.0124  |
| 106 | 227.250 | -1.801 | 1.204 | -0.649 | 3.8759   | 1.8202   | 0.0124  |
| 107 | 229.500 | -2.083 | 0.922 | -0.931 | 3.9037   | 1.7924   | 0.0124  |
| 108 | 231.750 | -2.303 | 0.702 | -1.150 | 3.9316   | 1.7645   | 0.0124  |
| 109 | 234.000 | -2.460 | 0.545 | -1.307 | 3.9595   | 1.7366   | 0.0124  |
| 110 | 236.250 | -2.554 | 0.451 | -1.401 | 3.9873   | 1.7088   | 0.0124  |

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 111 | 238.500 | -2.585 | 0.420 | -1.433 | 4.0153   | 1.6808   | 0.0124  |
| 112 | 240.750 | -2.560 | 0.445 | -1.407 | 4.0378   | 1.6583   | 0.0101  |
| 113 | 243.000 | -2.483 | 0.522 | -1.331 | 4.0606   | 1.6355   | 0.0101  |
| 114 | 245.250 | -2.356 | 0.649 | -1.203 | 4.0832   | 1.6129   | 0.0101  |
| 115 | 247.500 | -2.177 | 0.828 | -1.025 | 4.1058   | 1.5902   | 0.0101  |
| 116 | 249.750 | -1.948 | 1.057 | -0.796 | 4.1285   | 1.5675   | 0.0101  |
| 117 | 252.000 | -1.668 | 1.337 | -0.515 | 4.1513   | 1.5447   | 0.0101  |
| 118 | 254.250 | -1.336 | 1.669 | -0.184 | 4.1738   | 1.5223   | 0.0101  |
| 119 | 256.500 | -0.954 | 2.051 | 0.364  | 4.1964   | 1.4997   | 0.0101  |
| 120 | 258.750 | -0.608 | 2.397 | 0.710  | 4.2829   | 1.4132   | -0.0466 |
| 121 | 261.000 | -0.490 | 2.515 | 0.828  | 4.3878   | 1.3083   | 0.0000  |
| 122 | 263.250 | -0.492 | 2.513 | 0.826  | 4.4006   | 1.2955   | -0.0511 |
| 123 | 265.500 | -0.650 | 2.355 | 0.503  | 4.5156   | 1.1805   | -0.0511 |
| 124 | 267.750 | -1.049 | 1.956 | 0.104  | 4.6015   | 1.0946   | 0.0124  |
| 125 | 270.000 | -1.456 | 1.549 | -0.304 | 4.6294   | 1.0667   | 0.0124  |
| 126 | 272.250 | -1.801 | 1.204 | -0.649 | 4.6573   | 1.0388   | 0.0124  |
| 127 | 274.500 | -2.083 | 0.922 | -0.931 | 4.6851   | 1.0110   | 0.0124  |
| 128 | 276.750 | -2.303 | 0.702 | -1.150 | 4.7130   | 0.9831   | 0.0124  |
| 129 | 279.000 | -2.460 | 0.545 | -1.307 | 4.7409   | 0.9552   | 0.0124  |
| 130 | 281.250 | -2.554 | 0.451 | -1.401 | 4.7687   | 0.9274   | 0.0124  |
| 131 | 283.500 | -2.585 | 0.420 | -1.433 | 4.7967   | 0.8994   | 0.0124  |
| 132 | 285.750 | -2.560 | 0.445 | -1.407 | 4.8192   | 0.8769   | 0.0101  |
| 133 | 288.000 | -2.483 | 0.522 | -1.331 | 4.8420   | 0.8541   | 0.0101  |
| 134 | 290.250 | -2.356 | 0.649 | -1.203 | 4.8646   | 0.8315   | 0.0101  |
| 135 | 292.500 | -2.177 | 0.828 | -1.025 | 4.8872   | 0.8088   | 0.0101  |
| 136 | 294.750 | -1.948 | 1.057 | -0.796 | 4.9099   | 0.7861   | 0.0101  |
| 137 | 297.000 | -1.668 | 1.337 | -0.515 | 4.9327   | 0.7633   | 0.0101  |
| 138 | 299.250 | -1.336 | 1.669 | -0.184 | 4.9552   | 0.7409   | 0.0101  |
| 139 | 301.500 | -0.954 | 2.051 | 0.364  | 4.9778   | 0.7183   | 0.0101  |
| 140 | 303.750 | -0.608 | 2.397 | 0.710  | 5.0643   | 0.6318   | -0.0466 |
| 141 | 306.000 | -0.490 | 2.515 | 0.828  | 5.1692   | 0.5269   | 0.0000  |
| 142 | 307.800 | -0.490 | 2.515 | 0.828  | 5.1692   | 0.5269   | 0.0000  |
| 143 | 309.600 | -0.562 | 2.443 | 0.590  | 5.2598   | 0.4363   | -0.0566 |
| 144 | 311.400 | -0.817 | 2.188 | 0.335  | 5.3617   | 0.3343   | -0.0566 |
| 145 | 313.200 | -1.203 | 1.802 | -0.050 | 5.4155   | 0.2806   | 0.0165  |
| 146 | 315.000 | -1.548 | 1.457 | -0.396 | 5.4452   | 0.2509   | -0.0165 |
| 147 | 316.800 | -1.840 | 1.165 | -0.688 | 5.4748   | 0.2213   | 0.0165  |
| 148 | 318.600 | -2.079 | 0.926 | -0.927 | 5.5044   | 0.1916   | 0.0165  |
| 149 | 320.400 | -2.264 | 0.741 | -1.112 | 5.5341   | 0.1620   | 0.0165  |
| 150 | 322.200 | -2.396 | 0.609 | -1.244 | 5.5637   | 0.1324   | 0.0165  |
| 151 | 324.000 | -2.475 | 0.530 | -1.322 | 5.5934   | 0.1027   | 0.0165  |
| 152 | 325.800 | -2.500 | 0.505 | -1.348 | 5.6224   | 0.0737   | 0.0050  |
| 153 | 327.600 | -2.492 | 0.513 | -1.339 | 5.6313   | 0.0648   | 0.0050  |
| 154 | 329.400 | -2.467 | 0.538 | -1.315 | 5.6402   | 0.0558   | 0.0050  |
| 155 | 331.200 | -2.426 | 0.579 | -1.274 | 5.6492   | 0.0469   | 0.0050  |
| 156 | 333.000 | -2.370 | 0.635 | -1.217 | 5.6582   | 0.0379   | 0.0050  |
| 157 | 334.800 | -2.297 | 0.708 | -1.144 | 5.6673   | 0.0288   | 0.0050  |
| 158 | 336.600 | -2.208 | 0.797 | -1.056 | 5.6759   | 0.0202   | 0.0050  |
| 159 | 338.400 | -2.103 | 0.902 | -0.951 | 5.6850   | 0.0111   | 0.0050  |
| 160 | 340.200 | -1.982 | 1.023 | -0.830 | 5.6937   | 0.0024   | 0.0050  |
| 161 | 342.000 | -1.850 | 1.155 | -0.698 | 5.6961   | 0.0000   | 0.0000  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 1 161

NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 1 8

PENDIENTE INICIAL DEL TRAZADO = -0.07365

PENDIENTE FINAL DEL TRAZADO = 0.07365

Referencia del Proyecto:

VIADUCTO S/RÍO ANOIA (TRAZADO FAMILIA 3)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
 A = 0.00000 B = -0.03966 C = -2.45000  
 Origen = 0.00 Final = 1.40  
 Parametros de la parabola = 2  
 A = 0.00134 B = -0.04340 C = -2.44738  
 Origen = 1.40 Final = 16.25  
 Parametros de la parabola = 4  
 A = 0.00626 B = -0.20336 C = -1.14768  
 Origen = 16.25 Final = 33.00  
 Parametros de la parabola = 5  
 A = -0.03494 B = 2.51544 C = -46.00798  
 Origen = 33.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)



DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 2  
 A = -0.03407 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 3.00  
 Parametros de la parabola = 3  
 A = 0.00584 B = -0.23943 C = -0.37086  
 Origen = 3.00 Final = 20.50  
 Parametros de la parabola = 4  
 A = 0.00000 B = 0.00000 C = -2.82500  
 Origen = 20.50 Final = 24.50  
 Parametros de la parabola = 5  
 A = 0.00584 B = -0.28615 C = 0.68029  
 Origen = 24.50 Final = 42.00  
 Parametros de la parabola = 6  
 A = -0.03407 B = 3.06585 C = -69.71172  
 Origen = 42.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 8

Parametros de la parabola = 2  
 A = -0.02620 B = 0.00000 C = -0.73000  
 Origen = 0.00 Final = 4.00  
 Parametros de la parabola = 3  
 A = 0.00665 B = -0.26286 C = -0.20429  
 Origen = 4.00 Final = 19.75  
 Parametros de la parabola = 5  
 A = 0.00134 B = -0.05275 C = -2.27913  
 Origen = 19.75 Final = 34.60  
 Parametros de la parabola = 6  
 A = 0.00000 B = 0.03966 C = -3.87776  
 Origen = 34.60 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I  | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|---------|--------|-------|--------|----------|----------|---------|
| 1  | 0.000   | -2.450 | 0.555 | -1.298 | 0.0000   | 5.8251   | 0.0000  |
| 2  | 1.800   | -2.521 | 0.484 | -1.369 | 0.0011   | 5.8240   | 0.0027  |
| 3  | 3.600   | -2.586 | 0.419 | -1.434 | 0.0059   | 5.8192   | 0.0027  |
| 4  | 5.400   | -2.643 | 0.362 | -1.490 | 0.0107   | 5.8144   | 0.0027  |
| 5  | 7.200   | -2.691 | 0.314 | -1.538 | 0.0155   | 5.8096   | 0.0027  |
| 6  | 9.000   | -2.730 | 0.275 | -1.577 | 0.0203   | 5.8048   | 0.0027  |
| 7  | 10.800  | -2.760 | 0.245 | -1.608 | 0.0251   | 5.8000   | 0.0027  |
| 8  | 12.600  | -2.782 | 0.223 | -1.630 | 0.0299   | 5.7952   | 0.0027  |
| 9  | 14.400  | -2.795 | 0.210 | -1.643 | 0.0347   | 5.7904   | 0.0027  |
| 10 | 16.200  | -2.800 | 0.205 | -1.648 | 0.0395   | 5.7856   | 0.0027  |
| 11 | 18.000  | -2.781 | 0.224 | -1.628 | 0.0616   | 5.7635   | 0.0125  |
| 12 | 19.800  | -2.721 | 0.284 | -1.569 | 0.0841   | 5.7410   | 0.0125  |
| 13 | 21.600  | -2.621 | 0.384 | -1.468 | 0.1066   | 5.7185   | 0.0125  |
| 14 | 23.400  | -2.480 | 0.525 | -1.328 | 0.1291   | 5.6960   | 0.0125  |
| 15 | 25.200  | -2.299 | 0.706 | -1.146 | 0.1517   | 5.6734   | 0.0125  |
| 16 | 27.000  | -2.077 | 0.928 | -0.924 | 0.1742   | 5.6509   | 0.0125  |
| 17 | 28.800  | -1.814 | 1.191 | -0.662 | 0.1967   | 5.6284   | 0.0125  |
| 18 | 30.600  | -1.511 | 1.494 | -0.359 | 0.2193   | 5.6059   | 0.0125  |
| 19 | 32.400  | -1.168 | 1.837 | 0.150  | 0.2418   | 5.5833   | 0.0125  |
| 20 | 34.200  | -0.843 | 2.162 | 0.475  | 0.3332   | 5.4919   | -0.0699 |
| 21 | 36.000  | -0.730 | 2.275 | 0.588  | 0.4589   | 5.3662   | -0.0681 |
| 22 | 38.250  | -0.902 | 2.103 | 0.416  | 0.6122   | 5.2129   | -0.0681 |
| 23 | 40.500  | -1.330 | 1.675 | -0.178 | 0.6809   | 5.1443   | 0.0117  |
| 24 | 42.750  | -1.721 | 1.284 | -0.569 | 0.7072   | 5.1180   | 0.0117  |
| 25 | 45.000  | -2.053 | 0.952 | -0.900 | 0.7335   | 5.0916   | 0.0117  |
| 26 | 47.250  | -2.325 | 0.680 | -1.173 | 0.7598   | 5.0653   | 0.0117  |
| 27 | 49.500  | -2.539 | 0.466 | -1.386 | 0.7861   | 5.0390   | 0.0117  |
| 28 | 51.750  | -2.693 | 0.312 | -1.541 | 0.8123   | 5.0128   | 0.0117  |
| 29 | 54.000  | -2.789 | 0.216 | -1.636 | 0.8387   | 4.9864   | 0.0117  |
| 30 | 56.250  | -2.825 | 0.180 | -1.672 | 0.8649   | 4.9602   | 0.0117  |
| 31 | 58.500  | -2.825 | 0.180 | -1.673 | 0.8679   | 4.9572   | 0.0000  |
| 32 | 60.750  | -2.825 | 0.180 | -1.672 | 0.8707   | 4.9544   | 0.0117  |
| 33 | 63.000  | -2.789 | 0.216 | -1.636 | 0.8971   | 4.9280   | 0.0117  |
| 34 | 65.250  | -2.693 | 0.312 | -1.541 | 0.9234   | 4.9017   | 0.0117  |
| 35 | 67.500  | -2.539 | 0.466 | -1.386 | 0.9497   | 4.8754   | 0.0117  |
| 36 | 69.750  | -2.325 | 0.680 | -1.173 | 0.9760   | 4.8491   | 0.0117  |
| 37 | 72.000  | -2.053 | 0.952 | -0.900 | 1.0024   | 4.8228   | 0.0117  |
| 38 | 74.250  | -1.721 | 1.284 | -0.569 | 1.0285   | 4.7967   | 0.0117  |
| 39 | 76.500  | -1.330 | 1.675 | -0.012 | 1.0548   | 4.7703   | 0.0117  |
| 40 | 78.750  | -0.902 | 2.103 | 0.416  | 1.1235   | 4.7016   | -0.0681 |
| 41 | 81.000  | -0.730 | 2.275 | 0.588  | 1.2768   | 4.5483   | -0.0681 |
| 42 | 83.250  | -0.902 | 2.103 | 0.416  | 1.4301   | 4.3950   | -0.0681 |
| 43 | 85.500  | -1.330 | 1.675 | -0.178 | 1.4987   | 4.3264   | 0.0117  |
| 44 | 87.750  | -1.721 | 1.284 | -0.569 | 1.5250   | 4.3001   | 0.0117  |
| 45 | 90.000  | -2.053 | 0.952 | -0.900 | 1.5513   | 4.2738   | 0.0117  |
| 46 | 92.250  | -2.325 | 0.680 | -1.173 | 1.5776   | 4.2475   | 0.0117  |
| 47 | 94.500  | -2.539 | 0.466 | -1.386 | 1.6039   | 4.2212   | 0.0117  |
| 48 | 96.750  | -2.693 | 0.312 | -1.541 | 1.6302   | 4.1949   | 0.0117  |
| 49 | 99.000  | -2.789 | 0.216 | -1.636 | 1.6565   | 4.1686   | 0.0117  |
| 50 | 101.250 | -2.825 | 0.180 | -1.672 | 1.6828   | 4.1423   | 0.0117  |
| 51 | 103.500 | -2.825 | 0.180 | -1.673 | 1.6858   | 4.1394   | 0.0000  |
| 52 | 105.750 | -2.825 | 0.180 | -1.672 | 1.6885   | 4.1366   | 0.0117  |
| 53 | 108.000 | -2.789 | 0.216 | -1.636 | 1.7150   | 4.1101   | 0.0117  |
| 54 | 110.250 | -2.693 | 0.312 | -1.541 | 1.7413   | 4.0838   | 0.0117  |
| 55 | 112.500 | -2.539 | 0.466 | -1.386 | 1.7676   | 4.0575   | 0.0117  |

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 56  | 114.750 | -2.325 | 0.680 | -1.173 | 1.7939   | 4.0312   | 0.0117  |
| 57  | 117.000 | -2.053 | 0.952 | -0.900 | 1.8202   | 4.0049   | 0.0117  |
| 58  | 119.250 | -1.721 | 1.284 | -0.569 | 1.8463   | 3.9788   | 0.0117  |
| 59  | 121.500 | -1.330 | 1.675 | -0.012 | 1.8727   | 3.9525   | 0.0117  |
| 60  | 123.750 | -0.902 | 2.103 | 0.416  | 1.9413   | 3.8838   | -0.0681 |
| 61  | 126.000 | -0.730 | 2.275 | 0.588  | 2.0946   | 3.7305   | -0.0681 |
| 62  | 128.250 | -0.902 | 2.103 | 0.416  | 2.2479   | 3.5772   | -0.0681 |
| 63  | 130.500 | -1.330 | 1.675 | -0.178 | 2.3166   | 3.5085   | 0.0117  |
| 64  | 132.750 | -1.721 | 1.284 | -0.569 | 2.3429   | 3.4822   | 0.0117  |
| 65  | 135.000 | -2.053 | 0.952 | -0.900 | 2.3692   | 3.4559   | 0.0117  |
| 66  | 137.250 | -2.325 | 0.680 | -1.173 | 2.3955   | 3.4296   | 0.0117  |
| 67  | 139.500 | -2.539 | 0.466 | -1.386 | 2.4218   | 3.4033   | 0.0117  |
| 68  | 141.750 | -2.693 | 0.312 | -1.541 | 2.4481   | 3.3770   | 0.0117  |
| 69  | 144.000 | -2.789 | 0.216 | -1.636 | 2.4744   | 3.3507   | 0.0117  |
| 70  | 146.250 | -2.825 | 0.180 | -1.672 | 2.5007   | 3.3244   | 0.0117  |
| 71  | 148.500 | -2.825 | 0.180 | -1.673 | 2.5036   | 3.3215   | 0.0000  |
| 72  | 150.750 | -2.825 | 0.180 | -1.672 | 2.5064   | 3.3187   | 0.0117  |
| 73  | 153.000 | -2.789 | 0.216 | -1.636 | 2.5329   | 3.2922   | 0.0117  |
| 74  | 155.250 | -2.693 | 0.312 | -1.541 | 2.5591   | 3.2660   | 0.0117  |
| 75  | 157.500 | -2.539 | 0.466 | -1.386 | 2.5854   | 3.2397   | 0.0117  |
| 76  | 159.750 | -2.325 | 0.680 | -1.173 | 2.6118   | 3.2133   | 0.0117  |
| 77  | 162.000 | -2.053 | 0.952 | -0.900 | 2.6381   | 3.1870   | 0.0117  |
| 78  | 164.250 | -1.721 | 1.284 | -0.569 | 2.6642   | 3.1609   | 0.0117  |
| 79  | 166.500 | -1.330 | 1.675 | -0.012 | 2.6905   | 3.1346   | 0.0117  |
| 80  | 168.750 | -0.902 | 2.103 | 0.416  | 2.7592   | 3.0659   | -0.0681 |
| 81  | 171.000 | -0.730 | 2.275 | 0.588  | 2.9125   | 2.9126   | -0.0681 |
| 82  | 173.250 | -0.902 | 2.103 | 0.416  | 3.0658   | 2.7593   | -0.0681 |
| 83  | 175.500 | -1.330 | 1.675 | -0.178 | 3.1345   | 2.6907   | 0.0117  |
| 84  | 177.750 | -1.721 | 1.284 | -0.569 | 3.1608   | 2.6644   | 0.0117  |
| 85  | 180.000 | -2.053 | 0.952 | -0.900 | 3.1871   | 2.6381   | 0.0117  |
| 86  | 182.250 | -2.325 | 0.680 | -1.173 | 3.2134   | 2.6118   | 0.0117  |
| 87  | 184.500 | -2.539 | 0.466 | -1.386 | 3.2397   | 2.5854   | 0.0117  |
| 88  | 186.750 | -2.693 | 0.312 | -1.541 | 3.2659   | 2.5592   | 0.0117  |
| 89  | 189.000 | -2.789 | 0.216 | -1.636 | 3.2923   | 2.5328   | 0.0117  |
| 90  | 191.250 | -2.825 | 0.180 | -1.672 | 3.3185   | 2.5066   | 0.0117  |
| 91  | 193.500 | -2.825 | 0.180 | -1.673 | 3.3215   | 2.5036   | 0.0000  |
| 92  | 195.750 | -2.825 | 0.180 | -1.672 | 3.3243   | 2.5008   | 0.0117  |
| 93  | 198.000 | -2.789 | 0.216 | -1.636 | 3.3507   | 2.4744   | 0.0117  |
| 94  | 200.250 | -2.693 | 0.312 | -1.541 | 3.3770   | 2.4481   | 0.0117  |
| 95  | 202.500 | -2.539 | 0.466 | -1.386 | 3.4033   | 2.4218   | 0.0117  |
| 96  | 204.750 | -2.325 | 0.680 | -1.173 | 3.4296   | 2.3955   | 0.0117  |
| 97  | 207.000 | -2.053 | 0.952 | -0.900 | 3.4560   | 2.3692   | 0.0117  |
| 98  | 209.250 | -1.721 | 1.284 | -0.569 | 3.4821   | 2.3431   | 0.0117  |
| 99  | 211.500 | -1.330 | 1.675 | -0.012 | 3.5084   | 2.3167   | 0.0117  |
| 100 | 213.750 | -0.902 | 2.103 | 0.416  | 3.5771   | 2.2480   | -0.0681 |
| 101 | 216.000 | -0.730 | 2.275 | 0.588  | 3.7304   | 2.0947   | -0.0681 |
| 102 | 218.250 | -0.902 | 2.103 | 0.416  | 3.8837   | 1.9414   | -0.0681 |
| 103 | 220.500 | -1.330 | 1.675 | -0.178 | 3.9523   | 1.8728   | 0.0117  |
| 104 | 222.750 | -1.721 | 1.284 | -0.569 | 3.9786   | 1.8465   | 0.0117  |
| 105 | 225.000 | -2.053 | 0.952 | -0.900 | 4.0049   | 1.8202   | 0.0117  |
| 106 | 227.250 | -2.325 | 0.680 | -1.173 | 4.0312   | 1.7939   | 0.0117  |
| 107 | 229.500 | -2.539 | 0.466 | -1.386 | 4.0575   | 1.7676   | 0.0117  |
| 108 | 231.750 | -2.693 | 0.312 | -1.541 | 4.0838   | 1.7413   | 0.0117  |
| 109 | 234.000 | -2.789 | 0.216 | -1.636 | 4.1101   | 1.7150   | 0.0117  |
| 110 | 236.250 | -2.825 | 0.180 | -1.672 | 4.1364   | 1.6887   | 0.0117  |

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 111 | 238.500 | -2.825 | 0.180 | -1.673 | 4.1394   | 1.6858   | 0.0000  |
| 112 | 240.750 | -2.825 | 0.180 | -1.672 | 4.1421   | 1.6830   | 0.0117  |
| 113 | 243.000 | -2.789 | 0.216 | -1.636 | 4.1686   | 1.6565   | 0.0117  |
| 114 | 245.250 | -2.693 | 0.312 | -1.541 | 4.1949   | 1.6302   | 0.0117  |
| 115 | 247.500 | -2.539 | 0.466 | -1.386 | 4.2212   | 1.6039   | 0.0117  |
| 116 | 249.750 | -2.325 | 0.680 | -1.173 | 4.2475   | 1.5776   | 0.0117  |
| 117 | 252.000 | -2.053 | 0.952 | -0.900 | 4.2738   | 1.5513   | 0.0117  |
| 118 | 254.250 | -1.721 | 1.284 | -0.569 | 4.2999   | 1.5252   | 0.0117  |
| 119 | 256.500 | -1.330 | 1.675 | -0.012 | 4.3262   | 1.4989   | 0.0117  |
| 120 | 258.750 | -0.902 | 2.103 | 0.416  | 4.3949   | 1.4302   | -0.0681 |
| 121 | 261.000 | -0.730 | 2.275 | 0.588  | 4.5482   | 1.2769   | -0.0681 |
| 122 | 263.250 | -0.902 | 2.103 | 0.416  | 4.7015   | 1.1236   | -0.0681 |
| 123 | 265.500 | -1.330 | 1.675 | -0.178 | 4.7702   | 1.0549   | 0.0117  |
| 124 | 267.750 | -1.721 | 1.284 | -0.569 | 4.7965   | 1.0286   | 0.0117  |
| 125 | 270.000 | -2.053 | 0.952 | -0.900 | 4.8228   | 1.0023   | 0.0117  |
| 126 | 272.250 | -2.325 | 0.680 | -1.173 | 4.8491   | 0.9760   | 0.0117  |
| 127 | 274.500 | -2.539 | 0.466 | -1.386 | 4.8754   | 0.9497   | 0.0117  |
| 128 | 276.750 | -2.693 | 0.312 | -1.541 | 4.9017   | 0.9234   | 0.0117  |
| 129 | 279.000 | -2.789 | 0.216 | -1.636 | 4.9280   | 0.8971   | 0.0117  |
| 130 | 281.250 | -2.825 | 0.180 | -1.672 | 4.9543   | 0.8709   | 0.0117  |
| 131 | 283.500 | -2.825 | 0.180 | -1.673 | 4.9572   | 0.8679   | 0.0000  |
| 132 | 285.750 | -2.825 | 0.180 | -1.672 | 4.9600   | 0.8651   | 0.0117  |
| 133 | 288.000 | -2.789 | 0.216 | -1.636 | 4.9865   | 0.8386   | 0.0117  |
| 134 | 290.250 | -2.693 | 0.312 | -1.541 | 5.0127   | 0.8124   | 0.0117  |
| 135 | 292.500 | -2.539 | 0.466 | -1.386 | 5.0390   | 0.7861   | 0.0117  |
| 136 | 294.750 | -2.325 | 0.680 | -1.173 | 5.0654   | 0.7598   | 0.0117  |
| 137 | 297.000 | -2.053 | 0.952 | -0.900 | 5.0917   | 0.7334   | 0.0117  |
| 138 | 299.250 | -1.721 | 1.284 | -0.569 | 5.1178   | 0.7073   | 0.0117  |
| 139 | 301.500 | -1.330 | 1.675 | -0.012 | 5.1441   | 0.6810   | 0.0117  |
| 140 | 303.750 | -0.902 | 2.103 | 0.416  | 5.2128   | 0.6123   | -0.0681 |
| 141 | 306.000 | -0.730 | 2.275 | 0.588  | 5.3661   | 0.4590   | -0.0524 |
| 142 | 307.800 | -0.815 | 2.190 | 0.503  | 5.4604   | 0.3647   | -0.0524 |
| 143 | 309.600 | -1.070 | 1.935 | 0.083  | 5.5548   | 0.2703   | -0.0524 |
| 144 | 311.400 | -1.430 | 1.575 | -0.277 | 5.5944   | 0.2307   | 0.0133  |
| 145 | 313.200 | -1.752 | 1.253 | -0.599 | 5.6184   | 0.2067   | 0.0133  |
| 146 | 315.000 | -2.031 | 0.974 | -0.879 | 5.6423   | 0.1828   | 0.0133  |
| 147 | 316.800 | -2.267 | 0.738 | -1.115 | 5.6663   | 0.1588   | 0.0133  |
| 148 | 318.600 | -2.460 | 0.545 | -1.307 | 5.6902   | 0.1349   | 0.0133  |
| 149 | 320.400 | -2.610 | 0.395 | -1.457 | 5.7143   | 0.1108   | 0.0133  |
| 150 | 322.200 | -2.716 | 0.289 | -1.564 | 5.7382   | 0.0869   | 0.0133  |
| 151 | 324.000 | -2.780 | 0.225 | -1.627 | 5.7621   | 0.0630   | 0.0133  |
| 152 | 325.800 | -2.800 | 0.205 | -1.648 | 5.7855   | 0.0396   | 0.0027  |
| 153 | 327.600 | -2.795 | 0.210 | -1.643 | 5.7904   | 0.0347   | 0.0027  |
| 154 | 329.400 | -2.782 | 0.223 | -1.630 | 5.7952   | 0.0300   | 0.0027  |
| 155 | 331.200 | -2.760 | 0.245 | -1.608 | 5.7999   | 0.0252   | 0.0027  |
| 156 | 333.000 | -2.730 | 0.275 | -1.577 | 5.8049   | 0.0202   | 0.0027  |
| 157 | 334.800 | -2.691 | 0.314 | -1.538 | 5.8097   | 0.0154   | 0.0027  |
| 158 | 336.600 | -2.643 | 0.362 | -1.490 | 5.8144   | 0.0107   | 0.0027  |
| 159 | 338.400 | -2.586 | 0.419 | -1.434 | 5.8194   | 0.0057   | 0.0027  |
| 160 | 340.200 | -2.521 | 0.484 | -1.369 | 5.8241   | 0.0010   | 0.0027  |
| 161 | 342.000 | -2.450 | 0.555 | -1.298 | 5.8251   | 0.0000   | 0.0000  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 1 161  
 NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 1 8  
 PENDIENTE INICIAL DEL TRAZADO = -0.03966  
 PENDIENTE FINAL DEL TRAZADO = 0.03966

## 4.2 CÁLCULO DEL PRETENSADO

El cálculo de la fuerza de pretensado se realiza con un programa de cálculo automático que considera las pérdidas de tensión instantáneas y diferidas, de acuerdo con la normativa vigente (EHE). El programa calcula, además, un sistema de fuerzas equivalentes a la introducción del pretensado en la estructura, para su consideración en el modelo de análisis estructural del tablero.

El programa permite la determinación de las pérdidas de la fuerza de pretensado asociadas a los siguientes aspectos:

### Pérdidas instantáneas

- a.- Pérdidas por rozamiento.
- b.- Pérdidas de penetración de cuña en anclajes.
- c.- Pérdidas por acortamiento elástico del hormigón.

### Pérdidas diferidas

- d.- Pérdidas por retracción del hormigón.
- e.- Pérdidas por fluencia del hormigón.
- f.- Pérdidas por relajación del acero de pretensado.

## CÁLCULO ESTRUCTURAL

La acción del pretensado sobre la estructura se realiza considerándolo como un sistema de fuerzas equivalentes, constituido por las fuerzas de anclaje y las de interacción (de desviación o repartidas).

Los resultados del programa de cálculo del pretensado son los siguientes:

- a. Definición del trazado del pretensado, mediante su excentricidad y cotas respecto a la fibra superior e inferior del elemento.
- b. Listados de tensiones en los cables y de las pérdidas instantáneas y diferidas en cada punto.
- c. Longitud afectada por la penetración de las cuñas en anclajes.
- d. Alargamiento de los cables al tesar.
- e. Fuerzas equivalentes del pretensado en los nudos de los elementos por los que pasan los cables del pretensado.
- f. Esfuerzos isostáticos de pretensado en los nudos de los elementos atravesados por el trazado.

Al igual que con cualquier estado de cargas introducido en el programa general de análisis estructural, posteriormente se obtienen las reacciones, desplazamientos, esfuerzos y tensiones en todo punto de la estructura.

-----  
Referencia del Proyecto:

VIADUCTO S/RÍO ANOIA (TRAZADO MEDIO)  
-----

PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO  
-----

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 2  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00

COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)  
-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON  
-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION 1  
-----

AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 2  
-----

AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 3  
-----

AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
 A = 0.00000 B = -0.07365 C = -1.85000  
 Origen = 0.00 Final = 1.40  
 Parametros de la parabola = 2  
 A = 0.00248 B = -0.08060 C = -1.84514  
 Origen = 1.40 Final = 16.25  
 Parametros de la parabola = 4  
 A = 0.00646 B = -0.21001 C = -0.79370  
 Origen = 16.25 Final = 32.00  
 Parametros de la parabola = 5  
 A = -0.02544 B = 1.83190 C = -33.46418  
 Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
 A = -0.02328 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 4.00  
 Parametros de la parabola = 3  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 4.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I  | S      | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|--------|--------|-------|--------|----------|----------|---------|
| 1  | 0.000  | -1.850 | 1.155 | -0.698 | 0.0000   | 0.7402   | 0.0000  |
| 2  | 1.800  | -1.982 | 1.023 | -0.830 | 0.0022   | 0.7381   | 0.0050  |
| 3  | 3.600  | -2.103 | 0.902 | -0.951 | 0.0111   | 0.7291   | 0.0050  |
| 4  | 5.400  | -2.208 | 0.797 | -1.056 | 0.0200   | 0.7202   | 0.0050  |
| 5  | 7.200  | -2.297 | 0.708 | -1.144 | 0.0290   | 0.7113   | 0.0050  |
| 6  | 9.000  | -2.370 | 0.635 | -1.217 | 0.0379   | 0.7023   | 0.0050  |
| 7  | 10.800 | -2.426 | 0.579 | -1.274 | 0.0468   | 0.6934   | 0.0050  |
| 8  | 12.600 | -2.467 | 0.538 | -1.315 | 0.0558   | 0.6845   | 0.0050  |
| 9  | 14.400 | -2.492 | 0.513 | -1.339 | 0.0647   | 0.6755   | 0.0050  |
| 10 | 16.200 | -2.500 | 0.505 | -1.348 | 0.0736   | 0.6666   | 0.0050  |
| 11 | 18.000 | -2.480 | 0.525 | -1.328 | 0.0965   | 0.6437   | 0.0129  |
| 12 | 19.800 | -2.419 | 0.586 | -1.266 | 0.1198   | 0.6205   | 0.0129  |
| 13 | 21.600 | -2.315 | 0.690 | -1.163 | 0.1430   | 0.5972   | 0.0129  |
| 14 | 23.400 | -2.170 | 0.835 | -1.017 | 0.1663   | 0.5739   | 0.0129  |
| 15 | 25.200 | -1.982 | 1.023 | -0.830 | 0.1896   | 0.5507   | 0.0129  |
| 16 | 27.000 | -1.753 | 1.252 | -0.601 | 0.2128   | 0.5274   | 0.0129  |
| 17 | 28.800 | -1.482 | 1.523 | -0.330 | 0.2361   | 0.5042   | 0.0129  |
| 18 | 30.600 | -1.169 | 1.836 | -0.017 | 0.2594   | 0.4809   | 0.0129  |
| 19 | 32.400 | -0.820 | 2.185 | 0.498  | 0.2979   | 0.4423   | -0.0509 |
| 20 | 34.200 | -0.572 | 2.433 | 0.746  | 0.3894   | 0.3508   | -0.0509 |
| 21 | 36.000 | -0.490 | 2.515 | 0.828  | 0.4810   | 0.2592   | -0.0466 |
| 22 | 38.250 | -0.608 | 2.397 | 0.710  | 0.5858   | 0.1545   | -0.0466 |
| 23 | 40.500 | -0.954 | 2.051 | 0.198  | 0.6723   | 0.0679   | 0.0101  |
| 24 | 42.750 | -1.336 | 1.669 | -0.184 | 0.6950   | 0.0453   | 0.0101  |
| 25 | 45.000 | -1.668 | 1.337 | -0.515 | 0.7176   | 0.0226   | 0.0101  |
| 26 | 47.250 | -1.948 | 1.057 | -0.796 | 0.7402   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 1 26  
 NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 1 2  
 PENDIENTE INICIAL DEL TRAZADO = -0.07365  
 PENDIENTE FINAL DEL TRAZADO = -0.11324

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 470.40  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.58

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X     | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|----|-------|-------|-------|--------|--------|-------|
| 1  | 0.00  | 93.60 | 18.11 | 0.00   | 1.72   | 73.77 |
| 2  | 1.80  | 93.60 | 17.90 | 0.00   | 1.94   | 73.76 |
| 3  | 3.60  | 93.60 | 17.59 | 0.00   | 2.17   | 73.85 |
| 4  | 5.40  | 93.60 | 17.27 | 0.00   | 2.40   | 73.93 |
| 5  | 7.20  | 93.60 | 16.95 | 0.00   | 2.61   | 74.03 |
| 6  | 9.00  | 93.60 | 16.64 | 0.00   | 2.81   | 74.16 |
| 7  | 10.80 | 93.60 | 16.32 | 0.00   | 2.97   | 74.32 |
| 8  | 12.60 | 93.60 | 15.99 | 0.00   | 3.09   | 74.51 |
| 9  | 14.40 | 93.60 | 15.67 | 0.00   | 3.18   | 74.75 |
| 10 | 16.20 | 93.60 | 15.35 | 0.00   | 3.21   | 75.04 |
| 11 | 18.00 | 93.60 | 14.79 | 0.00   | 3.18   | 75.63 |
| 12 | 19.80 | 93.60 | 14.23 | 0.00   | 3.03   | 76.34 |
| 13 | 21.60 | 93.60 | 13.66 | 0.00   | 2.77   | 77.17 |
| 14 | 23.40 | 93.60 | 13.08 | 0.00   | 2.44   | 78.07 |
| 15 | 25.20 | 93.60 | 12.51 | 0.00   | 2.07   | 79.02 |
| 16 | 27.00 | 93.60 | 11.92 | 0.00   | 1.72   | 79.96 |
| 17 | 28.80 | 93.60 | 11.34 | 0.00   | 1.45   | 80.81 |
| 18 | 30.60 | 93.60 | 10.75 | 0.00   | 1.25   | 81.60 |
| 19 | 32.40 | 93.60 | 9.88  | 0.00   | 1.43   | 82.29 |
| 20 | 34.20 | 93.60 | 8.07  | 0.00   | 1.76   | 83.77 |
| 21 | 36.00 | 93.60 | 6.21  | 2.74   | 1.87   | 82.78 |
| 22 | 38.25 | 93.60 | 4.01  | 7.14   | 1.76   | 80.69 |
| 23 | 40.50 | 93.60 | 2.11  | 10.94  | 1.34   | 79.21 |
| 24 | 42.75 | 93.60 | 1.41  | 12.34  | 1.32   | 78.53 |
| 25 | 45.00 | 93.60 | 0.71  | 13.74  | 1.56   | 77.59 |
| 26 | 47.25 | 93.60 | 0.00  | 15.16  | 1.95   | 76.50 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 204.7 mm

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I  | S     | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|----|-------|-------|---------|--------|----------|
| 1  | 0.00  | 73.77 | 0.00    | 0.00   | 0.00     |
| 2  | 1.80  | 73.76 | 0.00    | 0.00   | 0.00     |
| 3  | 3.60  | 73.85 | 0.00    | 0.00   | 0.00     |
| 4  | 5.40  | 73.93 | 0.00    | 0.00   | 0.00     |
| 5  | 7.20  | 74.03 | 0.00    | 0.00   | 0.00     |
| 6  | 9.00  | 74.16 | 0.00    | 0.00   | 0.00     |
| 7  | 10.80 | 74.32 | 0.00    | 0.00   | 0.00     |
| 8  | 12.60 | 74.51 | 0.00    | 0.00   | 0.00     |
| 9  | 14.40 | 74.75 | 0.00    | 0.00   | 0.00     |
| 10 | 16.20 | 75.04 | 0.00    | 0.00   | 0.00     |
| 11 | 18.00 | 75.63 | 0.00    | 0.00   | 0.00     |
| 12 | 19.80 | 76.34 | 0.00    | 0.00   | 0.00     |
| 13 | 21.60 | 77.17 | 0.00    | 0.00   | 0.00     |
| 14 | 23.40 | 78.07 | 0.00    | 0.00   | 0.00     |
| 15 | 25.20 | 79.02 | 0.00    | 0.00   | 0.00     |
| 16 | 27.00 | 79.96 | 0.00    | 0.00   | 0.00     |
| 17 | 28.80 | 80.81 | 0.00    | 0.00   | 0.00     |
| 18 | 30.60 | 81.60 | 0.00    | 0.00   | 0.00     |
| 19 | 32.40 | 82.29 | 0.00    | 0.00   | 0.00     |
| 20 | 34.20 | 83.77 | 0.00    | 0.00   | 0.00     |
| 21 | 36.00 | 82.78 | 0.00    | 0.00   | 0.00     |
| 22 | 38.25 | 80.69 | 0.00    | 0.00   | 0.00     |
| 23 | 40.50 | 79.21 | 0.00    | 0.00   | 0.00     |
| 24 | 42.75 | 78.53 | 0.00    | 0.00   | 0.00     |
| 25 | 45.00 | 77.59 | 0.00    | 0.00   | 0.00     |
| 26 | 47.25 | 76.50 | 0.00    | 0.00   | 0.00     |



## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES (Kp/mm2)

| I  | S     | To    | APi   | Ti    | APf  | Tf    |
|----|-------|-------|-------|-------|------|-------|
| 1  | 0.00  | 93.60 | 19.83 | 73.77 | 0.00 | 73.77 |
| 2  | 1.80  | 93.60 | 19.84 | 73.76 | 0.00 | 73.76 |
| 3  | 3.60  | 93.60 | 19.75 | 73.85 | 0.00 | 73.85 |
| 4  | 5.40  | 93.60 | 19.67 | 73.93 | 0.00 | 73.93 |
| 5  | 7.20  | 93.60 | 19.57 | 74.03 | 0.00 | 74.03 |
| 6  | 9.00  | 93.60 | 19.44 | 74.16 | 0.00 | 74.16 |
| 7  | 10.80 | 93.60 | 19.28 | 74.32 | 0.00 | 74.32 |
| 8  | 12.60 | 93.60 | 19.09 | 74.51 | 0.00 | 74.51 |
| 9  | 14.40 | 93.60 | 18.85 | 74.75 | 0.00 | 74.75 |
| 10 | 16.20 | 93.60 | 18.56 | 75.04 | 0.00 | 75.04 |
| 11 | 18.00 | 93.60 | 17.97 | 75.63 | 0.00 | 75.63 |
| 12 | 19.80 | 93.60 | 17.26 | 76.34 | 0.00 | 76.34 |
| 13 | 21.60 | 93.60 | 16.43 | 77.17 | 0.00 | 77.17 |
| 14 | 23.40 | 93.60 | 15.53 | 78.07 | 0.00 | 78.07 |
| 15 | 25.20 | 93.60 | 14.58 | 79.02 | 0.00 | 79.02 |
| 16 | 27.00 | 93.60 | 13.64 | 79.96 | 0.00 | 79.96 |
| 17 | 28.80 | 93.60 | 12.79 | 80.81 | 0.00 | 80.81 |
| 18 | 30.60 | 93.60 | 12.00 | 81.60 | 0.00 | 81.60 |
| 19 | 32.40 | 93.60 | 11.31 | 82.29 | 0.00 | 82.29 |
| 20 | 34.20 | 93.60 | 9.83  | 83.77 | 0.00 | 83.77 |
| 21 | 36.00 | 93.60 | 10.82 | 82.78 | 0.00 | 82.78 |
| 22 | 38.25 | 93.60 | 12.91 | 80.69 | 0.00 | 80.69 |
| 23 | 40.50 | 93.60 | 14.39 | 79.21 | 0.00 | 79.21 |
| 24 | 42.75 | 93.60 | 15.07 | 78.53 | 0.00 | 78.53 |
| 25 | 45.00 | 93.60 | 16.01 | 77.59 | 0.00 | 77.59 |
| 26 | 47.25 | 93.60 | 17.10 | 76.50 | 0.00 | 76.50 |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I  | S(m)  | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|----|-------|---------|----------|-----------|---------|----------|-----------|
| 1  | 0.00  | 3470.27 | 2420.9   | 0.00      | 3470.27 | 2420.9   | 0.00      |
| 2  | 1.80  | 3469.86 | 2879.2   | 17.21     | 3469.86 | 2879.2   | 17.21     |
| 3  | 3.60  | 3473.68 | 3302.6   | 17.23     | 3473.68 | 3302.6   | 17.23     |
| 4  | 5.40  | 3477.71 | 3671.3   | 17.25     | 3477.71 | 3671.3   | 17.25     |
| 5  | 7.20  | 3482.46 | 3985.6   | 17.27     | 3482.46 | 3985.6   | 17.27     |
| 6  | 9.00  | 3488.37 | 4246.2   | 17.30     | 3488.37 | 4246.2   | 17.30     |
| 7  | 10.80 | 3495.79 | 4453.4   | 17.34     | 3495.79 | 4453.4   | 17.34     |
| 8  | 12.60 | 3505.03 | 4607.6   | 17.38     | 3505.03 | 4607.6   | 17.38     |
| 9  | 14.40 | 3516.30 | 4708.7   | 17.44     | 3516.30 | 4708.7   | 17.44     |
| 10 | 16.20 | 3529.74 | 4756.7   | 17.51     | 3529.74 | 4756.7   | 17.51     |
| 11 | 18.00 | 3557.49 | 4723.7   | 45.98     | 3557.49 | 4723.7   | 45.98     |
| 12 | 19.80 | 3591.23 | 4547.1   | 46.41     | 3591.23 | 4547.1   | 46.41     |
| 13 | 21.60 | 3630.03 | 4220.5   | 46.91     | 3630.03 | 4220.5   | 46.91     |
| 14 | 23.40 | 3672.58 | 3736.0   | 47.46     | 3672.58 | 3736.0   | 47.46     |
| 15 | 25.20 | 3717.12 | 3085.2   | 48.04     | 3717.12 | 3085.2   | 48.04     |
| 16 | 27.00 | 3761.11 | 2259.9   | 48.61     | 3761.11 | 2259.9   | 48.61     |
| 17 | 28.80 | 3801.51 | 1254.0   | 49.13     | 3801.51 | 1254.0   | 49.13     |
| 18 | 30.60 | 3838.60 | 65.2     | 49.61     | 3838.60 | 65.2     | 49.61     |
| 19 | 32.40 | 3870.91 | -1928.7  | -196.98   | 3870.91 | -1928.7  | -196.98   |
| 20 | 34.20 | 3940.75 | -2938.1  | -200.53   | 3940.75 | -2938.1  | -200.53   |
| 21 | 36.00 | 3894.08 | -3224.3  | -181.29   | 3894.08 | -3224.3  | -181.29   |
| 22 | 38.25 | 3795.57 | -2695.4  | -176.70   | 3795.57 | -2695.4  | -176.70   |
| 23 | 40.50 | 3726.05 | -738.1   | 37.51     | 3726.05 | -738.1   | 37.51     |
| 24 | 42.75 | 3694.06 | 680.1    | 37.18     | 3694.06 | 680.1    | 37.18     |
| 25 | 45.00 | 3649.66 | 1880.8   | 36.74     | 3649.66 | 1880.8   | 36.74     |
| 26 | 47.25 | 3598.44 | 2862.9   | 36.22     | 3598.44 | 2862.9   | 36.22     |

ETAPA DE TESADO INICIAL

FUERZAS HORIZONTALES DE DESVIACION

| I  | S(m)  | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|----|-------|--------|---------|---------|---------|---------|
| 1  | 0.00  | 7250.0 | 3470.27 | -0.48   | 3470.27 | -0.48   |
| 2  | 1.80  | 7250.0 | 3469.86 | -0.48   | 3469.86 | -0.48   |
| 3  | 3.60  | 7250.0 | 3473.68 | -0.48   | 3473.68 | -0.48   |
| 4  | 5.40  | 7250.0 | 3477.71 | -0.48   | 3477.71 | -0.48   |
| 5  | 7.20  | 7250.0 | 3482.46 | -0.48   | 3482.46 | -0.48   |
| 6  | 9.00  | 7250.0 | 3488.37 | -0.48   | 3488.37 | -0.48   |
| 7  | 10.80 | 7250.0 | 3495.79 | -0.48   | 3495.79 | -0.48   |
| 8  | 12.60 | 7250.0 | 3505.03 | -0.48   | 3505.03 | -0.48   |
| 9  | 14.40 | 7250.0 | 3516.30 | -0.49   | 3516.30 | -0.49   |
| 10 | 16.20 | 7250.0 | 3529.74 | -0.49   | 3529.74 | -0.49   |
| 11 | 18.00 | 7250.0 | 3557.49 | -0.49   | 3557.49 | -0.49   |
| 12 | 19.80 | 7250.0 | 3591.23 | -0.50   | 3591.23 | -0.50   |
| 13 | 21.60 | 7250.0 | 3630.03 | -0.50   | 3630.03 | -0.50   |
| 14 | 23.40 | 7250.0 | 3672.58 | -0.51   | 3672.58 | -0.51   |
| 15 | 25.20 | 7250.0 | 3717.12 | -0.52   | 3717.12 | -0.52   |
| 16 | 27.00 | 7250.0 | 3761.11 | -0.52   | 3761.11 | -0.52   |
| 17 | 28.80 | 7250.0 | 3801.51 | -0.53   | 3801.51 | -0.53   |
| 18 | 30.60 | 7250.0 | 3838.60 | -0.53   | 3838.60 | -0.53   |
| 19 | 32.40 | 7250.0 | 3870.91 | -0.54   | 3870.91 | -0.54   |
| 20 | 34.20 | 7250.0 | 3940.75 | -0.54   | 3940.75 | -0.54   |
| 21 | 36.00 | 7250.0 | 3894.08 | -0.53   | 3894.08 | -0.53   |
| 22 | 38.25 | 7250.0 | 3795.57 | -0.52   | 3795.57 | -0.52   |
| 23 | 40.50 | 7250.0 | 3726.05 | -0.51   | 3726.05 | -0.51   |
| 24 | 42.75 | 7250.0 | 3694.06 | -0.51   | 3694.06 | -0.51   |
| 25 | 45.00 | 7250.0 | 3649.66 | -0.50   | 3649.66 | -0.50   |
| 26 | 47.25 | 7250.0 | 3598.44 | -0.25   | 3598.44 | -0.25   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 470.40  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X     | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|----|-------|--------|-------|--------|--------|--------|
| 1  | 0.00  | 144.00 | 27.86 | 0.00   | 2.65   | 113.50 |
| 2  | 1.80  | 144.00 | 27.54 | 0.00   | 2.98   | 113.48 |
| 3  | 3.60  | 144.00 | 27.06 | 0.00   | 3.34   | 113.61 |
| 4  | 5.40  | 144.00 | 26.57 | 0.00   | 3.69   | 113.74 |
| 5  | 7.20  | 144.00 | 26.08 | 0.00   | 4.02   | 113.90 |
| 6  | 9.00  | 144.00 | 25.59 | 0.00   | 4.32   | 114.09 |
| 7  | 10.80 | 144.00 | 25.10 | 0.00   | 4.57   | 114.33 |
| 8  | 12.60 | 144.00 | 24.61 | 0.00   | 4.76   | 114.63 |
| 9  | 14.40 | 144.00 | 24.11 | 0.00   | 4.89   | 115.00 |
| 10 | 16.20 | 144.00 | 23.61 | 0.00   | 4.94   | 115.44 |
| 11 | 18.00 | 144.00 | 22.76 | 0.00   | 4.89   | 116.35 |
| 12 | 19.80 | 144.00 | 21.89 | 0.00   | 4.66   | 117.45 |
| 13 | 21.60 | 144.00 | 21.01 | 0.00   | 4.27   | 118.72 |
| 14 | 23.40 | 144.00 | 20.13 | 0.00   | 3.76   | 120.11 |
| 15 | 25.20 | 144.00 | 19.24 | 0.00   | 3.19   | 121.57 |
| 16 | 27.00 | 144.00 | 18.34 | 0.00   | 2.65   | 123.01 |
| 17 | 28.80 | 144.00 | 17.44 | 0.00   | 2.23   | 124.33 |
| 18 | 30.60 | 144.00 | 16.53 | 0.00   | 1.92   | 125.54 |
| 19 | 32.40 | 144.00 | 15.21 | 0.00   | 2.19   | 126.60 |
| 20 | 34.20 | 144.00 | 12.41 | 0.00   | 2.71   | 128.88 |
| 21 | 36.00 | 144.00 | 9.55  | 2.74   | 2.91   | 128.80 |
| 22 | 38.25 | 144.00 | 6.17  | 5.33   | 2.83   | 129.67 |
| 23 | 40.50 | 144.00 | 3.24  | 11.18  | 2.16   | 127.42 |
| 24 | 42.75 | 144.00 | 2.17  | 13.33  | 2.13   | 126.38 |
| 25 | 45.00 | 144.00 | 1.09  | 15.49  | 2.52   | 124.91 |
| 26 | 47.25 | 144.00 | 0.00  | 17.66  | 3.13   | 123.20 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 308.5 mm



## DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 3  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3

LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00

COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

## ACERO DE PRETENSADO (Kp/mm2)

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LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

## HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

## CARACTERISTICAS MECANICAS DE LA SECCION

-----

1

AREA DE LA SECCION (m2) = 9.674  
INERCIÁ DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

## CARACTERISTICAS MECANICAS DE LA SECCION

-----

2

AREA DE LA SECCION (m2) = 10.975  
INERCIÁ DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

## CARACTERISTICAS MECANICAS DE LA SECCION

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3

AREA DE LA SECCION (m2) = 1.000  
INERCIÁ DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00  
(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00  
(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00  
(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1

| I  | S      | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|--------|--------|-------|--------|----------|----------|---------|
| 26 | 47.250 | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7451   | 0.0101  |
| 27 | 49.500 | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7225   | 0.0101  |
| 28 | 51.750 | -2.356 | 0.649 | -1.203 | 0.0453   | 0.6998   | 0.0101  |
| 29 | 54.000 | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6770   | 0.0101  |
| 30 | 56.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6545   | 0.0101  |
| 31 | 58.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6318   | 0.0101  |
| 32 | 60.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6091   | 0.0101  |
| 33 | 63.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5865   | 0.0101  |
| 34 | 65.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5638   | 0.0101  |
| 35 | 67.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5413   | 0.0101  |
| 36 | 69.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5185   | 0.0101  |
| 37 | 72.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.4958   | 0.0101  |
| 38 | 74.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4731   | 0.0101  |
| 39 | 76.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4506   | 0.0101  |
| 40 | 78.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3638   | -0.0466 |
| 41 | 81.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2592   | -0.0466 |
| 42 | 83.250 | -0.608 | 2.397 | 0.710  | 0.5906   | 0.1545   | -0.0466 |
| 43 | 85.500 | -0.954 | 2.051 | 0.198  | 0.6772   | 0.0679   | 0.0101  |
| 44 | 87.750 | -1.336 | 1.669 | -0.184 | 0.6998   | 0.0453   | 0.0101  |
| 45 | 90.000 | -1.668 | 1.337 | -0.515 | 0.7225   | 0.0226   | 0.0101  |
| 46 | 92.250 | -1.948 | 1.057 | -0.796 | 0.7451   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 26 46  
NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 2 3  
PENDIENTE INICIAL DEL TRAZADO = -0.11324  
PENDIENTE FINAL DEL TRAZADO = -0.11324

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.63

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X     | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|----|-------|-------|-------|--------|--------|-------|
| 26 | 47.25 | 93.60 | 17.97 | 0.00   | 1.59   | 74.04 |
| 27 | 49.50 | 93.60 | 17.39 | 0.00   | 2.58   | 73.63 |
| 28 | 51.75 | 93.60 | 16.81 | 0.00   | 3.06   | 73.73 |
| 29 | 54.00 | 93.60 | 16.23 | 0.00   | 3.46   | 73.91 |
| 30 | 56.25 | 93.60 | 15.64 | 0.00   | 3.74   | 74.22 |
| 31 | 58.50 | 93.60 | 15.04 | 0.00   | 3.85   | 74.70 |
| 32 | 60.75 | 93.60 | 14.44 | 0.00   | 3.80   | 75.36 |
| 33 | 63.00 | 93.60 | 13.84 | 0.00   | 3.57   | 76.19 |
| 34 | 65.25 | 93.60 | 13.23 | 0.00   | 3.20   | 77.16 |
| 35 | 67.50 | 93.60 | 12.62 | 0.00   | 2.74   | 78.24 |
| 36 | 69.75 | 93.60 | 12.00 | 0.00   | 2.24   | 79.36 |
| 37 | 72.00 | 93.60 | 11.38 | 0.00   | 1.80   | 80.42 |
| 38 | 74.25 | 93.60 | 10.75 | 0.00   | 1.42   | 81.43 |
| 39 | 76.50 | 93.60 | 10.12 | 0.00   | 1.45   | 82.02 |
| 40 | 78.75 | 93.60 | 8.35  | 0.00   | 1.89   | 83.37 |
| 41 | 81.00 | 93.60 | 6.21  | 2.64   | 2.07   | 82.69 |
| 42 | 83.25 | 93.60 | 4.01  | 7.03   | 1.96   | 80.60 |
| 43 | 85.50 | 93.60 | 2.11  | 10.83  | 1.49   | 79.17 |
| 44 | 87.75 | 93.60 | 1.41  | 12.23  | 1.47   | 78.49 |
| 45 | 90.00 | 93.60 | 0.71  | 13.64  | 1.73   | 77.52 |
| 46 | 92.25 | 93.60 | 0.00  | 15.05  | 2.16   | 76.39 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 195.6 mm

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I  | S     | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|----|-------|-------|---------|--------|----------|
| 26 | 47.25 | 74.04 | 0.00    | 0.00   | 0.00     |
| 27 | 49.50 | 73.63 | 0.00    | 0.00   | 0.00     |
| 28 | 51.75 | 73.73 | 0.00    | 0.00   | 0.00     |
| 29 | 54.00 | 73.91 | 0.00    | 0.00   | 0.00     |
| 30 | 56.25 | 74.22 | 0.00    | 0.00   | 0.00     |
| 31 | 58.50 | 74.70 | 0.00    | 0.00   | 0.00     |
| 32 | 60.75 | 75.36 | 0.00    | 0.00   | 0.00     |
| 33 | 63.00 | 76.19 | 0.00    | 0.00   | 0.00     |
| 34 | 65.25 | 77.16 | 0.00    | 0.00   | 0.00     |
| 35 | 67.50 | 78.24 | 0.00    | 0.00   | 0.00     |
| 36 | 69.75 | 79.36 | 0.00    | 0.00   | 0.00     |
| 37 | 72.00 | 80.42 | 0.00    | 0.00   | 0.00     |
| 38 | 74.25 | 81.43 | 0.00    | 0.00   | 0.00     |
| 39 | 76.50 | 82.02 | 0.00    | 0.00   | 0.00     |
| 40 | 78.75 | 83.37 | 0.00    | 0.00   | 0.00     |
| 41 | 81.00 | 82.69 | 0.00    | 0.00   | 0.00     |
| 42 | 83.25 | 80.60 | 0.00    | 0.00   | 0.00     |
| 43 | 85.50 | 79.17 | 0.00    | 0.00   | 0.00     |
| 44 | 87.75 | 78.49 | 0.00    | 0.00   | 0.00     |
| 45 | 90.00 | 77.52 | 0.00    | 0.00   | 0.00     |
| 46 | 92.25 | 76.39 | 0.00    | 0.00   | 0.00     |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES (Kp/mm2)

| I  | S     | To    | APi   | Ti    | APf  | Tf    |
|----|-------|-------|-------|-------|------|-------|
| 26 | 47.25 | 93.60 | 19.56 | 74.04 | 0.00 | 74.04 |
| 27 | 49.50 | 93.60 | 19.97 | 73.63 | 0.00 | 73.63 |
| 28 | 51.75 | 93.60 | 19.87 | 73.73 | 0.00 | 73.73 |
| 29 | 54.00 | 93.60 | 19.69 | 73.91 | 0.00 | 73.91 |
| 30 | 56.25 | 93.60 | 19.38 | 74.22 | 0.00 | 74.22 |
| 31 | 58.50 | 93.60 | 18.90 | 74.70 | 0.00 | 74.70 |
| 32 | 60.75 | 93.60 | 18.24 | 75.36 | 0.00 | 75.36 |
| 33 | 63.00 | 93.60 | 17.41 | 76.19 | 0.00 | 76.19 |
| 34 | 65.25 | 93.60 | 16.44 | 77.16 | 0.00 | 77.16 |
| 35 | 67.50 | 93.60 | 15.36 | 78.24 | 0.00 | 78.24 |
| 36 | 69.75 | 93.60 | 14.24 | 79.36 | 0.00 | 79.36 |
| 37 | 72.00 | 93.60 | 13.18 | 80.42 | 0.00 | 80.42 |
| 38 | 74.25 | 93.60 | 12.17 | 81.43 | 0.00 | 81.43 |
| 39 | 76.50 | 93.60 | 11.58 | 82.02 | 0.00 | 82.02 |
| 40 | 78.75 | 93.60 | 10.23 | 83.37 | 0.00 | 83.37 |
| 41 | 81.00 | 93.60 | 10.91 | 82.69 | 0.00 | 82.69 |
| 42 | 83.25 | 93.60 | 13.00 | 80.60 | 0.00 | 80.60 |
| 43 | 85.50 | 93.60 | 14.43 | 79.17 | 0.00 | 79.17 |
| 44 | 87.75 | 93.60 | 15.11 | 78.49 | 0.00 | 78.49 |
| 45 | 90.00 | 93.60 | 16.08 | 77.52 | 0.00 | 77.52 |
| 46 | 92.25 | 93.60 | 17.21 | 76.39 | 0.00 | 76.39 |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I  | S(m)  | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|----|-------|---------|----------|-----------|---------|----------|-----------|
| 26 | 47.25 | 3855.92 | 3067.8   | 38.81     | 3855.92 | 3067.8   | 38.81     |
| 27 | 49.50 | 3834.63 | 3930.2   | 38.60     | 3834.63 | 3930.2   | 38.60     |
| 28 | 51.75 | 3839.65 | 4620.2   | 38.65     | 3839.65 | 4620.2   | 38.65     |
| 29 | 54.00 | 3849.21 | 5122.1   | 38.75     | 3849.21 | 5122.1   | 38.75     |
| 30 | 56.25 | 3865.53 | 5439.3   | 38.91     | 3865.53 | 5439.3   | 38.91     |
| 31 | 58.50 | 3890.49 | 5573.5   | 39.16     | 3890.49 | 5573.5   | 39.16     |
| 32 | 60.75 | 3924.71 | 5522.5   | 39.51     | 3924.71 | 5522.5   | 39.51     |
| 33 | 63.00 | 3967.82 | 5279.9   | 39.94     | 3967.82 | 5279.9   | 39.94     |
| 34 | 65.25 | 4018.67 | 4835.6   | 40.45     | 4018.67 | 4835.6   | 40.45     |
| 35 | 67.50 | 4074.73 | 4176.3   | 41.02     | 4074.73 | 4176.3   | 41.02     |
| 36 | 69.75 | 4132.89 | 3288.2   | 41.60     | 4132.89 | 3288.2   | 41.60     |
| 37 | 72.00 | 4188.36 | 2158.4   | 42.16     | 4188.36 | 2158.4   | 42.16     |
| 38 | 74.25 | 4240.62 | 780.7    | 42.69     | 4240.62 | 780.7    | 42.69     |
| 39 | 76.50 | 4271.80 | -1553.7  | 43.00     | 4271.80 | -1553.7  | 43.00     |
| 40 | 78.75 | 4341.75 | -3083.3  | -202.13   | 4341.75 | -3083.3  | -202.13   |
| 41 | 81.00 | 4306.39 | -3565.7  | -200.49   | 4306.39 | -3565.7  | -200.49   |
| 42 | 83.25 | 4197.91 | -2981.2  | -195.44   | 4197.91 | -2981.2  | -195.44   |
| 43 | 85.50 | 4123.33 | -816.8   | 41.51     | 4123.33 | -816.8   | 41.51     |
| 44 | 87.75 | 4088.01 | 752.6    | 41.15     | 4088.01 | 752.6    | 41.15     |
| 45 | 90.00 | 4037.50 | 2080.6   | 40.64     | 4037.50 | 2080.6   | 40.64     |
| 46 | 92.25 | 3978.61 | 3165.4   | 40.05     | 3978.61 | 3165.4   | 40.05     |

ETAPA DE TESADO INICIAL

FUERZAS HORIZONTALES DE DESVIACION

| I  | S(m)  | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|----|-------|--------|---------|---------|---------|---------|
| 26 | 47.25 | 7250.0 | 3855.92 | -0.53   | 3855.92 | -0.53   |
| 27 | 49.50 | 7250.0 | 3834.63 | -0.53   | 3834.63 | -0.53   |
| 28 | 51.75 | 7250.0 | 3839.65 | -0.53   | 3839.65 | -0.53   |
| 29 | 54.00 | 7250.0 | 3849.21 | -0.53   | 3849.21 | -0.53   |
| 30 | 56.25 | 7250.0 | 3865.53 | -0.53   | 3865.53 | -0.53   |
| 31 | 58.50 | 7250.0 | 3890.49 | -0.54   | 3890.49 | -0.54   |
| 32 | 60.75 | 7250.0 | 3924.71 | -0.54   | 3924.71 | -0.54   |
| 33 | 63.00 | 7250.0 | 3967.82 | -0.55   | 3967.82 | -0.55   |
| 34 | 65.25 | 7250.0 | 4018.67 | -0.56   | 4018.67 | -0.56   |
| 35 | 67.50 | 7250.0 | 4074.73 | -0.57   | 4074.73 | -0.57   |
| 36 | 69.75 | 7250.0 | 4132.89 | -0.57   | 4132.89 | -0.57   |
| 37 | 72.00 | 7250.0 | 4188.36 | -0.58   | 4188.36 | -0.58   |
| 38 | 74.25 | 7250.0 | 4240.62 | -0.59   | 4240.62 | -0.59   |
| 39 | 76.50 | 7250.0 | 4271.80 | -0.59   | 4271.80 | -0.59   |
| 40 | 78.75 | 7250.0 | 4341.75 | -0.60   | 4341.75 | -0.60   |
| 41 | 81.00 | 7250.0 | 4306.39 | -0.59   | 4306.39 | -0.59   |
| 42 | 83.25 | 7250.0 | 4197.91 | -0.57   | 4197.91 | -0.57   |
| 43 | 85.50 | 7250.0 | 4123.33 | -0.57   | 4123.33 | -0.57   |
| 44 | 87.75 | 7250.0 | 4088.01 | -0.56   | 4088.01 | -0.56   |
| 45 | 90.00 | 7250.0 | 4037.50 | -0.55   | 4037.50 | -0.55   |
| 46 | 92.25 | 7250.0 | 3978.61 | -0.27   | 3978.61 | -0.27   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X     | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|----|-------|--------|-------|--------|--------|--------|
| 26 | 47.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 27 | 49.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 28 | 51.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 29 | 54.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 30 | 56.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 31 | 58.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 32 | 60.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 33 | 63.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 34 | 65.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 35 | 67.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 36 | 69.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 37 | 72.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 38 | 74.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 39 | 76.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 40 | 78.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 41 | 81.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 42 | 83.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 43 | 85.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 44 | 87.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 45 | 90.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 46 | 92.25 | 144.00 | 0.00  | 17.66  | 3.47   | 122.87 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 296.2 mm

PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
 NUMERO DE VANOS = 4  
 NUMERO DE SECCIONES POR VANO = 21  
 NUMERO DE MATERIALES = 3

LUZ DEL VANO = 1 L (m) = 36.00  
 LUZ DEL VANO = 2 L (m) = 45.00  
 LUZ DEL VANO = 3 L (m) = 45.00  
 LUZ DEL VANO = 4 L (m) = 45.00

COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
 COEFICIENTE DE DESV. PARASITAS = 0.0060  
 RELAJACION = 0.04  
 RETRACCION mm/m = 0.240  
 COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
 TENSION DE ROTURA = 190.00  
 MODULO DE DEFORMACION = 19000.00

HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
 MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION

1

-----

AREA DE LA SECCION (m2) = 9.674  
 INERCIA DE LA SECCION (m2) = 11.3278  
 V\_SUP. DE LA SECCION (m2) = 1.15  
 V\_INF. DE LA SECCION (m2) = 1.85  
 CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

2

-----

AREA DE LA SECCION (m2) = 10.975  
 INERCIA DE LA SECCION (m2) = 13.5715  
 V\_SUP. DE LA SECCION (m2) = 1.32  
 V\_INF. DE LA SECCION (m2) = 1.69  
 CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

3

-----

AREA DE LA SECCION (m2) = 1.000  
 INERCIA DE LA SECCION (m2) = 2.0000  
 V\_SUP. DE LA SECCION (m2) = 1.50  
 V\_INF. DE LA SECCION (m2) = 1.50  
 CANTO DE LA SECCION (m2) = 3.00



DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1

| I  | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|---------|--------|-------|--------|----------|----------|---------|
| 46 | 92.250  | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7451   | 0.0101  |
| 47 | 94.500  | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7225   | 0.0101  |
| 48 | 96.750  | -2.356 | 0.649 | -1.203 | 0.0453   | 0.6998   | 0.0101  |
| 49 | 99.000  | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6770   | 0.0101  |
| 50 | 101.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6545   | 0.0101  |
| 51 | 103.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6318   | 0.0101  |
| 52 | 105.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6091   | 0.0101  |
| 53 | 108.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5865   | 0.0101  |
| 54 | 110.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5638   | 0.0101  |
| 55 | 112.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5413   | 0.0101  |
| 56 | 114.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5185   | 0.0101  |
| 57 | 117.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.4958   | 0.0101  |
| 58 | 119.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4731   | 0.0101  |
| 59 | 121.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4506   | 0.0101  |
| 60 | 123.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3638   | -0.0466 |
| 61 | 126.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2592   | -0.0466 |
| 62 | 128.250 | -0.608 | 2.397 | 0.710  | 0.5906   | 0.1545   | -0.0466 |
| 63 | 130.500 | -0.954 | 2.051 | 0.198  | 0.6772   | 0.0679   | 0.0101  |
| 64 | 132.750 | -1.336 | 1.669 | -0.184 | 0.6998   | 0.0453   | 0.0101  |
| 65 | 135.000 | -1.668 | 1.337 | -0.515 | 0.7225   | 0.0226   | 0.0101  |
| 66 | 137.250 | -1.948 | 1.057 | -0.796 | 0.7451   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 46 66

NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 3 4

PENDIENTE INICIAL DEL TRAZADO = -0.11324

PENDIENTE FINAL DEL TRAZADO = -0.11324

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1  
-----

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
TESAMOS POR LA IZQUIERDA (SI=1) = 0  
TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
AREA DE PRETENSADO (cm2) = 520.80  
PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.63

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|----|--------|-------|-------|--------|--------|-------|
| 46 | 92.25  | 93.60 | 17.97 | 0.00   | 1.59   | 74.04 |
| 47 | 94.50  | 93.60 | 17.39 | 0.00   | 2.58   | 73.63 |
| 48 | 96.75  | 93.60 | 16.81 | 0.00   | 3.06   | 73.73 |
| 49 | 99.00  | 93.60 | 16.23 | 0.00   | 3.46   | 73.91 |
| 50 | 101.25 | 93.60 | 15.64 | 0.00   | 3.74   | 74.22 |
| 51 | 103.50 | 93.60 | 15.04 | 0.00   | 3.85   | 74.70 |
| 52 | 105.75 | 93.60 | 14.44 | 0.00   | 3.80   | 75.36 |
| 53 | 108.00 | 93.60 | 13.84 | 0.00   | 3.57   | 76.19 |
| 54 | 110.25 | 93.60 | 13.23 | 0.00   | 3.20   | 77.16 |
| 55 | 112.50 | 93.60 | 12.62 | 0.00   | 2.74   | 78.24 |
| 56 | 114.75 | 93.60 | 12.00 | 0.00   | 2.24   | 79.36 |
| 57 | 117.00 | 93.60 | 11.38 | 0.00   | 1.80   | 80.42 |
| 58 | 119.25 | 93.60 | 10.75 | 0.00   | 1.42   | 81.43 |
| 59 | 121.50 | 93.60 | 10.12 | 0.00   | 1.45   | 82.02 |
| 60 | 123.75 | 93.60 | 8.35  | 0.00   | 1.89   | 83.37 |
| 61 | 126.00 | 93.60 | 6.21  | 2.64   | 2.07   | 82.69 |
| 62 | 128.25 | 93.60 | 4.01  | 7.03   | 1.96   | 80.60 |
| 63 | 130.50 | 93.60 | 2.11  | 10.83  | 1.49   | 79.17 |
| 64 | 132.75 | 93.60 | 1.41  | 12.23  | 1.47   | 78.49 |
| 65 | 135.00 | 93.60 | 0.71  | 13.64  | 1.73   | 77.52 |
| 66 | 137.25 | 93.60 | 0.00  | 15.05  | 2.16   | 76.39 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 195.6 mm

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1  
-----

TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I  | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|----|--------|-------|---------|--------|----------|
| 46 | 92.25  | 74.04 | 0.00    | 0.00   | 0.00     |
| 47 | 94.50  | 73.63 | 0.00    | 0.00   | 0.00     |
| 48 | 96.75  | 73.73 | 0.00    | 0.00   | 0.00     |
| 49 | 99.00  | 73.91 | 0.00    | 0.00   | 0.00     |
| 50 | 101.25 | 74.22 | 0.00    | 0.00   | 0.00     |
| 51 | 103.50 | 74.70 | 0.00    | 0.00   | 0.00     |
| 52 | 105.75 | 75.36 | 0.00    | 0.00   | 0.00     |
| 53 | 108.00 | 76.19 | 0.00    | 0.00   | 0.00     |
| 54 | 110.25 | 77.16 | 0.00    | 0.00   | 0.00     |
| 55 | 112.50 | 78.24 | 0.00    | 0.00   | 0.00     |
| 56 | 114.75 | 79.36 | 0.00    | 0.00   | 0.00     |
| 57 | 117.00 | 80.42 | 0.00    | 0.00   | 0.00     |
| 58 | 119.25 | 81.43 | 0.00    | 0.00   | 0.00     |
| 59 | 121.50 | 82.02 | 0.00    | 0.00   | 0.00     |
| 60 | 123.75 | 83.37 | 0.00    | 0.00   | 0.00     |
| 61 | 126.00 | 82.69 | 0.00    | 0.00   | 0.00     |
| 62 | 128.25 | 80.60 | 0.00    | 0.00   | 0.00     |
| 63 | 130.50 | 79.17 | 0.00    | 0.00   | 0.00     |
| 64 | 132.75 | 78.49 | 0.00    | 0.00   | 0.00     |
| 65 | 135.00 | 77.52 | 0.00    | 0.00   | 0.00     |
| 66 | 137.25 | 76.39 | 0.00    | 0.00   | 0.00     |



## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES (Kp/mm2)

| I  | S      | To    | APi   | Ti    | APf  | Tf    |
|----|--------|-------|-------|-------|------|-------|
| 46 | 92.25  | 93.60 | 19.56 | 74.04 | 0.00 | 74.04 |
| 47 | 94.50  | 93.60 | 19.97 | 73.63 | 0.00 | 73.63 |
| 48 | 96.75  | 93.60 | 19.87 | 73.73 | 0.00 | 73.73 |
| 49 | 99.00  | 93.60 | 19.69 | 73.91 | 0.00 | 73.91 |
| 50 | 101.25 | 93.60 | 19.38 | 74.22 | 0.00 | 74.22 |
| 51 | 103.50 | 93.60 | 18.90 | 74.70 | 0.00 | 74.70 |
| 52 | 105.75 | 93.60 | 18.24 | 75.36 | 0.00 | 75.36 |
| 53 | 108.00 | 93.60 | 17.41 | 76.19 | 0.00 | 76.19 |
| 54 | 110.25 | 93.60 | 16.44 | 77.16 | 0.00 | 77.16 |
| 55 | 112.50 | 93.60 | 15.36 | 78.24 | 0.00 | 78.24 |
| 56 | 114.75 | 93.60 | 14.24 | 79.36 | 0.00 | 79.36 |
| 57 | 117.00 | 93.60 | 13.18 | 80.42 | 0.00 | 80.42 |
| 58 | 119.25 | 93.60 | 12.17 | 81.43 | 0.00 | 81.43 |
| 59 | 121.50 | 93.60 | 11.58 | 82.02 | 0.00 | 82.02 |
| 60 | 123.75 | 93.60 | 10.23 | 83.37 | 0.00 | 83.37 |
| 61 | 126.00 | 93.60 | 10.91 | 82.69 | 0.00 | 82.69 |
| 62 | 128.25 | 93.60 | 13.00 | 80.60 | 0.00 | 80.60 |
| 63 | 130.50 | 93.60 | 14.43 | 79.17 | 0.00 | 79.17 |
| 64 | 132.75 | 93.60 | 15.11 | 78.49 | 0.00 | 78.49 |
| 65 | 135.00 | 93.60 | 16.08 | 77.52 | 0.00 | 77.52 |
| 66 | 137.25 | 93.60 | 17.21 | 76.39 | 0.00 | 76.39 |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I  | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|----|--------|---------|----------|-----------|---------|----------|-----------|
| 46 | 92.25  | 3855.92 | 3067.8   | 38.81     | 3855.92 | 3067.8   | 38.81     |
| 47 | 94.50  | 3834.63 | 3930.2   | 38.60     | 3834.63 | 3930.2   | 38.60     |
| 48 | 96.75  | 3839.65 | 4620.2   | 38.65     | 3839.65 | 4620.2   | 38.65     |
| 49 | 99.00  | 3849.21 | 5122.1   | 38.75     | 3849.21 | 5122.1   | 38.75     |
| 50 | 101.25 | 3865.53 | 5439.3   | 38.91     | 3865.53 | 5439.3   | 38.91     |
| 51 | 103.50 | 3890.49 | 5573.5   | 39.16     | 3890.49 | 5573.5   | 39.16     |
| 52 | 105.75 | 3924.71 | 5522.5   | 39.51     | 3924.71 | 5522.5   | 39.51     |
| 53 | 108.00 | 3967.82 | 5279.9   | 39.94     | 3967.82 | 5279.9   | 39.94     |
| 54 | 110.25 | 4018.67 | 4835.6   | 40.45     | 4018.67 | 4835.6   | 40.45     |
| 55 | 112.50 | 4074.73 | 4176.3   | 41.02     | 4074.73 | 4176.3   | 41.02     |
| 56 | 114.75 | 4132.89 | 3288.2   | 41.60     | 4132.89 | 3288.2   | 41.60     |
| 57 | 117.00 | 4188.36 | 2158.4   | 42.16     | 4188.36 | 2158.4   | 42.16     |
| 58 | 119.25 | 4240.62 | 780.7    | 42.69     | 4240.62 | 780.7    | 42.69     |
| 59 | 121.50 | 4271.80 | -1553.7  | 43.00     | 4271.80 | -1553.7  | 43.00     |
| 60 | 123.75 | 4341.75 | -3083.3  | -202.13   | 4341.75 | -3083.3  | -202.13   |
| 61 | 126.00 | 4306.39 | -3565.7  | -200.49   | 4306.39 | -3565.7  | -200.49   |
| 62 | 128.25 | 4197.91 | -2981.2  | -195.44   | 4197.91 | -2981.2  | -195.44   |
| 63 | 130.50 | 4123.33 | -816.8   | 41.51     | 4123.33 | -816.8   | 41.51     |
| 64 | 132.75 | 4088.02 | 752.6    | 41.15     | 4088.02 | 752.6    | 41.15     |
| 65 | 135.00 | 4037.50 | 2080.6   | 40.64     | 4037.50 | 2080.6   | 40.64     |
| 66 | 137.25 | 3978.61 | 3165.4   | 40.05     | 3978.61 | 3165.4   | 40.05     |

ETAPA DE TESADO INICIAL

FUERZAS HORIZONTALES DE DESVIACION

| I  | S(m)   | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|----|--------|--------|---------|---------|---------|---------|
| 46 | 92.25  | 7250.0 | 3855.92 | -0.53   | 3855.92 | -0.53   |
| 47 | 94.50  | 7250.0 | 3834.63 | -0.53   | 3834.63 | -0.53   |
| 48 | 96.75  | 7250.0 | 3839.65 | -0.53   | 3839.65 | -0.53   |
| 49 | 99.00  | 7250.0 | 3849.21 | -0.53   | 3849.21 | -0.53   |
| 50 | 101.25 | 7250.0 | 3865.53 | -0.53   | 3865.53 | -0.53   |
| 51 | 103.50 | 7250.0 | 3890.49 | -0.54   | 3890.49 | -0.54   |
| 52 | 105.75 | 7250.0 | 3924.71 | -0.54   | 3924.71 | -0.54   |
| 53 | 108.00 | 7250.0 | 3967.82 | -0.55   | 3967.82 | -0.55   |
| 54 | 110.25 | 7250.0 | 4018.67 | -0.56   | 4018.67 | -0.56   |
| 55 | 112.50 | 7250.0 | 4074.73 | -0.57   | 4074.73 | -0.57   |
| 56 | 114.75 | 7250.0 | 4132.89 | -0.57   | 4132.89 | -0.57   |
| 57 | 117.00 | 7250.0 | 4188.36 | -0.58   | 4188.36 | -0.58   |
| 58 | 119.25 | 7250.0 | 4240.62 | -0.59   | 4240.62 | -0.59   |
| 59 | 121.50 | 7250.0 | 4271.80 | -0.59   | 4271.80 | -0.59   |
| 60 | 123.75 | 7250.0 | 4341.75 | -0.60   | 4341.75 | -0.60   |
| 61 | 126.00 | 7250.0 | 4306.39 | -0.59   | 4306.39 | -0.59   |
| 62 | 128.25 | 7250.0 | 4197.91 | -0.57   | 4197.91 | -0.57   |
| 63 | 130.50 | 7250.0 | 4123.33 | -0.57   | 4123.33 | -0.57   |
| 64 | 132.75 | 7250.0 | 4088.02 | -0.56   | 4088.02 | -0.56   |
| 65 | 135.00 | 7250.0 | 4037.50 | -0.55   | 4037.50 | -0.55   |
| 66 | 137.25 | 7250.0 | 3978.61 | -0.27   | 3978.61 | -0.27   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|----|--------|--------|-------|--------|--------|--------|
| 46 | 92.25  | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 47 | 94.50  | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 48 | 96.75  | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 49 | 99.00  | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 50 | 101.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 51 | 103.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 52 | 105.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 53 | 108.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 54 | 110.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 55 | 112.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 56 | 114.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 57 | 117.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 58 | 119.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 59 | 121.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 60 | 123.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 61 | 126.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 62 | 128.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 63 | 130.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 64 | 132.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 65 | 135.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 66 | 137.25 | 144.00 | 0.00  | 17.66  | 3.47   | 122.87 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 296.2 mm

PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 5  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00  
LUZ DEL VANO = 4 L (m) = 45.00  
LUZ DEL VANO = 5 L (m) = 45.00  
  
COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION 1

-----

AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 2

-----

AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 3

-----

AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I. | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|----|---------|--------|-------|--------|----------|----------|---------|
| 66 | 137.250 | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7451   | 0.0101  |
| 67 | 139.500 | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7225   | 0.0101  |
| 68 | 141.750 | -2.356 | 0.649 | -1.203 | 0.0453   | 0.6998   | 0.0101  |
| 69 | 144.000 | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6770   | 0.0101  |
| 70 | 146.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6545   | 0.0101  |
| 71 | 148.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6318   | 0.0101  |
| 72 | 150.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6091   | 0.0101  |
| 73 | 153.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5865   | 0.0101  |
| 74 | 155.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5638   | 0.0101  |
| 75 | 157.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5413   | 0.0101  |
| 76 | 159.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5185   | 0.0101  |
| 77 | 162.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.4958   | 0.0101  |
| 78 | 164.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4731   | 0.0101  |
| 79 | 166.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4506   | 0.0101  |
| 80 | 168.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3638   | -0.0466 |
| 81 | 171.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2592   | -0.0466 |
| 82 | 173.250 | -0.608 | 2.397 | 0.710  | 0.5906   | 0.1545   | -0.0466 |
| 83 | 175.500 | -0.954 | 2.051 | 0.198  | 0.6772   | 0.0679   | 0.0101  |
| 84 | 177.750 | -1.336 | 1.669 | -0.184 | 0.6998   | 0.0453   | 0.0101  |
| 85 | 180.000 | -1.668 | 1.337 | -0.515 | 0.7225   | 0.0226   | 0.0101  |
| 86 | 182.250 | -1.948 | 1.057 | -0.796 | 0.7451   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 66 86  
 NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 4 5  
 PENDIENTE INICIAL DEL TRAZADO = -0.11324  
 PENDIENTE FINAL DEL TRAZADO = -0.11324

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.63

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|----|--------|-------|-------|--------|--------|-------|
| 66 | 137.25 | 93.60 | 17.97 | 0.00   | 1.59   | 74.04 |
| 67 | 139.50 | 93.60 | 17.39 | 0.00   | 2.58   | 73.63 |
| 68 | 141.75 | 93.60 | 16.81 | 0.00   | 3.06   | 73.73 |
| 69 | 144.00 | 93.60 | 16.23 | 0.00   | 3.46   | 73.91 |
| 70 | 146.25 | 93.60 | 15.64 | 0.00   | 3.74   | 74.22 |
| 71 | 148.50 | 93.60 | 15.04 | 0.00   | 3.85   | 74.70 |
| 72 | 150.75 | 93.60 | 14.44 | 0.00   | 3.80   | 75.36 |
| 73 | 153.00 | 93.60 | 13.84 | 0.00   | 3.57   | 76.19 |
| 74 | 155.25 | 93.60 | 13.23 | 0.00   | 3.20   | 77.16 |
| 75 | 157.50 | 93.60 | 12.62 | 0.00   | 2.74   | 78.24 |
| 76 | 159.75 | 93.60 | 12.00 | 0.00   | 2.24   | 79.36 |
| 77 | 162.00 | 93.60 | 11.38 | 0.00   | 1.80   | 80.42 |
| 78 | 164.25 | 93.60 | 10.75 | 0.00   | 1.42   | 81.43 |
| 79 | 166.50 | 93.60 | 10.12 | 0.00   | 1.45   | 82.02 |
| 80 | 168.75 | 93.60 | 8.35  | 0.00   | 1.89   | 83.37 |
| 81 | 171.00 | 93.60 | 6.21  | 2.64   | 2.07   | 82.69 |
| 82 | 173.25 | 93.60 | 4.01  | 7.03   | 1.96   | 80.60 |
| 83 | 175.50 | 93.60 | 2.11  | 10.83  | 1.49   | 79.17 |
| 84 | 177.75 | 93.60 | 1.41  | 12.23  | 1.47   | 78.49 |
| 85 | 180.00 | 93.60 | 0.71  | 13.64  | 1.73   | 77.52 |
| 86 | 182.25 | 93.60 | 0.00  | 15.05  | 2.16   | 76.39 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 195.6 mm

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I  | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|----|--------|-------|---------|--------|----------|
| 66 | 137.25 | 74.04 | 0.00    | 0.00   | 0.00     |
| 67 | 139.50 | 73.63 | 0.00    | 0.00   | 0.00     |
| 68 | 141.75 | 73.73 | 0.00    | 0.00   | 0.00     |
| 69 | 144.00 | 73.91 | 0.00    | 0.00   | 0.00     |
| 70 | 146.25 | 74.22 | 0.00    | 0.00   | 0.00     |
| 71 | 148.50 | 74.70 | 0.00    | 0.00   | 0.00     |
| 72 | 150.75 | 75.36 | 0.00    | 0.00   | 0.00     |
| 73 | 153.00 | 76.19 | 0.00    | 0.00   | 0.00     |
| 74 | 155.25 | 77.16 | 0.00    | 0.00   | 0.00     |
| 75 | 157.50 | 78.24 | 0.00    | 0.00   | 0.00     |
| 76 | 159.75 | 79.36 | 0.00    | 0.00   | 0.00     |
| 77 | 162.00 | 80.42 | 0.00    | 0.00   | 0.00     |
| 78 | 164.25 | 81.43 | 0.00    | 0.00   | 0.00     |
| 79 | 166.50 | 82.02 | 0.00    | 0.00   | 0.00     |
| 80 | 168.75 | 83.37 | 0.00    | 0.00   | 0.00     |
| 81 | 171.00 | 82.69 | 0.00    | 0.00   | 0.00     |
| 82 | 173.25 | 80.60 | 0.00    | 0.00   | 0.00     |
| 83 | 175.50 | 79.17 | 0.00    | 0.00   | 0.00     |
| 84 | 177.75 | 78.49 | 0.00    | 0.00   | 0.00     |
| 85 | 180.00 | 77.52 | 0.00    | 0.00   | 0.00     |
| 86 | 182.25 | 76.39 | 0.00    | 0.00   | 0.00     |

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES (Kp/mm2)

| I  | S      | To    | APi   | Ti    | APf  | Tf    |
|----|--------|-------|-------|-------|------|-------|
| 66 | 137.25 | 93.60 | 19.56 | 74.04 | 0.00 | 74.04 |
| 67 | 139.50 | 93.60 | 19.97 | 73.63 | 0.00 | 73.63 |
| 68 | 141.75 | 93.60 | 19.87 | 73.73 | 0.00 | 73.73 |
| 69 | 144.00 | 93.60 | 19.69 | 73.91 | 0.00 | 73.91 |
| 70 | 146.25 | 93.60 | 19.38 | 74.22 | 0.00 | 74.22 |
| 71 | 148.50 | 93.60 | 18.90 | 74.70 | 0.00 | 74.70 |
| 72 | 150.75 | 93.60 | 18.24 | 75.36 | 0.00 | 75.36 |
| 73 | 153.00 | 93.60 | 17.41 | 76.19 | 0.00 | 76.19 |
| 74 | 155.25 | 93.60 | 16.44 | 77.16 | 0.00 | 77.16 |
| 75 | 157.50 | 93.60 | 15.36 | 78.24 | 0.00 | 78.24 |
| 76 | 159.75 | 93.60 | 14.24 | 79.36 | 0.00 | 79.36 |
| 77 | 162.00 | 93.60 | 13.18 | 80.42 | 0.00 | 80.42 |
| 78 | 164.25 | 93.60 | 12.17 | 81.43 | 0.00 | 81.43 |
| 79 | 166.50 | 93.60 | 11.58 | 82.02 | 0.00 | 82.02 |
| 80 | 168.75 | 93.60 | 10.23 | 83.37 | 0.00 | 83.37 |
| 81 | 171.00 | 93.60 | 10.91 | 82.69 | 0.00 | 82.69 |
| 82 | 173.25 | 93.60 | 13.00 | 80.60 | 0.00 | 80.60 |
| 83 | 175.50 | 93.60 | 14.43 | 79.17 | 0.00 | 79.17 |
| 84 | 177.75 | 93.60 | 15.11 | 78.49 | 0.00 | 78.49 |
| 85 | 180.00 | 93.60 | 16.08 | 77.52 | 0.00 | 77.52 |
| 86 | 182.25 | 93.60 | 17.21 | 76.39 | 0.00 | 76.39 |



## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I  | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|----|--------|---------|----------|-----------|---------|----------|-----------|
| 66 | 137.25 | 3855.92 | 3067.8   | 38.81     | 3855.92 | 3067.8   | 38.81     |
| 67 | 139.50 | 3834.63 | 3930.2   | 38.60     | 3834.63 | 3930.2   | 38.60     |
| 68 | 141.75 | 3839.65 | 4620.2   | 38.65     | 3839.65 | 4620.2   | 38.65     |
| 69 | 144.00 | 3849.21 | 5122.1   | 38.75     | 3849.21 | 5122.1   | 38.75     |
| 70 | 146.25 | 3865.53 | 5439.3   | 38.91     | 3865.53 | 5439.3   | 38.91     |
| 71 | 148.50 | 3890.49 | 5573.5   | 39.16     | 3890.49 | 5573.5   | 39.16     |
| 72 | 150.75 | 3924.71 | 5522.5   | 39.51     | 3924.71 | 5522.5   | 39.51     |
| 73 | 153.00 | 3967.82 | 5279.9   | 39.94     | 3967.82 | 5279.9   | 39.94     |
| 74 | 155.25 | 4018.67 | 4835.6   | 40.45     | 4018.67 | 4835.6   | 40.45     |
| 75 | 157.50 | 4074.73 | 4176.3   | 41.02     | 4074.73 | 4176.3   | 41.02     |
| 76 | 159.75 | 4132.89 | 3288.2   | 41.60     | 4132.89 | 3288.2   | 41.60     |
| 77 | 162.00 | 4188.36 | 2158.4   | 42.16     | 4188.36 | 2158.4   | 42.16     |
| 78 | 164.25 | 4240.62 | 780.7    | 42.69     | 4240.62 | 780.7    | 42.69     |
| 79 | 166.50 | 4271.80 | -1553.7  | 43.00     | 4271.80 | -1553.7  | 43.00     |
| 80 | 168.75 | 4341.75 | -3083.3  | -202.13   | 4341.75 | -3083.3  | -202.13   |
| 81 | 171.00 | 4306.39 | -3565.7  | -200.49   | 4306.39 | -3565.7  | -200.49   |
| 82 | 173.25 | 4197.91 | -2981.2  | -195.44   | 4197.91 | -2981.2  | -195.44   |
| 83 | 175.50 | 4123.33 | -816.8   | 41.51     | 4123.33 | -816.8   | 41.51     |
| 84 | 177.75 | 4088.01 | 752.6    | 41.15     | 4088.01 | 752.6    | 41.15     |
| 85 | 180.00 | 4037.50 | 2080.6   | 40.64     | 4037.50 | 2080.6   | 40.64     |
| 86 | 182.25 | 3978.61 | 3165.4   | 40.05     | 3978.61 | 3165.4   | 40.05     |

## ETAPA DE TESADO INICIAL

## FUERZAS HORIZONTALES DE DESVIACION

| I  | S(m)   | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|----|--------|--------|---------|---------|---------|---------|
| 66 | 137.25 | 7250.0 | 3855.92 | -0.53   | 3855.92 | -0.53   |
| 67 | 139.50 | 7250.0 | 3834.63 | -0.53   | 3834.63 | -0.53   |
| 68 | 141.75 | 7250.0 | 3839.65 | -0.53   | 3839.65 | -0.53   |
| 69 | 144.00 | 7250.0 | 3849.21 | -0.53   | 3849.21 | -0.53   |
| 70 | 146.25 | 7250.0 | 3865.53 | -0.53   | 3865.53 | -0.53   |
| 71 | 148.50 | 7250.0 | 3890.49 | -0.54   | 3890.49 | -0.54   |
| 72 | 150.75 | 7250.0 | 3924.71 | -0.54   | 3924.71 | -0.54   |
| 73 | 153.00 | 7250.0 | 3967.82 | -0.55   | 3967.82 | -0.55   |
| 74 | 155.25 | 7250.0 | 4018.67 | -0.56   | 4018.67 | -0.56   |
| 75 | 157.50 | 7250.0 | 4074.73 | -0.57   | 4074.73 | -0.57   |
| 76 | 159.75 | 7250.0 | 4132.89 | -0.57   | 4132.89 | -0.57   |
| 77 | 162.00 | 7250.0 | 4188.36 | -0.58   | 4188.36 | -0.58   |
| 78 | 164.25 | 7250.0 | 4240.62 | -0.59   | 4240.62 | -0.59   |
| 79 | 166.50 | 7250.0 | 4271.80 | -0.59   | 4271.80 | -0.59   |
| 80 | 168.75 | 7250.0 | 4341.75 | -0.60   | 4341.75 | -0.60   |
| 81 | 171.00 | 7250.0 | 4306.39 | -0.59   | 4306.39 | -0.59   |
| 82 | 173.25 | 7250.0 | 4197.91 | -0.57   | 4197.91 | -0.57   |
| 83 | 175.50 | 7250.0 | 4123.33 | -0.57   | 4123.33 | -0.57   |
| 84 | 177.75 | 7250.0 | 4088.01 | -0.56   | 4088.01 | -0.56   |
| 85 | 180.00 | 7250.0 | 4037.50 | -0.55   | 4037.50 | -0.55   |
| 86 | 182.25 | 7250.0 | 3978.61 | -0.27   | 3978.61 | -0.27   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|----|--------|--------|-------|--------|--------|--------|
| 66 | 137.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 67 | 139.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 68 | 141.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 69 | 144.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 70 | 146.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 71 | 148.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 72 | 150.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 73 | 153.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 74 | 155.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 75 | 157.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 76 | 159.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 77 | 162.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 78 | 164.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 79 | 166.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 80 | 168.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 81 | 171.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 82 | 173.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 83 | 175.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 84 | 177.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 85 | 180.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 86 | 182.25 | 144.00 | 0.00  | 17.66  | 3.47   | 122.87 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 296.2 mm



PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 6  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00  
LUZ DEL VANO = 4 L (m) = 45.00  
LUZ DEL VANO = 5 L (m) = 45.00  
LUZ DEL VANO = 6 L (m) = 45.00  
COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = -0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION

1

-----

AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

2

-----

AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

3

-----

AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 86  | 182.250 | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7451   | 0.0101  |
| 87  | 184.500 | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7225   | 0.0101  |
| 88  | 186.750 | -2.356 | 0.649 | -1.203 | 0.0453   | 0.6998   | 0.0101  |
| 89  | 189.000 | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6770   | 0.0101  |
| 90  | 191.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6545   | 0.0101  |
| 91  | 193.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6318   | 0.0101  |
| 92  | 195.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6091   | 0.0101  |
| 93  | 198.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5865   | 0.0101  |
| 94  | 200.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5638   | 0.0101  |
| 95  | 202.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5413   | 0.0101  |
| 96  | 204.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5185   | 0.0101  |
| 97  | 207.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.4958   | 0.0101  |
| 98  | 209.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4731   | 0.0101  |
| 99  | 211.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4506   | 0.0101  |
| 100 | 213.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3638   | -0.0466 |
| 101 | 216.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2592   | -0.0466 |
| 102 | 218.250 | -0.608 | 2.397 | 0.710  | 0.5906   | 0.1545   | -0.0466 |
| 103 | 220.500 | -0.954 | 2.051 | 0.198  | 0.6772   | 0.0679   | 0.0101  |
| 104 | 222.750 | -1.336 | 1.669 | -0.184 | 0.6998   | 0.0453   | 0.0101  |
| 105 | 225.000 | -1.668 | 1.337 | -0.515 | 0.7225   | 0.0226   | 0.0101  |
| 106 | 227.250 | -1.948 | 1.057 | -0.796 | 0.7451   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 86 106  
NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 5 6  
PENDIENTE INICIAL DEL TRAZADO = -0.11324  
PENDIENTE FINAL DEL TRAZADO = -0.11324

#### ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
TESAMOS POR LA IZQUIERDA (SI=1) = 0  
TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
AREA DE PRETENSADO (cm2) = 520.80  
PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.63

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|-----|--------|-------|-------|--------|--------|-------|
| 86  | 182.25 | 93.60 | 17.97 | 0.00   | 1.59   | 74.04 |
| 87  | 184.50 | 93.60 | 17.39 | 0.00   | 2.58   | 73.63 |
| 88  | 186.75 | 93.60 | 16.81 | 0.00   | 3.06   | 73.73 |
| 89  | 189.00 | 93.60 | 16.23 | 0.00   | 3.46   | 73.91 |
| 90  | 191.25 | 93.60 | 15.64 | 0.00   | 3.74   | 74.22 |
| 91  | 193.50 | 93.60 | 15.04 | 0.00   | 3.85   | 74.70 |
| 92  | 195.75 | 93.60 | 14.44 | 0.00   | 3.80   | 75.36 |
| 93  | 198.00 | 93.60 | 13.84 | 0.00   | 3.57   | 76.19 |
| 94  | 200.25 | 93.60 | 13.23 | 0.00   | 3.20   | 77.16 |
| 95  | 202.50 | 93.60 | 12.62 | 0.00   | 2.74   | 78.24 |
| 96  | 204.75 | 93.60 | 12.00 | 0.00   | 2.24   | 79.36 |
| 97  | 207.00 | 93.60 | 11.38 | 0.00   | 1.80   | 80.42 |
| 98  | 209.25 | 93.60 | 10.75 | 0.00   | 1.42   | 81.43 |
| 99  | 211.50 | 93.60 | 10.12 | 0.00   | 1.45   | 82.02 |
| 100 | 213.75 | 93.60 | 8.35  | 0.00   | 1.89   | 83.37 |
| 101 | 216.00 | 93.60 | 6.21  | 2.64   | 2.07   | 82.69 |
| 102 | 218.25 | 93.60 | 4.01  | 7.03   | 1.96   | 80.60 |
| 103 | 220.50 | 93.60 | 2.11  | 10.83  | 1.49   | 79.17 |
| 104 | 222.75 | 93.60 | 1.41  | 12.23  | 1.47   | 78.49 |
| 105 | 225.00 | 93.60 | 0.71  | 13.64  | 1.73   | 77.52 |
| 106 | 227.25 | 93.60 | 0.00  | 15.05  | 2.16   | 76.39 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 195.6 mm

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|-------|---------|--------|----------|
| 86  | 182.25 | 74.04 | 0.00    | 0.00   | 0.00     |
| 87  | 184.50 | 73.63 | 0.00    | 0.00   | 0.00     |
| 88  | 186.75 | 73.73 | 0.00    | 0.00   | 0.00     |
| 89  | 189.00 | 73.91 | 0.00    | 0.00   | 0.00     |
| 90  | 191.25 | 74.22 | 0.00    | 0.00   | 0.00     |
| 91  | 193.50 | 74.70 | 0.00    | 0.00   | 0.00     |
| 92  | 195.75 | 75.36 | 0.00    | 0.00   | 0.00     |
| 93  | 198.00 | 76.19 | 0.00    | 0.00   | 0.00     |
| 94  | 200.25 | 77.16 | 0.00    | 0.00   | 0.00     |
| 95  | 202.50 | 78.24 | 0.00    | 0.00   | 0.00     |
| 96  | 204.75 | 79.36 | 0.00    | 0.00   | 0.00     |
| 97  | 207.00 | 80.42 | 0.00    | 0.00   | 0.00     |
| 98  | 209.25 | 81.43 | 0.00    | 0.00   | 0.00     |
| 99  | 211.50 | 82.02 | 0.00    | 0.00   | 0.00     |
| 100 | 213.75 | 83.37 | 0.00    | 0.00   | 0.00     |
| 101 | 216.00 | 82.69 | 0.00    | 0.00   | 0.00     |
| 102 | 218.25 | 80.60 | 0.00    | 0.00   | 0.00     |
| 103 | 220.50 | 79.17 | 0.00    | 0.00   | 0.00     |
| 104 | 222.75 | 78.49 | 0.00    | 0.00   | 0.00     |
| 105 | 225.00 | 77.52 | 0.00    | 0.00   | 0.00     |
| 106 | 227.25 | 76.39 | 0.00    | 0.00   | 0.00     |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To    | APi   | Ti    | APf  | Tf    |
|-----|--------|-------|-------|-------|------|-------|
| 86  | 182.25 | 93.60 | 19.56 | 74.04 | 0.00 | 74.04 |
| 87  | 184.50 | 93.60 | 19.97 | 73.63 | 0.00 | 73.63 |
| 88  | 186.75 | 93.60 | 19.87 | 73.73 | 0.00 | 73.73 |
| 89  | 189.00 | 93.60 | 19.69 | 73.91 | 0.00 | 73.91 |
| 90  | 191.25 | 93.60 | 19.38 | 74.22 | 0.00 | 74.22 |
| 91  | 193.50 | 93.60 | 18.90 | 74.70 | 0.00 | 74.70 |
| 92  | 195.75 | 93.60 | 18.24 | 75.36 | 0.00 | 75.36 |
| 93  | 198.00 | 93.60 | 17.41 | 76.19 | 0.00 | 76.19 |
| 94  | 200.25 | 93.60 | 16.44 | 77.16 | 0.00 | 77.16 |
| 95  | 202.50 | 93.60 | 15.36 | 78.24 | 0.00 | 78.24 |
| 96  | 204.75 | 93.60 | 14.24 | 79.36 | 0.00 | 79.36 |
| 97  | 207.00 | 93.60 | 13.18 | 80.42 | 0.00 | 80.42 |
| 98  | 209.25 | 93.60 | 12.17 | 81.43 | 0.00 | 81.43 |
| 99  | 211.50 | 93.60 | 11.58 | 82.02 | 0.00 | 82.02 |
| 100 | 213.75 | 93.60 | 10.23 | 83.37 | 0.00 | 83.37 |
| 101 | 216.00 | 93.60 | 10.91 | 82.69 | 0.00 | 82.69 |
| 102 | 218.25 | 93.60 | 13.00 | 80.60 | 0.00 | 80.60 |
| 103 | 220.50 | 93.60 | 14.43 | 79.17 | 0.00 | 79.17 |
| 104 | 222.75 | 93.60 | 15.11 | 78.49 | 0.00 | 78.49 |
| 105 | 225.00 | 93.60 | 16.08 | 77.52 | 0.00 | 77.52 |
| 106 | 227.25 | 93.60 | 17.21 | 76.39 | 0.00 | 76.39 |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 86  | 182.25 | 3855.92 | 3067.8   | 38.81     | 3855.92 | 3067.8   | 38.81     |
| 87  | 184.50 | 3834.63 | 3930.2   | 38.60     | 3834.63 | 3930.2   | 38.60     |
| 88  | 186.75 | 3839.65 | 4620.2   | 38.65     | 3839.65 | 4620.2   | 38.65     |
| 89  | 189.00 | 3849.21 | 5122.1   | 38.75     | 3849.21 | 5122.1   | 38.75     |
| 90  | 191.25 | 3865.53 | 5439.3   | 38.91     | 3865.53 | 5439.3   | 38.91     |
| 91  | 193.50 | 3890.49 | 5573.5   | 39.16     | 3890.49 | 5573.5   | 39.16     |
| 92  | 195.75 | 3924.71 | 5522.5   | 39.51     | 3924.71 | 5522.5   | 39.51     |
| 93  | 198.00 | 3967.82 | 5279.9   | 39.94     | 3967.82 | 5279.9   | 39.94     |
| 94  | 200.25 | 4018.67 | 4835.6   | 40.45     | 4018.67 | 4835.6   | 40.45     |
| 95  | 202.50 | 4074.73 | 4176.3   | 41.02     | 4074.73 | 4176.3   | 41.02     |
| 96  | 204.75 | 4132.89 | 3288.2   | 41.60     | 4132.89 | 3288.2   | 41.60     |
| 97  | 207.00 | 4188.36 | 2158.4   | 42.16     | 4188.36 | 2158.4   | 42.16     |
| 98  | 209.25 | 4240.62 | 780.7    | 42.69     | 4240.62 | 780.7    | 42.69     |
| 99  | 211.50 | 4271.80 | -1553.7  | 43.00     | 4271.80 | -1553.7  | 43.00     |
| 100 | 213.75 | 4341.75 | -3083.3  | -202.13   | 4341.75 | -3083.3  | -202.13   |
| 101 | 216.00 | 4306.39 | -3565.7  | -200.49   | 4306.39 | -3565.7  | -200.49   |
| 102 | 218.25 | 4197.91 | -2981.2  | -195.44   | 4197.91 | -2981.2  | -195.44   |
| 103 | 220.50 | 4123.33 | -816.8   | 41.51     | 4123.33 | -816.8   | 41.51     |
| 104 | 222.75 | 4088.01 | 752.6    | 41.15     | 4088.01 | 752.6    | 41.15     |
| 105 | 225.00 | 4037.50 | 2080.6   | 40.64     | 4037.50 | 2080.6   | 40.64     |
| 106 | 227.25 | 3978.61 | 3165.4   | 40.05     | 3978.61 | 3165.4   | 40.05     |

## ETAPA DE TESADO INICIAL

## FUERZAS HORIZONTALES DE DESVIACION

| I   | S(m)   | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|-----|--------|--------|---------|---------|---------|---------|
| 86  | 182.25 | 7250.0 | 3855.92 | -0.53   | 3855.92 | -0.53   |
| 87  | 184.50 | 7250.0 | 3834.63 | -0.53   | 3834.63 | -0.53   |
| 88  | 186.75 | 7250.0 | 3839.65 | -0.53   | 3839.65 | -0.53   |
| 89  | 189.00 | 7250.0 | 3849.21 | -0.53   | 3849.21 | -0.53   |
| 90  | 191.25 | 7250.0 | 3865.53 | -0.53   | 3865.53 | -0.53   |
| 91  | 193.50 | 7250.0 | 3890.49 | -0.54   | 3890.49 | -0.54   |
| 92  | 195.75 | 7250.0 | 3924.71 | -0.54   | 3924.71 | -0.54   |
| 93  | 198.00 | 7250.0 | 3967.82 | -0.55   | 3967.82 | -0.55   |
| 94  | 200.25 | 7250.0 | 4018.67 | -0.56   | 4018.67 | -0.56   |
| 95  | 202.50 | 7250.0 | 4074.73 | -0.57   | 4074.73 | -0.57   |
| 96  | 204.75 | 7250.0 | 4132.89 | -0.57   | 4132.89 | -0.57   |
| 97  | 207.00 | 7250.0 | 4188.36 | -0.58   | 4188.36 | -0.58   |
| 98  | 209.25 | 7250.0 | 4240.62 | -0.59   | 4240.62 | -0.59   |
| 99  | 211.50 | 7250.0 | 4271.80 | -0.59   | 4271.80 | -0.59   |
| 100 | 213.75 | 7250.0 | 4341.75 | -0.60   | 4341.75 | -0.60   |
| 101 | 216.00 | 7250.0 | 4306.39 | -0.59   | 4306.39 | -0.59   |
| 102 | 218.25 | 7250.0 | 4197.91 | -0.57   | 4197.91 | -0.57   |
| 103 | 220.50 | 7250.0 | 4123.33 | -0.57   | 4123.33 | -0.57   |
| 104 | 222.75 | 7250.0 | 4088.01 | -0.56   | 4088.01 | -0.56   |
| 105 | 225.00 | 7250.0 | 4037.50 | -0.55   | 4037.50 | -0.55   |
| 106 | 227.25 | 7250.0 | 3978.61 | -0.27   | 3978.61 | -0.27   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 86  | 182.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 87  | 184.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 88  | 186.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 89  | 189.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 90  | 191.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 91  | 193.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 92  | 195.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 93  | 198.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 94  | 200.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 95  | 202.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 96  | 204.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 97  | 207.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 98  | 209.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 99  | 211.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 100 | 213.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 101 | 216.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 102 | 218.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 103 | 220.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 104 | 222.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 105 | 225.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 106 | 227.25 | 144.00 | 0.00  | 17.66  | 3.47   | 122.87 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 296.2 mm



PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 7  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00  
LUZ DEL VANO = 4 L (m) = 45.00  
LUZ DEL VANO = 5 L (m) = 45.00  
LUZ DEL VANO = 6 L (m) = 45.00  
LUZ DEL VANO = 7 L (m) = 45.00  
  
COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION 1

-----

AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 2

-----

AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION 3

-----

AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)



DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 2  
 A = -0.02328 B = 0.00000 C = -0.49000  
 Origen = 0.00 Final = 4.00  
 Parametros de la parabola = 3  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 4.00 Final = 22.50  
 Parametros de la parabola = 5  
 A = 0.00503 B = -0.22649 C = -0.03703  
 Origen = 22.50 Final = 41.00  
 Parametros de la parabola = 6  
 A = -0.02328 B = 2.09500 C = -47.62750  
 Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 106 | 227.250 | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7451   | 0.0101  |
| 107 | 229.500 | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7225   | 0.0101  |
| 108 | 231.750 | -2.356 | 0.649 | -1.203 | 0.0453   | 0.6998   | 0.0101  |
| 109 | 234.000 | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6770   | 0.0101  |
| 110 | 236.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6545   | 0.0101  |
| 111 | 238.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6318   | 0.0101  |
| 112 | 240.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6091   | 0.0101  |
| 113 | 243.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5865   | 0.0101  |
| 114 | 245.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5638   | 0.0101  |
| 115 | 247.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5413   | 0.0101  |
| 116 | 249.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5185   | 0.0101  |
| 117 | 252.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.4958   | 0.0101  |
| 118 | 254.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4731   | 0.0101  |
| 119 | 256.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4506   | 0.0101  |
| 120 | 258.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3638   | -0.0466 |
| 121 | 261.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2592   | -0.0466 |
| 122 | 263.250 | -0.608 | 2.397 | 0.710  | 0.5906   | 0.1545   | -0.0466 |
| 123 | 265.500 | -0.954 | 2.051 | 0.198  | 0.6772   | 0.0679   | 0.0101  |
| 124 | 267.750 | -1.336 | 1.669 | -0.184 | 0.6998   | 0.0453   | 0.0101  |
| 125 | 270.000 | -1.668 | 1.337 | -0.515 | 0.7225   | 0.0226   | 0.0101  |
| 126 | 272.250 | -1.948 | 1.057 | -0.796 | 0.7451   | 0.0000   | 0.0101  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 106 126  
 NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 6 7  
 PENDIENTE INICIAL DEL TRAZADO = -0.11324  
 PENDIENTE FINAL DEL TRAZADO = -0.11324

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 12.63

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|-----|--------|-------|-------|--------|--------|-------|
| 106 | 227.25 | 93.60 | 17.97 | 0.00   | 1.59   | 74.04 |
| 107 | 229.50 | 93.60 | 17.39 | 0.00   | 2.58   | 73.63 |
| 108 | 231.75 | 93.60 | 16.81 | 0.00   | 3.06   | 73.73 |
| 109 | 234.00 | 93.60 | 16.23 | 0.00   | 3.46   | 73.91 |
| 110 | 236.25 | 93.60 | 15.64 | 0.00   | 3.74   | 74.22 |
| 111 | 238.50 | 93.60 | 15.04 | 0.00   | 3.85   | 74.70 |
| 112 | 240.75 | 93.60 | 14.44 | 0.00   | 3.80   | 75.36 |
| 113 | 243.00 | 93.60 | 13.84 | 0.00   | 3.57   | 76.19 |
| 114 | 245.25 | 93.60 | 13.23 | 0.00   | 3.20   | 77.16 |
| 115 | 247.50 | 93.60 | 12.62 | 0.00   | 2.74   | 78.24 |
| 116 | 249.75 | 93.60 | 12.00 | 0.00   | 2.24   | 79.36 |
| 117 | 252.00 | 93.60 | 11.38 | 0.00   | 1.80   | 80.42 |
| 118 | 254.25 | 93.60 | 10.75 | 0.00   | 1.42   | 81.43 |
| 119 | 256.50 | 93.60 | 10.12 | 0.00   | 1.45   | 82.02 |
| 120 | 258.75 | 93.60 | 8.35  | 0.00   | 1.89   | 83.37 |
| 121 | 261.00 | 93.60 | 6.21  | 2.64   | 2.07   | 82.69 |
| 122 | 263.25 | 93.60 | 4.01  | 7.03   | 1.96   | 80.60 |
| 123 | 265.50 | 93.60 | 2.11  | 10.83  | 1.49   | 79.17 |
| 124 | 267.75 | 93.60 | 1.41  | 12.23  | 1.47   | 78.49 |
| 125 | 270.00 | 93.60 | 0.71  | 13.64  | 1.73   | 77.52 |
| 126 | 272.25 | 93.60 | 0.00  | 15.05  | 2.16   | 76.39 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 195.6 mm

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|-------|---------|--------|----------|
| 106 | 227.25 | 74.04 | 0.00    | 0.00   | 0.00     |
| 107 | 229.50 | 73.63 | 0.00    | 0.00   | 0.00     |
| 108 | 231.75 | 73.73 | 0.00    | 0.00   | 0.00     |
| 109 | 234.00 | 73.91 | 0.00    | 0.00   | 0.00     |
| 110 | 236.25 | 74.22 | 0.00    | 0.00   | 0.00     |
| 111 | 238.50 | 74.70 | 0.00    | 0.00   | 0.00     |
| 112 | 240.75 | 75.36 | 0.00    | 0.00   | 0.00     |
| 113 | 243.00 | 76.19 | 0.00    | 0.00   | 0.00     |
| 114 | 245.25 | 77.16 | 0.00    | 0.00   | 0.00     |
| 115 | 247.50 | 78.24 | 0.00    | 0.00   | 0.00     |
| 116 | 249.75 | 79.36 | 0.00    | 0.00   | 0.00     |
| 117 | 252.00 | 80.42 | 0.00    | 0.00   | 0.00     |
| 118 | 254.25 | 81.43 | 0.00    | 0.00   | 0.00     |
| 119 | 256.50 | 82.02 | 0.00    | 0.00   | 0.00     |
| 120 | 258.75 | 83.37 | 0.00    | 0.00   | 0.00     |
| 121 | 261.00 | 82.69 | 0.00    | 0.00   | 0.00     |
| 122 | 263.25 | 80.60 | 0.00    | 0.00   | 0.00     |
| 123 | 265.50 | 79.17 | 0.00    | 0.00   | 0.00     |
| 124 | 267.75 | 78.49 | 0.00    | 0.00   | 0.00     |
| 125 | 270.00 | 77.52 | 0.00    | 0.00   | 0.00     |
| 126 | 272.25 | 76.39 | 0.00    | 0.00   | 0.00     |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To    | APi   | Ti    | APf  | Tf    |
|-----|--------|-------|-------|-------|------|-------|
| 106 | 227.25 | 93.60 | 19.56 | 74.04 | 0.00 | 74.04 |
| 107 | 229.50 | 93.60 | 19.97 | 73.63 | 0.00 | 73.63 |
| 108 | 231.75 | 93.60 | 19.87 | 73.73 | 0.00 | 73.73 |
| 109 | 234.00 | 93.60 | 19.69 | 73.91 | 0.00 | 73.91 |
| 110 | 236.25 | 93.60 | 19.38 | 74.22 | 0.00 | 74.22 |
| 111 | 238.50 | 93.60 | 18.90 | 74.70 | 0.00 | 74.70 |
| 112 | 240.75 | 93.60 | 18.24 | 75.36 | 0.00 | 75.36 |
| 113 | 243.00 | 93.60 | 17.41 | 76.19 | 0.00 | 76.19 |
| 114 | 245.25 | 93.60 | 16.44 | 77.16 | 0.00 | 77.16 |
| 115 | 247.50 | 93.60 | 15.36 | 78.24 | 0.00 | 78.24 |
| 116 | 249.75 | 93.60 | 14.24 | 79.36 | 0.00 | 79.36 |
| 117 | 252.00 | 93.60 | 13.18 | 80.42 | 0.00 | 80.42 |
| 118 | 254.25 | 93.60 | 12.17 | 81.43 | 0.00 | 81.43 |
| 119 | 256.50 | 93.60 | 11.58 | 82.02 | 0.00 | 82.02 |
| 120 | 258.75 | 93.60 | 10.23 | 83.37 | 0.00 | 83.37 |
| 121 | 261.00 | 93.60 | 10.91 | 82.69 | 0.00 | 82.69 |
| 122 | 263.25 | 93.60 | 13.00 | 80.60 | 0.00 | 80.60 |
| 123 | 265.50 | 93.60 | 14.43 | 79.17 | 0.00 | 79.17 |
| 124 | 267.75 | 93.60 | 15.11 | 78.49 | 0.00 | 78.49 |
| 125 | 270.00 | 93.60 | 16.08 | 77.52 | 0.00 | 77.52 |
| 126 | 272.25 | 93.60 | 17.21 | 76.39 | 0.00 | 76.39 |

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 106 | 227.25 | 3855.92 | 3067.8   | 38.81     | 3855.92 | 3067.8   | 38.81     |
| 107 | 229.50 | 3834.64 | 3930.2   | 38.60     | 3834.64 | 3930.2   | 38.60     |
| 108 | 231.75 | 3839.65 | 4620.2   | 38.65     | 3839.65 | 4620.2   | 38.65     |
| 109 | 234.00 | 3849.21 | 5122.1   | 38.75     | 3849.21 | 5122.1   | 38.75     |
| 110 | 236.25 | 3865.53 | 5439.3   | 38.91     | 3865.53 | 5439.3   | 38.91     |
| 111 | 238.50 | 3890.49 | 5573.5   | 39.16     | 3890.49 | 5573.5   | 39.16     |
| 112 | 240.75 | 3924.71 | 5522.5   | 39.51     | 3924.71 | 5522.5   | 39.51     |
| 113 | 243.00 | 3967.82 | 5279.9   | 39.94     | 3967.82 | 5279.9   | 39.94     |
| 114 | 245.25 | 4018.67 | 4835.6   | 40.45     | 4018.67 | 4835.6   | 40.45     |
| 115 | 247.50 | 4074.73 | 4176.3   | 41.02     | 4074.73 | 4176.3   | 41.02     |
| 116 | 249.75 | 4132.89 | 3288.2   | 41.60     | 4132.89 | 3288.2   | 41.60     |
| 117 | 252.00 | 4188.36 | 2158.4   | 42.16     | 4188.36 | 2158.4   | 42.16     |
| 118 | 254.25 | 4240.62 | 780.7    | 42.69     | 4240.62 | 780.7    | 42.69     |
| 119 | 256.50 | 4271.80 | -1553.7  | 43.00     | 4271.80 | -1553.7  | 43.00     |
| 120 | 258.75 | 4341.75 | -3083.3  | -202.13   | 4341.75 | -3083.3  | -202.13   |
| 121 | 261.00 | 4306.39 | -3565.7  | -200.49   | 4306.39 | -3565.7  | -200.49   |
| 122 | 263.25 | 4197.91 | -2981.2  | -195.44   | 4197.91 | -2981.2  | -195.44   |
| 123 | 265.50 | 4123.33 | -816.8   | 41.51     | 4123.33 | -816.8   | 41.51     |
| 124 | 267.75 | 4088.01 | 752.6    | 41.15     | 4088.01 | 752.6    | 41.15     |
| 125 | 270.00 | 4037.50 | 2080.6   | 40.64     | 4037.50 | 2080.6   | 40.64     |
| 126 | 272.25 | 3978.61 | 3165.4   | 40.05     | 3978.61 | 3165.4   | 40.05     |

## ETAPA DE TESADO INICIAL

## FUERZAS HORIZONTALES DE DESVIACION

| I   | S(m)   | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|-----|--------|--------|---------|---------|---------|---------|
| 106 | 227.25 | 7250.0 | 3855.92 | -0.53   | 3855.92 | -0.53   |
| 107 | 229.50 | 7250.0 | 3834.64 | -0.53   | 3834.64 | -0.53   |
| 108 | 231.75 | 7250.0 | 3839.65 | -0.53   | 3839.65 | -0.53   |
| 109 | 234.00 | 7250.0 | 3849.21 | -0.53   | 3849.21 | -0.53   |
| 110 | 236.25 | 7250.0 | 3865.53 | -0.53   | 3865.53 | -0.53   |
| 111 | 238.50 | 7250.0 | 3890.49 | -0.54   | 3890.49 | -0.54   |
| 112 | 240.75 | 7250.0 | 3924.71 | -0.54   | 3924.71 | -0.54   |
| 113 | 243.00 | 7250.0 | 3967.82 | -0.55   | 3967.82 | -0.55   |
| 114 | 245.25 | 7250.0 | 4018.67 | -0.56   | 4018.67 | -0.56   |
| 115 | 247.50 | 7250.0 | 4074.73 | -0.57   | 4074.73 | -0.57   |
| 116 | 249.75 | 7250.0 | 4132.89 | -0.57   | 4132.89 | -0.57   |
| 117 | 252.00 | 7250.0 | 4188.36 | -0.58   | 4188.36 | -0.58   |
| 118 | 254.25 | 7250.0 | 4240.62 | -0.59   | 4240.62 | -0.59   |
| 119 | 256.50 | 7250.0 | 4271.80 | -0.59   | 4271.80 | -0.59   |
| 120 | 258.75 | 7250.0 | 4341.75 | -0.60   | 4341.75 | -0.60   |
| 121 | 261.00 | 7250.0 | 4306.39 | -0.59   | 4306.39 | -0.59   |
| 122 | 263.25 | 7250.0 | 4197.91 | -0.57   | 4197.91 | -0.57   |
| 123 | 265.50 | 7250.0 | 4123.33 | -0.57   | 4123.33 | -0.57   |
| 124 | 267.75 | 7250.0 | 4088.01 | -0.56   | 4088.01 | -0.56   |
| 125 | 270.00 | 7250.0 | 4037.50 | -0.55   | 4037.50 | -0.55   |
| 126 | 272.25 | 7250.0 | 3978.61 | -0.27   | 3978.61 | -0.27   |

## TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 10.77

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 106 | 227.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 107 | 229.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 108 | 231.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 109 | 234.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 110 | 236.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 111 | 238.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 112 | 240.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 113 | 243.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 114 | 245.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 115 | 247.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 116 | 249.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 117 | 252.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 118 | 254.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 119 | 256.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 120 | 258.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 121 | 261.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 122 | 263.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 123 | 265.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 124 | 267.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 125 | 270.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 126 | 272.25 | 144.00 | 0.00  | 17.66  | 3.47   | 122.87 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 296.2 mm

PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----  
NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 8  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00  
LUZ DEL VANO = 4 L (m) = 45.00  
LUZ DEL VANO = 5 L (m) = 45.00  
LUZ DEL VANO = 6 L (m) = 45.00  
LUZ DEL VANO = 7 L (m) = 45.00  
LUZ DEL VANO = 8 L (m) = 36.00  
  
COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----  
LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON

-----  
MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION

-----  
AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

-----  
AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

-----  
AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)



DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 8

Parametros de la parabola = 2  
A = -0.02544 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00646 B = -0.25524 C = 0.02048  
Origen = 4.00 Final = 19.75  
Parametros de la parabola = 5  
A = 0.00248 B = -0.09796 C = -1.53267  
Origen = 19.75 Final = 34.60  
Parametros de la parabola = 6  
A = 0.00000 B = 0.07365 C = -4.50156  
Origen = 34.60 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_I2 | ALPHA_DE | CURV    |
|-----|---------|--------|-------|--------|----------|----------|---------|
| 126 | 272.250 | -1.948 | 1.057 | -0.796 | 0.0000   | 0.7541   | 0.0101  |
| 127 | 274.500 | -2.177 | 0.828 | -1.025 | 0.0227   | 0.7314   | 0.0101  |
| 128 | 276.750 | -2.356 | 0.649 | -1.203 | 0.0453   | 0.7088   | 0.0101  |
| 129 | 279.000 | -2.483 | 0.522 | -1.331 | 0.0681   | 0.6860   | 0.0101  |
| 130 | 281.250 | -2.560 | 0.445 | -1.407 | 0.0906   | 0.6635   | 0.0101  |
| 131 | 283.500 | -2.585 | 0.420 | -1.433 | 0.1133   | 0.6408   | 0.0101  |
| 132 | 285.750 | -2.560 | 0.445 | -1.407 | 0.1360   | 0.6181   | 0.0101  |
| 133 | 288.000 | -2.483 | 0.522 | -1.331 | 0.1586   | 0.5955   | 0.0101  |
| 134 | 290.250 | -2.356 | 0.649 | -1.203 | 0.1813   | 0.5728   | 0.0101  |
| 135 | 292.500 | -2.177 | 0.828 | -1.025 | 0.2039   | 0.5503   | 0.0101  |
| 136 | 294.750 | -1.948 | 1.057 | -0.796 | 0.2266   | 0.5275   | 0.0101  |
| 137 | 297.000 | -1.668 | 1.337 | -0.515 | 0.2493   | 0.5048   | 0.0101  |
| 138 | 299.250 | -1.336 | 1.669 | -0.184 | 0.2720   | 0.4821   | 0.0101  |
| 139 | 301.500 | -0.954 | 2.051 | 0.364  | 0.2945   | 0.4596   | 0.0101  |
| 140 | 303.750 | -0.608 | 2.397 | 0.710  | 0.3813   | 0.3728   | -0.0466 |
| 141 | 306.000 | -0.490 | 2.515 | 0.828  | 0.4859   | 0.2682   | -0.0509 |
| 142 | 307.800 | -0.572 | 2.433 | 0.746  | 0.5775   | 0.1766   | -0.0509 |
| 143 | 309.600 | -0.820 | 2.185 | 0.333  | 0.6691   | 0.0850   | -0.0509 |
| 144 | 311.400 | -1.169 | 1.836 | -0.017 | 0.7075   | 0.0466   | 0.0129  |
| 145 | 313.200 | -1.482 | 1.523 | -0.330 | 0.7308   | 0.0233   | 0.0129  |
| 146 | 315.000 | -1.753 | 1.252 | -0.601 | 0.7541   | 0.0000   | 0.0129  |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 126 146  
NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 7 8  
PENDIENTE INICIAL DEL TRAZADO = -0.11324  
PENDIENTE FINAL DEL TRAZADO = -0.13893

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 520.80  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 11.38

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|-----|--------|-------|-------|--------|--------|-------|
| 126 | 272.25 | 93.60 | 17.90 | 0.00   | 1.59   | 74.11 |
| 127 | 274.50 | 93.60 | 17.32 | 0.00   | 2.58   | 73.70 |
| 128 | 276.75 | 93.60 | 16.74 | 0.00   | 3.06   | 73.80 |
| 129 | 279.00 | 93.60 | 16.15 | 0.00   | 3.47   | 73.98 |
| 130 | 281.25 | 93.60 | 15.56 | 0.00   | 3.74   | 74.29 |
| 131 | 283.50 | 93.60 | 14.97 | 0.00   | 3.86   | 74.77 |
| 132 | 285.75 | 93.60 | 14.37 | 0.00   | 3.80   | 75.43 |
| 133 | 288.00 | 93.60 | 13.77 | 0.00   | 3.58   | 76.26 |
| 134 | 290.25 | 93.60 | 13.16 | 0.00   | 3.21   | 77.24 |
| 135 | 292.50 | 93.60 | 12.55 | 0.00   | 2.74   | 78.31 |
| 136 | 294.75 | 93.60 | 11.93 | 0.00   | 2.24   | 79.43 |
| 137 | 297.00 | 93.60 | 11.30 | 0.00   | 1.80   | 80.50 |
| 138 | 299.25 | 93.60 | 10.67 | 0.00   | 1.42   | 81.50 |
| 139 | 301.50 | 93.60 | 10.05 | 0.00   | 1.45   | 82.10 |
| 140 | 303.75 | 93.60 | 8.27  | 0.21   | 1.88   | 83.24 |
| 141 | 306.00 | 93.60 | 6.12  | 4.49   | 2.03   | 80.96 |
| 142 | 307.80 | 93.60 | 4.22  | 8.30   | 1.98   | 79.10 |
| 143 | 309.60 | 93.60 | 2.28  | 12.18  | 1.54   | 77.60 |
| 144 | 311.40 | 93.60 | 1.33  | 14.08  | 1.39   | 76.80 |
| 145 | 313.20 | 93.60 | 0.67  | 15.41  | 1.51   | 76.02 |
| 146 | 315.00 | 93.60 | 0.00  | 16.74  | 1.79   | 75.07 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 184.9 mm

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|-------|---------|--------|----------|
| 126 | 272.25 | 74.11 | 0.00    | 0.00   | 0.00     |
| 127 | 274.50 | 73.70 | 0.00    | 0.00   | 0.00     |
| 128 | 276.75 | 73.80 | 0.00    | 0.00   | 0.00     |
| 129 | 279.00 | 73.98 | 0.00    | 0.00   | 0.00     |
| 130 | 281.25 | 74.29 | 0.00    | 0.00   | 0.00     |
| 131 | 283.50 | 74.77 | 0.00    | 0.00   | 0.00     |
| 132 | 285.75 | 75.43 | 0.00    | 0.00   | 0.00     |
| 133 | 288.00 | 76.26 | 0.00    | 0.00   | 0.00     |
| 134 | 290.25 | 77.24 | 0.00    | 0.00   | 0.00     |
| 135 | 292.50 | 78.31 | 0.00    | 0.00   | 0.00     |
| 136 | 294.75 | 79.43 | 0.00    | 0.00   | 0.00     |
| 137 | 297.00 | 80.50 | 0.00    | 0.00   | 0.00     |
| 138 | 299.25 | 81.50 | 0.00    | 0.00   | 0.00     |
| 139 | 301.50 | 82.10 | 0.00    | 0.00   | 0.00     |
| 140 | 303.75 | 83.24 | 0.00    | 0.00   | 0.00     |
| 141 | 306.00 | 80.96 | 0.00    | 0.00   | 0.00     |
| 142 | 307.80 | 79.10 | 0.00    | 0.00   | 0.00     |
| 143 | 309.60 | 77.60 | 0.00    | 0.00   | 0.00     |
| 144 | 311.40 | 76.80 | 0.00    | 0.00   | 0.00     |
| 145 | 313.20 | 76.02 | 0.00    | 0.00   | 0.00     |
| 146 | 315.00 | 75.07 | 0.00    | 0.00   | 0.00     |



ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1  
-----

TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To    | APi   | Ti    | APf  | Tf    |
|-----|--------|-------|-------|-------|------|-------|
| 126 | 272.25 | 93.60 | 19.49 | 74.11 | 0.00 | 74.11 |
| 127 | 274.50 | 93.60 | 19.90 | 73.70 | 0.00 | 73.70 |
| 128 | 276.75 | 93.60 | 19.80 | 73.80 | 0.00 | 73.80 |
| 129 | 279.00 | 93.60 | 19.62 | 73.98 | 0.00 | 73.98 |
| 130 | 281.25 | 93.60 | 19.31 | 74.29 | 0.00 | 74.29 |
| 131 | 283.50 | 93.60 | 18.83 | 74.77 | 0.00 | 74.77 |
| 132 | 285.75 | 93.60 | 18.17 | 75.43 | 0.00 | 75.43 |
| 133 | 288.00 | 93.60 | 17.34 | 76.26 | 0.00 | 76.26 |
| 134 | 290.25 | 93.60 | 16.36 | 77.24 | 0.00 | 77.24 |
| 135 | 292.50 | 93.60 | 15.29 | 78.31 | 0.00 | 78.31 |
| 136 | 294.75 | 93.60 | 14.17 | 79.43 | 0.00 | 79.43 |
| 137 | 297.00 | 93.60 | 13.10 | 80.50 | 0.00 | 80.50 |
| 138 | 299.25 | 93.60 | 12.10 | 81.50 | 0.00 | 81.50 |
| 139 | 301.50 | 93.60 | 11.50 | 82.10 | 0.00 | 82.10 |
| 140 | 303.75 | 93.60 | 10.36 | 83.24 | 0.00 | 83.24 |
| 141 | 306.00 | 93.60 | 12.64 | 80.96 | 0.00 | 80.96 |
| 142 | 307.80 | 93.60 | 14.50 | 79.10 | 0.00 | 79.10 |
| 143 | 309.60 | 93.60 | 16.00 | 77.60 | 0.00 | 77.60 |
| 144 | 311.40 | 93.60 | 16.80 | 76.80 | 0.00 | 76.80 |
| 145 | 313.20 | 93.60 | 17.58 | 76.02 | 0.00 | 76.02 |
| 146 | 315.00 | 93.60 | 18.53 | 75.07 | 0.00 | 75.07 |

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1  
-----

FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 126 | 272.25 | 3859.55 | 3070.7   | 38.85     | 3859.55 | 3070.7   | 38.85     |
| 127 | 274.50 | 3838.26 | 3933.9   | 38.64     | 3838.26 | 3933.9   | 38.64     |
| 128 | 276.75 | 3843.29 | 4624.6   | 38.69     | 3843.29 | 4624.6   | 38.69     |
| 129 | 279.00 | 3852.85 | 5126.9   | 38.78     | 3852.85 | 5126.9   | 38.78     |
| 130 | 281.25 | 3869.18 | 5444.4   | 38.95     | 3869.18 | 5444.4   | 38.95     |
| 131 | 283.50 | 3894.17 | 5578.8   | 39.20     | 3894.17 | 5578.8   | 39.20     |
| 132 | 285.75 | 3928.43 | 5527.8   | 39.54     | 3928.43 | 5527.8   | 39.54     |
| 133 | 288.00 | 3971.57 | 5284.9   | 39.98     | 3971.57 | 5284.9   | 39.98     |
| 134 | 290.25 | 4022.47 | 4840.2   | 40.49     | 4022.47 | 4840.2   | 40.49     |
| 135 | 292.50 | 4078.59 | 4180.2   | 41.06     | 4078.59 | 4180.2   | 41.06     |
| 136 | 294.75 | 4136.80 | 3291.3   | 41.64     | 4136.80 | 3291.3   | 41.64     |
| 137 | 297.00 | 4192.32 | 2160.4   | 42.20     | 4192.32 | 2160.4   | 42.20     |
| 138 | 299.25 | 4244.63 | 781.4    | 42.73     | 4244.63 | 781.4    | 42.73     |
| 139 | 301.50 | 4275.84 | -1555.1  | 43.04     | 4275.84 | -1555.1  | 43.04     |
| 140 | 303.75 | 4335.31 | -3078.8  | -201.83   | 4335.31 | -3078.8  | -201.83   |
| 141 | 306.00 | 4216.24 | -3491.0  | -214.55   | 4216.24 | -3491.0  | -214.55   |
| 142 | 307.80 | 4119.72 | -3071.5  | -209.64   | 4119.72 | -3071.5  | -209.64   |
| 143 | 309.60 | 4041.16 | -1344.3  | -205.64   | 4041.16 | -1344.3  | -205.64   |
| 144 | 311.40 | 3999.54 | 67.9     | 51.69     | 3999.54 | 67.9     | 51.69     |
| 145 | 313.20 | 3958.94 | 1305.9   | 51.16     | 3958.94 | 1305.9   | 51.16     |
| 146 | 315.00 | 3909.50 | 2349.1   | 50.52     | 3909.50 | 2349.1   | 50.52     |

## ETAPA DE TESADO INICIAL

## FUERZAS HORIZONTALES DE DESVIACION

| I   | S (m)  | R (m)  | Ti (T)  | Uh (T/m) | Tf (T)  | Uh (T/m) |
|-----|--------|--------|---------|----------|---------|----------|
| 126 | 272.25 | 7250.0 | 3859.55 | -0.53    | 3859.55 | -0.53    |
| 127 | 274.50 | 7250.0 | 3838.26 | -0.53    | 3838.26 | -0.53    |
| 128 | 276.75 | 7250.0 | 3843.29 | -0.53    | 3843.29 | -0.53    |
| 129 | 279.00 | 7250.0 | 3852.85 | -0.53    | 3852.85 | -0.53    |
| 130 | 281.25 | 7250.0 | 3869.18 | -0.54    | 3869.18 | -0.54    |
| 131 | 283.50 | 7250.0 | 3894.17 | -0.54    | 3894.17 | -0.54    |
| 132 | 285.75 | 7250.0 | 3928.43 | -0.54    | 3928.43 | -0.54    |
| 133 | 288.00 | 7250.0 | 3971.57 | -0.55    | 3971.57 | -0.55    |
| 134 | 290.25 | 7250.0 | 4022.47 | -0.56    | 4022.47 | -0.56    |
| 135 | 292.50 | 7250.0 | 4078.59 | -0.57    | 4078.59 | -0.57    |
| 136 | 294.75 | 7250.0 | 4136.80 | -0.57    | 4136.80 | -0.57    |
| 137 | 297.00 | 7250.0 | 4192.32 | -0.58    | 4192.32 | -0.58    |
| 138 | 299.25 | 7250.0 | 4244.63 | -0.59    | 4244.63 | -0.59    |
| 139 | 301.50 | 7250.0 | 4275.84 | -0.59    | 4275.84 | -0.59    |
| 140 | 303.75 | 7250.0 | 4335.31 | -0.59    | 4335.31 | -0.59    |
| 141 | 306.00 | 7250.0 | 4216.24 | -0.57    | 4216.24 | -0.57    |
| 142 | 307.80 | 7250.0 | 4119.72 | -0.56    | 4119.72 | -0.56    |
| 143 | 309.60 | 7250.0 | 4041.16 | -0.55    | 4041.16 | -0.55    |
| 144 | 311.40 | 7250.0 | 3999.54 | -0.55    | 3999.54 | -0.55    |
| 145 | 313.20 | 7250.0 | 3958.94 | -0.54    | 3958.94 | -0.54    |
| 146 | 315.00 | 7250.0 | 3909.50 | -0.27    | 3909.50 | -0.27    |

## TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
TESAMOS POR LA IZQUIERDA (SI=1) = 0  
TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
AREA DE PRETENSADO (cm2) = 520.80  
PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 9.44

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 126 | 272.25 | 144.00 | 27.54 | 0.00   | 3.20   | 113.27 |
| 127 | 274.50 | 144.00 | 26.65 | 0.00   | 3.97   | 113.38 |
| 128 | 276.75 | 144.00 | 25.75 | 0.00   | 4.71   | 113.53 |
| 129 | 279.00 | 144.00 | 24.85 | 0.00   | 5.34   | 113.81 |
| 130 | 281.25 | 144.00 | 23.94 | 0.00   | 5.76   | 114.30 |
| 131 | 283.50 | 144.00 | 23.03 | 0.00   | 5.94   | 115.04 |
| 132 | 285.75 | 144.00 | 22.11 | 0.00   | 5.85   | 116.05 |
| 133 | 288.00 | 144.00 | 21.18 | 0.00   | 5.50   | 117.32 |
| 134 | 290.25 | 144.00 | 20.24 | 0.00   | 4.93   | 118.83 |
| 135 | 292.50 | 144.00 | 19.30 | 0.00   | 4.22   | 120.48 |
| 136 | 294.75 | 144.00 | 18.35 | 0.00   | 3.45   | 122.20 |
| 137 | 297.00 | 144.00 | 17.39 | 0.00   | 2.77   | 123.84 |
| 138 | 299.25 | 144.00 | 16.42 | 0.00   | 2.19   | 125.39 |
| 139 | 301.50 | 144.00 | 15.45 | 0.00   | 2.24   | 126.31 |
| 140 | 303.75 | 144.00 | 12.72 | 0.00   | 2.90   | 128.38 |
| 141 | 306.00 | 144.00 | 9.42  | 1.30   | 3.26   | 130.03 |
| 142 | 307.80 | 144.00 | 6.50  | 7.15   | 3.18   | 127.17 |
| 143 | 309.60 | 144.00 | 3.51  | 13.13  | 2.48   | 124.88 |
| 144 | 311.40 | 144.00 | 2.05  | 16.05  | 2.24   | 123.66 |
| 145 | 313.20 | 144.00 | 1.03  | 18.09  | 2.43   | 122.45 |
| 146 | 315.00 | 144.00 | 0.00  | 20.14  | 2.89   | 120.97 |

ALARGAMIENTO DE LOS CABLES (sobre embolo) = 280.1 mm

PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

NUMERO DE NERVIOS = 1  
NUMERO DE VANOS = 8  
NUMERO DE SECCIONES POR VANO = 21  
NUMERO DE MATERIALES = 3  
LUZ DEL VANO = 1 L (m) = 36.00  
LUZ DEL VANO = 2 L (m) = 45.00  
LUZ DEL VANO = 3 L (m) = 45.00  
LUZ DEL VANO = 4 L (m) = 45.00  
LUZ DEL VANO = 5 L (m) = 45.00  
LUZ DEL VANO = 6 L (m) = 45.00  
LUZ DEL VANO = 7 L (m) = 45.00  
LUZ DEL VANO = 8 L (m) = 36.00  
COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
COEFICIENTE DE DESV. PARASITAS = 0.0060  
RELAJACION = 0.04  
RETRACCION mm/m = 0.240  
COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
TENSION DE ROTURA = 190.00  
MODULO DE DEFORMACION = 19000.00

HORMIGON

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION

AREA DE LA SECCION (m2) = 9.674  
INERCIA DE LA SECCION (m2) = 11.3278  
V\_SUP. DE LA SECCION (m2) = 1.15  
V\_INF. DE LA SECCION (m2) = 1.85  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

AREA DE LA SECCION (m2) = 10.975  
INERCIA DE LA SECCION (m2) = 13.5715  
V\_SUP. DE LA SECCION (m2) = 1.32  
V\_INF. DE LA SECCION (m2) = 1.69  
CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

AREA DE LA SECCION (m2) = 1.000  
INERCIA DE LA SECCION (m2) = 2.0000  
V\_SUP. DE LA SECCION (m2) = 1.50  
V\_INF. DE LA SECCION (m2) = 1.50  
CANTO DE LA SECCION (m2) = 3.00

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 1

Parametros de la parabola = 1  
A = 0.00000 B = -0.07365 C = -1.85000  
Origen = 0.00 Final = 1.40  
Parametros de la parabola = 2  
A = 0.00248 B = -0.08060 C = -1.84514  
Origen = 1.40 Final = 16.25  
Parametros de la parabola = 4  
A = 0.00646 B = -0.21001 C = -0.79370  
Origen = 16.25 Final = 32.00  
Parametros de la parabola = 5  
A = -0.02544 B = 1.83190 C = -33.46418  
Origen = 32.00 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 2

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 3

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 4

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 5

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 6

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 7

Parametros de la parabola = 2  
A = -0.02328 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 4.00  
Parametros de la parabola = 3  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 4.00 Final = 22.50  
Parametros de la parabola = 5  
A = 0.00503 B = -0.22649 C = -0.03703  
Origen = 22.50 Final = 41.00  
Parametros de la parabola = 6  
A = -0.02328 B = 2.09500 C = -47.62750  
Origen = 41.00 Final = 45.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO = 1 VANO = 8

Parametros de la parabola = 1  
A = 0.00000 B = 0.00000 C = -0.49000  
Origen = 0.00 Final = 2.00  
Parametros de la parabola = 2  
A = -0.02831 B = 0.11324 C = -0.60324  
Origen = 2.00 Final = 6.00  
Parametros de la parabola = 3  
A = 0.00824 B = -0.32531 C = 0.71240  
Origen = 6.00 Final = 19.75  
Parametros de la parabola = 5  
A = 0.00248 B = -0.09796 C = -1.53267  
Origen = 19.75 Final = 34.60  
Parametros de la parabola = 6  
A = 0.00000 B = 0.07365 C = -4.50156  
Origen = 34.60 Final = 36.00

(origen en inicio vano)

DEFINICION DEL TRAZADO DEL NERVIO= 1

| I   | S       | Ysup   | Yinf  | EXC    | ALPHA_IZ | ALPHA_DE | CURV   |
|-----|---------|--------|-------|--------|----------|----------|--------|
| 146 | 315.000 | -1.548 | 1.457 | -0.396 | 0.0000   | 0.2511   | 0.0165 |
| 147 | 316.800 | -1.840 | 1.165 | -0.688 | 0.0296   | 0.2215   | 0.0165 |
| 148 | 318.600 | -2.079 | 0.926 | -0.927 | 0.0593   | 0.1918   | 0.0165 |
| 149 | 320.400 | -2.264 | 0.741 | -1.112 | 0.0889   | 0.1622   | 0.0165 |
| 150 | 322.200 | -2.396 | 0.609 | -1.244 | 0.1185   | 0.1326   | 0.0165 |
| 151 | 324.000 | -2.475 | 0.530 | -1.322 | 0.1482   | 0.1029   | 0.0165 |
| 152 | 325.800 | -2.500 | 0.505 | -1.348 | 0.1772   | 0.0739   | 0.0050 |
| 153 | 327.600 | -2.492 | 0.513 | -1.339 | 0.1862   | 0.0649   | 0.0050 |
| 154 | 329.400 | -2.467 | 0.538 | -1.315 | 0.1951   | 0.0560   | 0.0050 |
| 155 | 331.200 | -2.426 | 0.579 | -1.274 | 0.2040   | 0.0471   | 0.0050 |
| 156 | 333.000 | -2.370 | 0.635 | -1.217 | 0.2130   | 0.0381   | 0.0050 |
| 157 | 334.800 | -2.297 | 0.708 | -1.144 | 0.2221   | 0.0290   | 0.0050 |
| 158 | 336.600 | -2.208 | 0.797 | -1.056 | 0.2307   | 0.0204   | 0.0050 |
| 159 | 338.400 | -2.103 | 0.902 | -0.951 | 0.2398   | 0.0113   | 0.0050 |
| 160 | 340.200 | -1.982 | 1.023 | -0.830 | 0.2486   | 0.0025   | 0.0050 |
| 161 | 342.000 | -1.850 | 1.155 | -0.698 | 0.2511   | 0.0000   | 0.0000 |

SECCIONES INICIAL Y FINAL DEL TRAZADO = 146 161

NUMERO DE VANOS INICIAL Y FINAL DEL TRAZADO = 8 8

PENDIENTE INICIAL DEL TRAZADO = -0.17707

PENDIENTE FINAL DEL TRAZADO = 0.07365

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 470.40  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 19.78

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To    | P_ROZ | P_CUNA | P_ELAS | Ti    |
|-----|--------|-------|-------|--------|--------|-------|
| 146 | 315.00 | 93.60 | 0.00  | 20.14  | 1.20   | 72.26 |
| 147 | 316.80 | 93.60 | 7.05  | 0.00   | 1.96   | 84.60 |
| 148 | 318.60 | 93.60 | 6.31  | 0.00   | 2.44   | 84.86 |
| 149 | 320.40 | 93.60 | 5.56  | 0.00   | 2.91   | 85.12 |
| 150 | 322.20 | 93.60 | 4.81  | 0.00   | 3.32   | 85.47 |
| 151 | 324.00 | 93.60 | 4.05  | 1.50   | 3.53   | 84.51 |
| 152 | 325.80 | 93.60 | 3.30  | 3.00   | 3.59   | 83.71 |
| 153 | 327.60 | 93.60 | 2.93  | 3.75   | 3.54   | 83.38 |
| 154 | 329.40 | 93.60 | 2.55  | 4.50   | 3.45   | 83.09 |
| 155 | 331.20 | 93.60 | 2.17  | 5.26   | 3.31   | 82.86 |
| 156 | 333.00 | 93.60 | 1.79  | 6.02   | 3.13   | 82.66 |
| 157 | 334.80 | 93.60 | 1.41  | 6.79   | 2.91   | 82.49 |
| 158 | 336.60 | 93.60 | 1.03  | 7.54   | 2.67   | 82.35 |
| 159 | 338.40 | 93.60 | 0.64  | 8.32   | 2.41   | 82.22 |
| 160 | 340.20 | 93.60 | 0.26  | 9.09   | 2.15   | 82.10 |
| 161 | 342.00 | 93.60 | 0.00  | 9.61   | 1.91   | 82.08 |

ALARGAMIENTO DE LOS CABLES (sobre embolo) = 127.5 mm

## ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti    | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|-------|---------|--------|----------|
| 146 | 315.00 | 72.26 | 0.00    | 0.00   | 0.00     |
| 147 | 316.80 | 84.60 | 0.00    | 0.00   | 0.00     |
| 148 | 318.60 | 84.86 | 0.00    | 0.00   | 0.00     |
| 149 | 320.40 | 85.12 | 0.00    | 0.00   | 0.00     |
| 150 | 322.20 | 85.47 | 0.00    | 0.00   | 0.00     |
| 151 | 324.00 | 84.51 | 0.00    | 0.00   | 0.00     |
| 152 | 325.80 | 83.71 | 0.00    | 0.00   | 0.00     |
| 153 | 327.60 | 83.38 | 0.00    | 0.00   | 0.00     |
| 154 | 329.40 | 83.09 | 0.00    | 0.00   | 0.00     |
| 155 | 331.20 | 82.86 | 0.00    | 0.00   | 0.00     |
| 156 | 333.00 | 82.66 | 0.00    | 0.00   | 0.00     |
| 157 | 334.80 | 82.49 | 0.00    | 0.00   | 0.00     |
| 158 | 336.60 | 82.35 | 0.00    | 0.00   | 0.00     |
| 159 | 338.40 | 82.22 | 0.00    | 0.00   | 0.00     |
| 160 | 340.20 | 82.10 | 0.00    | 0.00   | 0.00     |
| 161 | 342.00 | 82.08 | 0.00    | 0.00   | 0.00     |



ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To    | APi   | Ti    | APf  | Tf    |
|-----|--------|-------|-------|-------|------|-------|
| 146 | 315.00 | 93.60 | 21.34 | 72.26 | 0.00 | 72.26 |
| 147 | 316.80 | 93.60 | 9.00  | 84.60 | 0.00 | 84.60 |
| 148 | 318.60 | 93.60 | 8.74  | 84.86 | 0.00 | 84.86 |
| 149 | 320.40 | 93.60 | 8.48  | 85.12 | 0.00 | 85.12 |
| 150 | 322.20 | 93.60 | 8.13  | 85.47 | 0.00 | 85.47 |
| 151 | 324.00 | 93.60 | 9.09  | 84.51 | 0.00 | 84.51 |
| 152 | 325.80 | 93.60 | 9.89  | 83.71 | 0.00 | 83.71 |
| 153 | 327.60 | 93.60 | 10.22 | 83.38 | 0.00 | 83.38 |
| 154 | 329.40 | 93.60 | 10.51 | 83.09 | 0.00 | 83.09 |
| 155 | 331.20 | 93.60 | 10.74 | 82.86 | 0.00 | 82.86 |
| 156 | 333.00 | 93.60 | 10.94 | 82.66 | 0.00 | 82.66 |
| 157 | 334.80 | 93.60 | 11.11 | 82.49 | 0.00 | 82.49 |
| 158 | 336.60 | 93.60 | 11.25 | 82.35 | 0.00 | 82.35 |
| 159 | 338.40 | 93.60 | 11.38 | 82.22 | 0.00 | 82.22 |
| 160 | 340.20 | 93.60 | 11.50 | 82.10 | 0.00 | 82.10 |
| 161 | 342.00 | 93.60 | 11.52 | 82.08 | 0.00 | 82.08 |

ETAPA DE TESADO INICIAL

PRETENSADO EN EL NERVIO = 1

FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 146 | 315.00 | 3399.10 | 1345.6   | 55.99     | 3399.10 | 1345.6   | 55.99     |
| 147 | 316.80 | 3979.44 | 2737.5   | 65.55     | 3979.44 | 2737.5   | 65.55     |
| 148 | 318.60 | 3991.64 | 3698.6   | 65.75     | 3991.64 | 3698.6   | 65.75     |
| 149 | 320.40 | 4004.20 | 4452.2   | 65.95     | 4004.20 | 4452.2   | 65.95     |
| 150 | 322.20 | 4020.46 | 5000.7   | 66.22     | 4020.46 | 5000.7   | 66.22     |
| 151 | 324.00 | 3975.44 | 5257.0   | 65.48     | 3975.44 | 5257.0   | 65.48     |
| 152 | 325.80 | 3937.70 | 5306.4   | 19.53     | 3937.70 | 5306.4   | 19.53     |
| 153 | 327.60 | 3922.08 | 5252.1   | 19.45     | 3922.08 | 5252.1   | 19.45     |
| 154 | 329.40 | 3908.75 | 5138.3   | 19.39     | 3908.75 | 5138.3   | 19.39     |
| 155 | 331.20 | 3897.52 | 4965.2   | 19.33     | 3897.52 | 4965.2   | 19.33     |
| 156 | 333.00 | 3888.12 | 4732.8   | 19.28     | 3888.12 | 4732.8   | 19.28     |
| 157 | 334.80 | 3880.20 | 4440.8   | 19.25     | 3880.20 | 4440.8   | 19.25     |
| 158 | 336.60 | 3873.83 | 4089.4   | 19.21     | 3873.83 | 4089.4   | 19.21     |
| 159 | 338.40 | 3867.72 | 3677.2   | 19.18     | 3867.72 | 3677.2   | 19.18     |
| 160 | 340.20 | 3861.95 | 3204.6   | 19.15     | 3861.95 | 3204.6   | 19.15     |
| 161 | 342.00 | 3860.94 | 2693.4   | 0.00      | 3860.94 | 2693.4   | 0.00      |

ETAPA DE TESADO INICIAL

FUERZAS HORIZONTALES DE DESVIACION

| I   | S(m)   | R(m)   | Ti (T)  | Uh(T/m) | Tf(T)   | Uh(T/m) |
|-----|--------|--------|---------|---------|---------|---------|
| 146 | 315.00 | 7250.0 | 3399.10 | -0.51   | 3399.10 | -0.51   |
| 147 | 316.80 | 7250.0 | 3979.44 | -0.55   | 3979.44 | -0.55   |
| 148 | 318.60 | 7250.0 | 3991.64 | -0.55   | 3991.64 | -0.55   |
| 149 | 320.40 | 7250.0 | 4004.20 | -0.55   | 4004.20 | -0.55   |
| 150 | 322.20 | 7250.0 | 4020.46 | -0.55   | 4020.46 | -0.55   |
| 151 | 324.00 | 7250.0 | 3975.44 | -0.55   | 3975.44 | -0.55   |
| 152 | 325.80 | 7250.0 | 3937.70 | -0.54   | 3937.70 | -0.54   |
| 153 | 327.60 | 7250.0 | 3922.08 | -0.54   | 3922.08 | -0.54   |
| 154 | 329.40 | 7250.0 | 3908.75 | -0.54   | 3908.75 | -0.54   |
| 155 | 331.20 | 7250.0 | 3897.52 | -0.54   | 3897.52 | -0.54   |
| 156 | 333.00 | 7250.0 | 3888.12 | -0.54   | 3888.12 | -0.54   |
| 157 | 334.80 | 7250.0 | 3880.20 | -0.53   | 3880.20 | -0.53   |
| 158 | 336.60 | 7250.0 | 3873.83 | -0.53   | 3873.83 | -0.53   |
| 159 | 338.40 | 7250.0 | 3867.72 | -0.53   | 3867.72 | -0.53   |
| 160 | 340.20 | 7250.0 | 3861.95 | -0.53   | 3861.95 | -0.53   |
| 161 | 342.00 | 7250.0 | 3860.94 | -0.27   | 3860.94 | -0.27   |

TESADO DEFINITIVO

PRETENSADO EN EL NERVIO = 1

NUMERO DE CABLES = 12

TENSION EN ANCLAJE IZQUIERDO (Kp/mm2) = 144.00  
 TESAMOS POR LA IZQUIERDA (SI=1) = 0  
 TENSION EN ANCLAJE DERECHO (Kp/mm2) = 144.00  
 TESAMOS POR LA DERECHA (SI=1) = 1

PROPORCION DE TESADO EN LA PRIMERA FASE 0.65  
 AREA DE PRETENSADO (cm2) = 470.40  
 PENETRACION DE CUNA EN EXTREMO 1 (mm) = 5.000  
 PENETRACION DE CUNA EN EXTREMO 2 (mm) = 5.000

LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-1 (m) = 0.00  
 LONGITUD AFECT. POR PENETRAC. DE CUNA EXTR-2 (m) = 17.00

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 146 | 315.00 | 144.00 | 0.00  | 20.14  | 2.04   | 121.82 |
| 147 | 316.80 | 144.00 | 10.84 | 0.00   | 3.01   | 130.15 |
| 148 | 318.60 | 144.00 | 9.70  | 0.00   | 3.75   | 130.55 |
| 149 | 320.40 | 144.00 | 8.56  | 0.00   | 4.48   | 130.96 |
| 150 | 322.20 | 144.00 | 7.40  | 0.00   | 5.10   | 131.49 |
| 151 | 324.00 | 144.00 | 6.24  | 0.00   | 5.47   | 132.29 |
| 152 | 325.80 | 144.00 | 5.08  | 1.03   | 5.66   | 132.22 |
| 153 | 327.60 | 144.00 | 4.50  | 2.19   | 5.60   | 131.71 |
| 154 | 329.40 | 144.00 | 3.93  | 3.34   | 5.45   | 131.28 |
| 155 | 331.20 | 144.00 | 3.34  | 4.51   | 5.23   | 130.92 |
| 156 | 333.00 | 144.00 | 2.76  | 5.68   | 4.94   | 130.62 |
| 157 | 334.80 | 144.00 | 2.17  | 6.86   | 4.60   | 130.37 |
| 158 | 336.60 | 144.00 | 1.59  | 8.02   | 4.22   | 130.17 |
| 159 | 338.40 | 144.00 | 0.99  | 9.21   | 3.82   | 129.98 |
| 160 | 340.20 | 144.00 | 0.40  | 10.39  | 3.41   | 129.80 |
| 161 | 342.00 | 144.00 | 0.00  | 11.20  | 3.03   | 129.78 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 191.0 mm



PROGRAMA DE CALCULO DE PRETENSADO EN NERVIOS DE UN EMPARRILLADO

DATOS GENERALES DE PRETENSADO

-----

NUMERO DE NERVIOS = 1  
 NUMERO DE VANOS = 8  
 NUMERO DE SECCIONES POR VANO = 21  
 NUMERO DE MATERIALES = 3

|                  |         |       |
|------------------|---------|-------|
| LUZ DEL VANO = 1 | L (m) = | 36.00 |
| LUZ DEL VANO = 2 | L (m) = | 45.00 |
| LUZ DEL VANO = 3 | L (m) = | 45.00 |
| LUZ DEL VANO = 4 | L (m) = | 45.00 |
| LUZ DEL VANO = 5 | L (m) = | 45.00 |
| LUZ DEL VANO = 6 | L (m) = | 45.00 |
| LUZ DEL VANO = 7 | L (m) = | 45.00 |
| LUZ DEL VANO = 8 | L (m) = | 36.00 |

COEFICIENTE DE ROZAMIENTO EN CURVA = 0.21  
 COEFICIENTE DE DESV. PARASITAS = 0.0060  
 RELAJACION = 0.04  
 RETRACCION mm/m = 0.240  
 COEF. FLUENCIA = 2.050

ACERO DE PRETENSADO (Kp/mm2)

-----

LIMITE DE PROPORCIONALIDAD AL 0,2% = 170.00  
 TENSION DE ROTURA = 190.00  
 MODULO DE DEFORMACION = 19000.00

HORMIGON

-----

MODULO DE DEFORMACION DURANTE TESADO (Kp/cm2) = 263000.00  
 MODULO DE DEFORMACION A 28 DIAS (Kp/cm2) = 329000.00

CARACTERISTICAS MECANICAS DE LA SECCION

1

-----

AREA DE LA SECCION (m2) = 9.674  
 INERCIA DE LA SECCION (m2) = 11.3278  
 V\_SUP. DE LA SECCION (m2) = 1.15  
 V\_INF. DE LA SECCION (m2) = 1.85  
 CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

2

-----

AREA DE LA SECCION (m2) = 10.975  
 INERCIA DE LA SECCION (m2) = 13.5715  
 V\_SUP. DE LA SECCION (m2) = 1.32  
 V\_INF. DE LA SECCION (m2) = 1.69  
 CANTO DE LA SECCION (m2) = 3.01

CARACTERISTICAS MECANICAS DE LA SECCION

3

-----

AREA DE LA SECCION (m2) = 1.000  
 INERCIA DE LA SECCION (m2) = 2.0000  
 V\_SUP. DE LA SECCION (m2) = 1.50  
 V\_INF. DE LA SECCION (m2) = 1.50  
 CANTO DE LA SECCION (m2) = 3.00

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I  | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|----|--------|--------|-------|--------|--------|--------|
| 1  | 0.00   | 144.00 | 27.86 | 0.00   | 2.65   | 113.50 |
| 2  | 1.80   | 144.00 | 27.54 | 0.00   | 2.98   | 113.48 |
| 3  | 3.60   | 144.00 | 27.06 | 0.00   | 3.34   | 113.61 |
| 4  | 5.40   | 144.00 | 26.57 | 0.00   | 3.69   | 113.74 |
| 5  | 7.20   | 144.00 | 26.08 | 0.00   | 4.02   | 113.90 |
| 6  | 9.00   | 144.00 | 25.59 | 0.00   | 4.32   | 114.09 |
| 7  | 10.80  | 144.00 | 25.10 | 0.00   | 4.57   | 114.33 |
| 8  | 12.60  | 144.00 | 24.61 | 0.00   | 4.76   | 114.63 |
| 9  | 14.40  | 144.00 | 24.11 | 0.00   | 4.89   | 115.00 |
| 10 | 16.20  | 144.00 | 23.61 | 0.00   | 4.94   | 115.44 |
| 11 | 18.00  | 144.00 | 22.76 | 0.00   | 4.89   | 116.35 |
| 12 | 19.80  | 144.00 | 21.89 | 0.00   | 4.66   | 117.45 |
| 13 | 21.60  | 144.00 | 21.01 | 0.00   | 4.27   | 118.72 |
| 14 | 23.40  | 144.00 | 20.13 | 0.00   | 3.76   | 120.11 |
| 15 | 25.20  | 144.00 | 19.24 | 0.00   | 3.19   | 121.57 |
| 16 | 27.00  | 144.00 | 18.34 | 0.00   | 2.65   | 123.01 |
| 17 | 28.80  | 144.00 | 17.44 | 0.00   | 2.23   | 124.33 |
| 18 | 30.60  | 144.00 | 16.53 | 0.00   | 1.92   | 125.54 |
| 19 | 32.40  | 144.00 | 15.21 | 0.00   | 2.19   | 126.60 |
| 20 | 34.20  | 144.00 | 12.41 | 0.00   | 2.71   | 128.88 |
| 21 | 36.00  | 144.00 | 9.55  | 0.00   | 2.91   | 131.55 |
| 22 | 38.25  | 144.00 | 6.17  | 5.33   | 2.83   | 129.67 |
| 23 | 40.50  | 144.00 | 3.24  | 11.18  | 2.16   | 127.42 |
| 24 | 42.75  | 144.00 | 2.17  | 13.33  | 2.13   | 126.38 |
| 25 | 45.00  | 144.00 | 1.09  | 15.49  | 2.52   | 124.91 |
| 26 | 47.25  | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 27 | 49.50  | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 28 | 51.75  | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 29 | 54.00  | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 30 | 56.25  | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 31 | 58.50  | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 32 | 60.75  | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 33 | 63.00  | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 34 | 65.25  | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 35 | 67.50  | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 36 | 69.75  | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 37 | 72.00  | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 38 | 74.25  | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 39 | 76.50  | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 40 | 78.75  | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 41 | 81.00  | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 42 | 83.25  | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 43 | 85.50  | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 44 | 87.75  | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 45 | 90.00  | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 46 | 92.25  | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 47 | 94.50  | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 48 | 96.75  | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 49 | 99.00  | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 50 | 101.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |

## TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 51  | 103.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 52  | 105.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 53  | 108.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 54  | 110.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 55  | 112.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 56  | 114.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 57  | 117.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 58  | 119.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 59  | 121.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 60  | 123.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 61  | 126.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 62  | 128.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 63  | 130.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 64  | 132.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 65  | 135.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 66  | 137.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 67  | 139.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 68  | 141.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 69  | 144.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 70  | 146.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 71  | 148.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 72  | 150.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 73  | 153.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 74  | 155.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 75  | 157.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 76  | 159.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 77  | 162.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 78  | 164.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 79  | 166.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 80  | 168.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 81  | 171.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 82  | 173.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 83  | 175.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 84  | 177.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 85  | 180.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 86  | 182.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 87  | 184.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 88  | 186.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 89  | 189.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 90  | 191.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 91  | 193.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 92  | 195.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 93  | 198.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 94  | 200.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 95  | 202.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 96  | 204.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 97  | 207.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 98  | 209.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 99  | 211.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 100 | 213.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 101 | 216.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 102 | 218.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 103 | 220.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 104 | 222.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 105 | 225.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 106 | 227.25 | 144.00 | 27.65 | 0.00   | 3.20   | 113.16 |
| 107 | 229.50 | 144.00 | 26.76 | 0.00   | 3.96   | 113.28 |
| 108 | 231.75 | 144.00 | 25.87 | 0.00   | 4.71   | 113.42 |
| 109 | 234.00 | 144.00 | 24.96 | 0.00   | 5.33   | 113.71 |
| 110 | 236.25 | 144.00 | 24.06 | 0.00   | 5.75   | 114.19 |
| 111 | 238.50 | 144.00 | 23.14 | 0.00   | 5.93   | 114.93 |
| 112 | 240.75 | 144.00 | 22.22 | 0.00   | 5.84   | 115.94 |
| 113 | 243.00 | 144.00 | 21.29 | 0.00   | 5.49   | 117.21 |
| 114 | 245.25 | 144.00 | 20.36 | 0.00   | 4.93   | 118.71 |
| 115 | 247.50 | 144.00 | 19.42 | 0.00   | 4.21   | 120.37 |
| 116 | 249.75 | 144.00 | 18.47 | 0.00   | 3.45   | 122.09 |
| 117 | 252.00 | 144.00 | 17.51 | 0.00   | 2.77   | 123.73 |
| 118 | 254.25 | 144.00 | 16.54 | 0.00   | 2.19   | 125.27 |
| 119 | 256.50 | 144.00 | 15.58 | 0.00   | 2.23   | 126.19 |
| 120 | 258.75 | 144.00 | 12.84 | 0.00   | 2.90   | 128.26 |
| 121 | 261.00 | 144.00 | 9.55  | 0.00   | 3.22   | 131.23 |
| 122 | 263.25 | 144.00 | 6.17  | 5.33   | 3.14   | 129.37 |
| 123 | 265.50 | 144.00 | 3.24  | 11.18  | 2.39   | 127.19 |
| 124 | 267.75 | 144.00 | 2.17  | 13.33  | 2.36   | 126.15 |
| 125 | 270.00 | 144.00 | 1.09  | 15.49  | 2.79   | 124.64 |
| 126 | 272.25 | 144.00 | 27.54 | 0.00   | 3.20   | 113.27 |
| 127 | 274.50 | 144.00 | 26.65 | 0.00   | 3.97   | 113.38 |
| 128 | 276.75 | 144.00 | 25.75 | 0.00   | 4.71   | 113.53 |
| 129 | 279.00 | 144.00 | 24.85 | 0.00   | 5.34   | 113.81 |
| 130 | 281.25 | 144.00 | 23.94 | 0.00   | 5.76   | 114.30 |
| 131 | 283.50 | 144.00 | 23.03 | 0.00   | 5.94   | 115.04 |
| 132 | 285.75 | 144.00 | 22.11 | 0.00   | 5.85   | 116.05 |
| 133 | 288.00 | 144.00 | 21.18 | 0.00   | 5.50   | 117.32 |
| 134 | 290.25 | 144.00 | 20.24 | 0.00   | 4.93   | 118.83 |
| 135 | 292.50 | 144.00 | 19.30 | 0.00   | 4.22   | 120.48 |
| 136 | 294.75 | 144.00 | 18.35 | 0.00   | 3.45   | 122.20 |
| 137 | 297.00 | 144.00 | 17.39 | 0.00   | 2.77   | 123.84 |
| 138 | 299.25 | 144.00 | 16.42 | 0.00   | 2.19   | 125.39 |
| 139 | 301.50 | 144.00 | 15.45 | 0.00   | 2.24   | 126.31 |
| 140 | 303.75 | 144.00 | 12.72 | 0.00   | 2.90   | 128.38 |
| 141 | 306.00 | 144.00 | 9.42  | 1.30   | 3.26   | 130.03 |
| 142 | 307.80 | 144.00 | 6.50  | 7.15   | 3.18   | 127.17 |
| 143 | 309.60 | 144.00 | 3.51  | 13.13  | 2.48   | 124.88 |
| 144 | 311.40 | 144.00 | 2.05  | 16.05  | 2.24   | 123.66 |
| 145 | 313.20 | 144.00 | 1.03  | 18.09  | 2.43   | 122.45 |
| 146 | 315.00 | 144.00 | 0.00  | 20.14  | 2.04   | 121.82 |
| 147 | 316.80 | 144.00 | 10.84 | 0.00   | 3.01   | 130.15 |
| 148 | 318.60 | 144.00 | 9.70  | 0.00   | 3.75   | 130.55 |
| 149 | 320.40 | 144.00 | 8.56  | 0.00   | 4.48   | 130.96 |
| 150 | 322.20 | 144.00 | 7.40  | 0.00   | 5.10   | 131.49 |

TENSION EN LOS CABLES. PERDIDAS INSTANT. (Kp/mm2)

| I   | X      | To     | P_ROZ | P_CUNA | P_ELAS | Ti     |
|-----|--------|--------|-------|--------|--------|--------|
| 151 | 324.00 | 144.00 | 6.24  | 0.00   | 5.47   | 132.29 |
| 152 | 325.80 | 144.00 | 5.08  | 1.03   | 5.66   | 132.22 |
| 153 | 327.60 | 144.00 | 4.50  | 2.19   | 5.60   | 131.71 |
| 154 | 329.40 | 144.00 | 3.93  | 3.34   | 5.45   | 131.28 |
| 155 | 331.20 | 144.00 | 3.34  | 4.51   | 5.23   | 130.92 |
| 156 | 333.00 | 144.00 | 2.76  | 5.68   | 4.94   | 130.62 |
| 157 | 334.80 | 144.00 | 2.17  | 6.86   | 4.60   | 130.37 |
| 158 | 336.60 | 144.00 | 1.59  | 8.02   | 4.22   | 130.17 |
| 159 | 338.40 | 144.00 | 0.99  | 9.21   | 3.82   | 129.98 |
| 160 | 340.20 | 144.00 | 0.40  | 10.39  | 3.41   | 129.80 |
| 161 | 342.00 | 144.00 | 0.00  | 11.20  | 3.03   | 129.78 |

ALARGAMIENTO DE LOS CABLES (sobre embolo)= 191.0 mm

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I  | S      | Ti     | P_RETRA | P_FLUE | P_RELAJ. |
|----|--------|--------|---------|--------|----------|
| 1  | 0.00   | 113.50 | 4.13    | 10.81  | 3.29     |
| 2  | 1.80   | 113.48 | 4.08    | 8.44   | 3.25     |
| 3  | 3.60   | 113.61 | 4.03    | 8.46   | 3.21     |
| 4  | 5.40   | 113.74 | 3.98    | 8.42   | 3.18     |
| 5  | 7.20   | 113.90 | 3.94    | 8.36   | 3.15     |
| 6  | 9.00   | 114.09 | 3.90    | 8.30   | 3.13     |
| 7  | 10.80  | 114.33 | 3.87    | 8.27   | 3.11     |
| 8  | 12.60  | 114.63 | 3.85    | 8.27   | 3.10     |
| 9  | 14.40  | 115.00 | 3.84    | 8.31   | 3.10     |
| 10 | 16.20  | 115.44 | 3.83    | 8.41   | 3.11     |
| 11 | 18.00  | 116.35 | 3.85    | 8.51   | 3.14     |
| 12 | 19.80  | 117.45 | 3.88    | 8.48   | 3.20     |
| 13 | 21.60  | 118.72 | 3.93    | 8.30   | 3.28     |
| 14 | 23.40  | 120.11 | 4.00    | 7.99   | 3.37     |
| 15 | 25.20  | 121.57 | 4.08    | 7.59   | 3.48     |
| 16 | 27.00  | 123.01 | 4.16    | 7.15   | 3.59     |
| 17 | 28.80  | 124.33 | 4.22    | 6.81   | 3.68     |
| 18 | 30.60  | 125.54 | 4.26    | 6.33   | 3.76     |
| 19 | 32.40  | 126.60 | 4.23    | 6.80   | 3.76     |
| 20 | 34.20  | 128.88 | 4.17    | 7.36   | 3.77     |
| 21 | 36.00  | 131.55 | 4.14    | 6.96   | 3.82     |
| 22 | 38.25  | 129.67 | 4.15    | 8.05   | 3.78     |
| 23 | 40.50  | 127.42 | 4.24    | 7.09   | 3.79     |
| 24 | 42.75  | 126.38 | 4.24    | 6.62   | 3.76     |
| 25 | 45.00  | 124.91 | 4.18    | 6.49   | 3.66     |
| 26 | 47.25  | 113.16 | 4.05    | 6.63   | 3.21     |
| 27 | 49.50  | 113.28 | 3.95    | 7.01   | 3.14     |
| 28 | 51.75  | 113.42 | 3.85    | 7.40   | 3.07     |
| 29 | 54.00  | 113.71 | 3.78    | 7.76   | 3.02     |
| 30 | 56.25  | 114.19 | 3.74    | 8.07   | 2.99     |
| 31 | 58.50  | 114.93 | 3.72    | 8.30   | 3.00     |
| 32 | 60.75  | 115.94 | 3.74    | 8.44   | 3.04     |
| 33 | 63.00  | 117.21 | 3.78    | 8.47   | 3.11     |
| 34 | 65.25  | 118.71 | 3.85    | 8.37   | 3.21     |
| 35 | 67.50  | 120.37 | 3.95    | 8.14   | 3.33     |
| 36 | 69.75  | 122.09 | 4.05    | 7.82   | 3.47     |
| 37 | 72.00  | 123.73 | 4.14    | 7.50   | 3.60     |
| 38 | 74.25  | 125.27 | 4.23    | 6.93   | 3.71     |
| 39 | 76.50  | 126.19 | 4.22    | 7.15   | 3.74     |
| 40 | 78.75  | 128.26 | 4.14    | 7.97   | 3.72     |
| 41 | 81.00  | 131.23 | 4.10    | 7.55   | 3.77     |
| 42 | 83.25  | 129.37 | 4.11    | 8.57   | 3.73     |
| 43 | 85.50  | 127.19 | 4.20    | 7.67   | 3.75     |
| 44 | 87.75  | 126.15 | 4.20    | 7.39   | 3.72     |
| 45 | 90.00  | 124.64 | 4.14    | 7.50   | 3.62     |
| 46 | 92.25  | 113.16 | 4.05    | 7.11   | 3.21     |
| 47 | 94.50  | 113.28 | 3.95    | 7.36   | 3.14     |
| 48 | 96.75  | 113.42 | 3.85    | 7.76   | 3.07     |
| 49 | 99.00  | 113.71 | 3.78    | 8.11   | 3.02     |
| 50 | 101.25 | 114.19 | 3.74    | 8.39   | 2.99     |

TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti     | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|--------|---------|--------|----------|
| 51  | 103.50 | 114.93 | 3.72    | 8.58   | 3.00     |
| 52  | 105.75 | 115.94 | 3.74    | 8.67   | 3.04     |
| 53  | 108.00 | 117.21 | 3.78    | 8.64   | 3.11     |
| 54  | 110.25 | 118.71 | 3.85    | 8.48   | 3.21     |
| 55  | 112.50 | 120.37 | 3.95    | 8.21   | 3.33     |
| 56  | 114.75 | 122.09 | 4.05    | 7.85   | 3.47     |
| 57  | 117.00 | 123.73 | 4.14    | 7.50   | 3.60     |
| 58  | 119.25 | 125.27 | 4.23    | 6.92   | 3.71     |
| 59  | 121.50 | 126.19 | 4.22    | 7.18   | 3.74     |
| 60  | 123.75 | 128.26 | 4.14    | 8.04   | 3.72     |
| 61  | 126.00 | 131.23 | 4.10    | 7.65   | 3.77     |
| 62  | 128.25 | 129.37 | 4.11    | 8.66   | 3.73     |
| 63  | 130.50 | 127.19 | 4.20    | 7.70   | 3.75     |
| 64  | 132.75 | 126.15 | 4.20    | 7.36   | 3.72     |
| 65  | 135.00 | 124.64 | 4.14    | 7.44   | 3.62     |
| 66  | 137.25 | 113.16 | 4.05    | 7.03   | 3.21     |
| 67  | 139.50 | 113.28 | 3.95    | 7.27   | 3.14     |
| 68  | 141.75 | 113.42 | 3.85    | 7.67   | 3.07     |
| 69  | 144.00 | 113.71 | 3.78    | 8.02   | 3.02     |
| 70  | 146.25 | 114.19 | 3.74    | 8.31   | 2.99     |
| 71  | 148.50 | 114.93 | 3.72    | 8.51   | 3.00     |
| 72  | 150.75 | 115.94 | 3.74    | 8.61   | 3.04     |
| 73  | 153.00 | 117.21 | 3.78    | 8.60   | 3.11     |
| 74  | 155.25 | 118.71 | 3.85    | 8.46   | 3.21     |
| 75  | 157.50 | 120.37 | 3.95    | 8.20   | 3.33     |
| 76  | 159.75 | 122.09 | 4.05    | 7.85   | 3.47     |
| 77  | 162.00 | 123.73 | 4.14    | 7.51   | 3.60     |
| 78  | 164.25 | 125.27 | 4.23    | 6.92   | 3.71     |
| 79  | 166.50 | 126.19 | 4.22    | 7.17   | 3.74     |
| 80  | 168.75 | 128.26 | 4.14    | 8.01   | 3.72     |
| 81  | 171.00 | 131.23 | 4.10    | 7.62   | 3.77     |
| 82  | 173.25 | 129.37 | 4.11    | 8.63   | 3.73     |
| 83  | 175.50 | 127.19 | 4.20    | 7.69   | 3.75     |
| 84  | 177.75 | 126.15 | 4.20    | 7.37   | 3.72     |
| 85  | 180.00 | 124.64 | 4.14    | 7.45   | 3.62     |
| 86  | 182.25 | 113.16 | 4.05    | 7.05   | 3.21     |
| 87  | 184.50 | 113.28 | 3.95    | 7.29   | 3.14     |
| 88  | 186.75 | 113.42 | 3.85    | 7.68   | 3.07     |
| 89  | 189.00 | 113.71 | 3.78    | 8.03   | 3.02     |
| 90  | 191.25 | 114.19 | 3.74    | 8.31   | 2.99     |
| 91  | 193.50 | 114.93 | 3.72    | 8.51   | 3.00     |
| 92  | 195.75 | 115.94 | 3.74    | 8.61   | 3.04     |
| 93  | 198.00 | 117.21 | 3.78    | 8.59   | 3.11     |
| 94  | 200.25 | 118.71 | 3.85    | 8.44   | 3.21     |
| 95  | 202.50 | 120.37 | 3.95    | 8.17   | 3.33     |
| 96  | 204.75 | 122.09 | 4.05    | 7.82   | 3.47     |
| 97  | 207.00 | 123.73 | 4.14    | 7.49   | 3.60     |
| 98  | 209.25 | 125.27 | 4.23    | 6.92   | 3.71     |
| 99  | 211.50 | 126.19 | 4.22    | 7.18   | 3.74     |
| 100 | 213.75 | 128.26 | 4.14    | 8.04   | 3.72     |

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti     | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|--------|---------|--------|----------|
| 101 | 216.00 | 131.23 | 4.10    | 7.65   | 3.77     |
| 102 | 218.25 | 129.37 | 4.11    | 8.66   | 3.73     |
| 103 | 220.50 | 127.19 | 4.20    | 7.69   | 3.75     |
| 104 | 222.75 | 126.15 | 4.20    | 7.37   | 3.72     |
| 105 | 225.00 | 124.64 | 4.14    | 7.45   | 3.62     |
| 106 | 227.25 | 113.16 | 4.05    | 7.05   | 3.21     |
| 107 | 229.50 | 113.28 | 3.95    | 7.30   | 3.14     |
| 108 | 231.75 | 113.42 | 3.85    | 7.71   | 3.07     |
| 109 | 234.00 | 113.71 | 3.78    | 8.07   | 3.02     |
| 110 | 236.25 | 114.19 | 3.74    | 8.37   | 2.99     |
| 111 | 238.50 | 114.93 | 3.72    | 8.58   | 3.00     |
| 112 | 240.75 | 115.94 | 3.74    | 8.69   | 3.04     |
| 113 | 243.00 | 117.21 | 3.78    | 8.68   | 3.11     |
| 114 | 245.25 | 118.71 | 3.85    | 8.54   | 3.21     |
| 115 | 247.50 | 120.37 | 3.95    | 8.27   | 3.33     |
| 116 | 249.75 | 122.09 | 4.05    | 7.91   | 3.47     |
| 117 | 252.00 | 123.73 | 4.14    | 7.55   | 3.60     |
| 118 | 254.25 | 125.27 | 4.23    | 6.94   | 3.71     |
| 119 | 256.50 | 126.19 | 4.22    | 7.14   | 3.74     |
| 120 | 258.75 | 128.26 | 4.14    | 7.96   | 3.72     |
| 121 | 261.00 | 131.23 | 4.10    | 7.54   | 3.77     |
| 122 | 263.25 | 129.37 | 4.11    | 8.58   | 3.73     |
| 123 | 265.50 | 127.19 | 4.20    | 7.68   | 3.75     |
| 124 | 267.75 | 126.15 | 4.20    | 7.38   | 3.72     |
| 125 | 270.00 | 124.64 | 4.14    | 7.45   | 3.62     |
| 126 | 272.25 | 113.27 | 4.05    | 7.04   | 3.22     |
| 127 | 274.50 | 113.38 | 3.95    | 7.25   | 3.14     |
| 128 | 276.75 | 113.53 | 3.85    | 7.61   | 3.07     |
| 129 | 279.00 | 113.81 | 3.78    | 7.92   | 3.02     |
| 130 | 281.25 | 114.30 | 3.74    | 8.17   | 3.00     |
| 131 | 283.50 | 115.04 | 3.72    | 8.33   | 3.00     |
| 132 | 285.75 | 116.05 | 3.74    | 8.39   | 3.04     |
| 133 | 288.00 | 117.32 | 3.78    | 8.35   | 3.11     |
| 134 | 290.25 | 118.83 | 3.85    | 8.19   | 3.21     |
| 135 | 292.50 | 120.48 | 3.95    | 7.93   | 3.34     |
| 136 | 294.75 | 122.20 | 4.05    | 7.61   | 3.47     |
| 137 | 297.00 | 123.84 | 4.14    | 7.34   | 3.60     |
| 138 | 299.25 | 125.39 | 4.23    | 6.87   | 3.72     |
| 139 | 301.50 | 126.31 | 4.22    | 7.30   | 3.74     |
| 140 | 303.75 | 128.38 | 4.14    | 8.29   | 3.73     |
| 141 | 306.00 | 130.03 | 4.10    | 7.98   | 3.74     |
| 142 | 307.80 | 127.17 | 4.07    | 8.91   | 3.63     |
| 143 | 309.60 | 124.88 | 4.12    | 8.10   | 3.61     |
| 144 | 311.40 | 123.66 | 4.18    | 7.42   | 3.63     |
| 145 | 313.20 | 122.45 | 4.21    | 7.23   | 3.62     |
| 146 | 315.00 | 121.82 | 4.21    | 6.60   | 3.60     |
| 147 | 316.80 | 130.15 | 4.13    | 7.29   | 3.77     |
| 148 | 318.60 | 130.55 | 4.04    | 8.07   | 3.70     |
| 149 | 320.40 | 130.96 | 3.96    | 8.88   | 3.64     |
| 150 | 322.20 | 131.49 | 3.89    | 9.57   | 3.59     |

## TENSION EN LOS CABLES. PERDIDAS DIFERIDAS (Kp/mm2)

| I   | S      | Ti     | P_RETRA | P_FLUE | P_RELAJ. |
|-----|--------|--------|---------|--------|----------|
| 151 | 324.00 | 132.29 | 3.85    | 10.07  | 3.57     |
| 152 | 325.80 | 132.22 | 3.83    | 10.18  | 3.56     |
| 153 | 327.60 | 131.71 | 3.84    | 10.10  | 3.55     |
| 154 | 329.40 | 131.28 | 3.85    | 10.04  | 3.55     |
| 155 | 331.20 | 130.92 | 3.87    | 10.01  | 3.56     |
| 156 | 333.00 | 130.62 | 3.90    | 9.99   | 3.58     |
| 157 | 334.80 | 130.37 | 3.94    | 9.98   | 3.61     |
| 158 | 336.60 | 130.17 | 3.98    | 9.95   | 3.64     |
| 159 | 338.40 | 129.98 | 4.03    | 9.88   | 3.68     |
| 160 | 340.20 | 129.80 | 4.08    | 9.75   | 3.72     |
| 161 | 342.00 | 129.78 | 4.13    | 9.37   | 3.76     |

PRETENSADO EN EL NERVIO = 1

TENSION EN LOS CABLES (Kp/mm2)

| I  | S      | To     | APi   | Ti     | APf   | Tf     |
|----|--------|--------|-------|--------|-------|--------|
| 1  | 0.00   | 144.00 | 30.50 | 113.50 | 18.23 | 95.27  |
| 2  | 1.80   | 144.00 | 30.52 | 113.48 | 15.77 | 97.72  |
| 3  | 3.60   | 144.00 | 30.39 | 113.61 | 15.70 | 97.91  |
| 4  | 5.40   | 144.00 | 30.26 | 113.74 | 15.59 | 98.15  |
| 5  | 7.20   | 144.00 | 30.10 | 113.90 | 15.45 | 98.44  |
| 6  | 9.00   | 144.00 | 29.91 | 114.09 | 15.33 | 98.76  |
| 7  | 10.80  | 144.00 | 29.67 | 114.33 | 15.25 | 99.08  |
| 8  | 12.60  | 144.00 | 29.37 | 114.63 | 15.22 | 99.41  |
| 9  | 14.40  | 144.00 | 29.00 | 115.00 | 15.25 | 99.75  |
| 10 | 16.20  | 144.00 | 28.56 | 115.44 | 15.35 | 100.09 |
| 11 | 18.00  | 144.00 | 27.65 | 116.35 | 15.50 | 100.85 |
| 12 | 19.80  | 144.00 | 26.55 | 117.45 | 15.55 | 101.90 |
| 13 | 21.60  | 144.00 | 25.28 | 118.72 | 15.51 | 103.21 |
| 14 | 23.40  | 144.00 | 23.89 | 120.11 | 15.37 | 104.75 |
| 15 | 25.20  | 144.00 | 22.43 | 121.57 | 15.15 | 106.42 |
| 16 | 27.00  | 144.00 | 20.99 | 123.01 | 14.90 | 108.11 |
| 17 | 28.80  | 144.00 | 19.67 | 124.33 | 14.70 | 109.63 |
| 18 | 30.60  | 144.00 | 18.46 | 125.54 | 14.35 | 111.19 |
| 19 | 32.40  | 144.00 | 17.40 | 126.60 | 14.79 | 111.81 |
| 20 | 34.20  | 144.00 | 15.12 | 128.88 | 15.30 | 113.59 |
| 21 | 36.00  | 144.00 | 12.45 | 131.55 | 14.93 | 116.62 |
| 22 | 38.25  | 144.00 | 14.33 | 129.67 | 15.98 | 113.69 |
| 23 | 40.50  | 144.00 | 16.58 | 127.42 | 15.11 | 112.31 |
| 24 | 42.75  | 144.00 | 17.62 | 126.38 | 14.62 | 111.76 |
| 25 | 45.00  | 144.00 | 19.09 | 124.91 | 14.34 | 110.57 |
| 26 | 47.25  | 144.00 | 30.84 | 113.16 | 13.89 | 99.27  |
| 27 | 49.50  | 144.00 | 30.72 | 113.28 | 14.09 | 99.18  |
| 28 | 51.75  | 144.00 | 30.58 | 113.42 | 14.32 | 99.11  |
| 29 | 54.00  | 144.00 | 30.29 | 113.71 | 14.56 | 99.15  |
| 30 | 56.25  | 144.00 | 29.81 | 114.19 | 14.80 | 99.39  |
| 31 | 58.50  | 144.00 | 29.07 | 114.93 | 15.02 | 99.90  |
| 32 | 60.75  | 144.00 | 28.06 | 115.94 | 15.22 | 100.72 |
| 33 | 63.00  | 144.00 | 26.79 | 117.21 | 15.36 | 101.85 |
| 34 | 65.25  | 144.00 | 25.29 | 118.71 | 15.43 | 103.28 |
| 35 | 67.50  | 144.00 | 23.63 | 120.37 | 15.42 | 104.95 |
| 36 | 69.75  | 144.00 | 21.91 | 122.09 | 15.34 | 106.75 |
| 37 | 72.00  | 144.00 | 20.27 | 123.73 | 15.24 | 108.48 |
| 38 | 74.25  | 144.00 | 18.73 | 125.27 | 14.87 | 110.40 |
| 39 | 76.50  | 144.00 | 17.81 | 126.19 | 15.12 | 111.08 |
| 40 | 78.75  | 144.00 | 15.74 | 128.26 | 15.83 | 112.42 |
| 41 | 81.00  | 144.00 | 12.77 | 131.23 | 15.42 | 115.81 |
| 42 | 83.25  | 144.00 | 14.63 | 129.37 | 16.41 | 112.95 |
| 43 | 85.50  | 144.00 | 16.81 | 127.19 | 15.62 | 111.57 |
| 44 | 87.75  | 144.00 | 17.85 | 126.15 | 15.31 | 110.83 |
| 45 | 90.00  | 144.00 | 19.36 | 124.64 | 15.26 | 109.37 |
| 46 | 92.25  | 144.00 | 30.84 | 113.16 | 14.38 | 98.78  |
| 47 | 94.50  | 144.00 | 30.72 | 113.28 | 14.45 | 98.83  |
| 48 | 96.75  | 144.00 | 30.58 | 113.42 | 14.68 | 98.74  |
| 49 | 99.00  | 144.00 | 30.29 | 113.71 | 14.91 | 98.80  |
| 50 | 101.25 | 144.00 | 29.81 | 114.19 | 15.12 | 99.07  |

TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To     | APi   | Ti     | APf   | Tf     |
|-----|--------|--------|-------|--------|-------|--------|
| 51  | 103.50 | 144.00 | 29.07 | 114.93 | 15.30 | 99.63  |
| 52  | 105.75 | 144.00 | 28.06 | 115.94 | 15.44 | 100.50 |
| 53  | 108.00 | 144.00 | 26.79 | 117.21 | 15.53 | 101.68 |
| 54  | 110.25 | 144.00 | 25.29 | 118.71 | 15.55 | 103.17 |
| 55  | 112.50 | 144.00 | 23.63 | 120.37 | 15.48 | 104.88 |
| 56  | 114.75 | 144.00 | 21.91 | 122.09 | 15.36 | 106.72 |
| 57  | 117.00 | 144.00 | 20.27 | 123.73 | 15.24 | 108.49 |
| 58  | 119.25 | 144.00 | 18.73 | 125.27 | 14.86 | 110.41 |
| 59  | 121.50 | 144.00 | 17.81 | 126.19 | 15.14 | 111.05 |
| 60  | 123.75 | 144.00 | 15.74 | 128.26 | 15.90 | 112.35 |
| 61  | 126.00 | 144.00 | 12.77 | 131.23 | 15.53 | 115.70 |
| 62  | 128.25 | 144.00 | 14.63 | 129.37 | 16.51 | 112.86 |
| 63  | 130.50 | 144.00 | 16.81 | 127.19 | 15.65 | 111.54 |
| 64  | 132.75 | 144.00 | 17.85 | 126.15 | 15.29 | 110.86 |
| 65  | 135.00 | 144.00 | 19.36 | 124.64 | 15.20 | 109.43 |
| 66  | 137.25 | 144.00 | 30.84 | 113.16 | 14.30 | 98.86  |
| 67  | 139.50 | 144.00 | 30.72 | 113.28 | 14.35 | 98.92  |
| 68  | 141.75 | 144.00 | 30.58 | 113.42 | 14.59 | 98.84  |
| 69  | 144.00 | 144.00 | 30.29 | 113.71 | 14.82 | 98.89  |
| 70  | 146.25 | 144.00 | 29.81 | 114.19 | 15.04 | 99.15  |
| 71  | 148.50 | 144.00 | 29.07 | 114.93 | 15.23 | 99.70  |
| 72  | 150.75 | 144.00 | 28.06 | 115.94 | 15.39 | 100.55 |
| 73  | 153.00 | 144.00 | 26.79 | 117.21 | 15.49 | 101.72 |
| 74  | 155.25 | 144.00 | 25.29 | 118.71 | 15.52 | 103.19 |
| 75  | 157.50 | 144.00 | 23.63 | 120.37 | 15.48 | 104.89 |
| 76  | 159.75 | 144.00 | 21.91 | 122.09 | 15.36 | 106.72 |
| 77  | 162.00 | 144.00 | 20.27 | 123.73 | 15.25 | 108.48 |
| 78  | 164.25 | 144.00 | 18.73 | 125.27 | 14.87 | 110.40 |
| 79  | 166.50 | 144.00 | 17.81 | 126.19 | 15.13 | 111.06 |
| 80  | 168.75 | 144.00 | 15.74 | 128.26 | 15.88 | 112.38 |
| 81  | 171.00 | 144.00 | 12.77 | 131.23 | 15.49 | 115.74 |
| 82  | 173.25 | 144.00 | 14.63 | 129.37 | 16.47 | 112.89 |
| 83  | 175.50 | 144.00 | 16.81 | 127.19 | 15.64 | 111.55 |
| 84  | 177.75 | 144.00 | 17.85 | 126.15 | 15.30 | 110.85 |
| 85  | 180.00 | 144.00 | 19.36 | 124.64 | 15.22 | 109.42 |
| 86  | 182.25 | 144.00 | 30.84 | 113.16 | 14.32 | 98.84  |
| 87  | 184.50 | 144.00 | 30.72 | 113.28 | 14.37 | 98.90  |
| 88  | 186.75 | 144.00 | 30.58 | 113.42 | 14.60 | 98.82  |
| 89  | 189.00 | 144.00 | 30.29 | 113.71 | 14.83 | 98.88  |
| 90  | 191.25 | 144.00 | 29.81 | 114.19 | 15.04 | 99.15  |
| 91  | 193.50 | 144.00 | 29.07 | 114.93 | 15.23 | 99.70  |
| 92  | 195.75 | 144.00 | 28.06 | 115.94 | 15.38 | 100.56 |
| 93  | 198.00 | 144.00 | 26.79 | 117.21 | 15.48 | 101.73 |
| 94  | 200.25 | 144.00 | 25.29 | 118.71 | 15.50 | 103.21 |
| 95  | 202.50 | 144.00 | 23.63 | 120.37 | 15.45 | 104.92 |
| 96  | 204.75 | 144.00 | 21.91 | 122.09 | 15.34 | 106.75 |
| 97  | 207.00 | 144.00 | 20.27 | 123.73 | 15.23 | 108.50 |
| 98  | 209.25 | 144.00 | 18.73 | 125.27 | 14.86 | 110.41 |
| 99  | 211.50 | 144.00 | 17.81 | 126.19 | 15.14 | 111.05 |
| 100 | 213.75 | 144.00 | 15.74 | 128.26 | 15.91 | 112.35 |



## TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To     | APi   | Ti     | APf   | Tf     |
|-----|--------|--------|-------|--------|-------|--------|
| 101 | 216.00 | 144.00 | 12.77 | 131.23 | 15.53 | 115.70 |
| 102 | 218.25 | 144.00 | 14.63 | 129.37 | 16.50 | 112.86 |
| 103 | 220.50 | 144.00 | 16.81 | 127.19 | 15.65 | 111.54 |
| 104 | 222.75 | 144.00 | 17.85 | 126.15 | 15.29 | 110.85 |
| 105 | 225.00 | 144.00 | 19.36 | 124.64 | 15.21 | 109.42 |
| 106 | 227.25 | 144.00 | 30.84 | 113.16 | 14.32 | 98.84  |
| 107 | 229.50 | 144.00 | 30.72 | 113.28 | 14.38 | 98.89  |
| 108 | 231.75 | 144.00 | 30.58 | 113.42 | 14.63 | 98.80  |
| 109 | 234.00 | 144.00 | 30.29 | 113.71 | 14.87 | 98.84  |
| 110 | 236.25 | 144.00 | 29.81 | 114.19 | 15.10 | 99.09  |
| 111 | 238.50 | 144.00 | 29.07 | 114.93 | 15.30 | 99.63  |
| 112 | 240.75 | 144.00 | 28.06 | 115.94 | 15.46 | 100.48 |
| 113 | 243.00 | 144.00 | 26.79 | 117.21 | 15.57 | 101.64 |
| 114 | 245.25 | 144.00 | 25.29 | 118.71 | 15.60 | 103.11 |
| 115 | 247.50 | 144.00 | 23.63 | 120.37 | 15.55 | 104.82 |
| 116 | 249.75 | 144.00 | 21.91 | 122.09 | 15.43 | 106.66 |
| 117 | 252.00 | 144.00 | 20.27 | 123.73 | 15.29 | 108.44 |
| 118 | 254.25 | 144.00 | 18.73 | 125.27 | 14.88 | 110.39 |
| 119 | 256.50 | 144.00 | 17.81 | 126.19 | 15.10 | 111.09 |
| 120 | 258.75 | 144.00 | 15.74 | 128.26 | 15.82 | 112.44 |
| 121 | 261.00 | 144.00 | 12.77 | 131.23 | 15.42 | 115.81 |
| 122 | 263.25 | 144.00 | 14.63 | 129.37 | 16.42 | 112.94 |
| 123 | 265.50 | 144.00 | 16.81 | 127.19 | 15.63 | 111.56 |
| 124 | 267.75 | 144.00 | 17.85 | 126.15 | 15.30 | 110.85 |
| 125 | 270.00 | 144.00 | 19.36 | 124.64 | 15.22 | 109.42 |
| 126 | 272.25 | 144.00 | 30.73 | 113.27 | 14.31 | 98.96  |
| 127 | 274.50 | 144.00 | 30.62 | 113.38 | 14.34 | 99.04  |
| 128 | 276.75 | 144.00 | 30.47 | 113.53 | 14.53 | 99.00  |
| 129 | 279.00 | 144.00 | 30.19 | 113.81 | 14.72 | 99.09  |
| 130 | 281.25 | 144.00 | 29.70 | 114.30 | 14.90 | 99.40  |
| 131 | 283.50 | 144.00 | 28.96 | 115.04 | 15.05 | 99.99  |
| 132 | 285.75 | 144.00 | 27.95 | 116.05 | 15.17 | 100.88 |
| 133 | 288.00 | 144.00 | 26.68 | 117.32 | 15.24 | 102.08 |
| 134 | 290.25 | 144.00 | 25.17 | 118.83 | 15.26 | 103.57 |
| 135 | 292.50 | 144.00 | 23.52 | 120.48 | 15.21 | 105.27 |
| 136 | 294.75 | 144.00 | 21.80 | 122.20 | 15.13 | 107.07 |
| 137 | 297.00 | 144.00 | 20.16 | 123.84 | 15.08 | 108.76 |
| 138 | 299.25 | 144.00 | 18.61 | 125.39 | 14.81 | 110.58 |
| 139 | 301.50 | 144.00 | 17.69 | 126.31 | 15.27 | 111.04 |
| 140 | 303.75 | 144.00 | 15.62 | 128.38 | 16.15 | 112.23 |
| 141 | 306.00 | 144.00 | 13.97 | 130.03 | 15.82 | 114.20 |
| 142 | 307.80 | 144.00 | 16.83 | 127.17 | 16.61 | 110.57 |
| 143 | 309.60 | 144.00 | 19.12 | 124.88 | 15.83 | 109.05 |
| 144 | 311.40 | 144.00 | 20.34 | 123.66 | 15.24 | 108.43 |
| 145 | 313.20 | 144.00 | 21.55 | 122.45 | 15.06 | 107.39 |
| 146 | 315.00 | 144.00 | 22.18 | 121.82 | 14.40 | 107.41 |
| 147 | 316.80 | 144.00 | 13.85 | 130.15 | 15.19 | 114.95 |
| 148 | 318.60 | 144.00 | 13.45 | 130.55 | 15.81 | 114.74 |
| 149 | 320.40 | 144.00 | 13.04 | 130.96 | 16.47 | 114.49 |
| 150 | 322.20 | 144.00 | 12.51 | 131.49 | 17.05 | 114.44 |

## TENSION EN LOS CABLES (Kp/mm2)

| I   | S      | To     | APi   | Ti     | APf   | Tf     |
|-----|--------|--------|-------|--------|-------|--------|
| 151 | 324.00 | 144.00 | 11.71 | 132.29 | 17.49 | 114.80 |
| 152 | 325.80 | 144.00 | 11.78 | 132.22 | 17.57 | 114.65 |
| 153 | 327.60 | 144.00 | 12.29 | 131.71 | 17.48 | 114.23 |
| 154 | 329.40 | 144.00 | 12.72 | 131.28 | 17.44 | 113.84 |
| 155 | 331.20 | 144.00 | 13.08 | 130.92 | 17.44 | 113.47 |
| 156 | 333.00 | 144.00 | 13.38 | 130.62 | 17.48 | 113.14 |
| 157 | 334.80 | 144.00 | 13.63 | 130.37 | 17.53 | 112.84 |
| 158 | 336.60 | 144.00 | 13.83 | 130.17 | 17.57 | 112.59 |
| 159 | 338.40 | 144.00 | 14.02 | 129.98 | 17.59 | 112.39 |
| 160 | 340.20 | 144.00 | 14.20 | 129.80 | 17.54 | 112.25 |
| 161 | 342.00 | 144.00 | 14.22 | 129.78 | 17.25 | 112.52 |

PRETENSADO EN EL NERVIO = 1

FUERZAS EN LOS CABLES (T, m)

| I  | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|----|--------|---------|----------|-----------|---------|----------|-----------|
| 1  | 0.00   | 5338.88 | 3724.4   | 0.00      | 4481.41 | 3126.2   | 0.00      |
| 2  | 1.80   | 5338.24 | 4429.6   | 26.48     | 4596.59 | 3814.2   | 22.80     |
| 3  | 3.60   | 5344.12 | 5080.9   | 26.51     | 4605.50 | 4378.7   | 22.84     |
| 4  | 5.40   | 5350.32 | 5648.1   | 26.54     | 4617.20 | 4874.2   | 22.90     |
| 5  | 7.20   | 5357.63 | 6131.7   | 26.57     | 4630.75 | 5299.8   | 22.97     |
| 6  | 9.00   | 5366.72 | 6532.6   | 26.62     | 4645.44 | 5654.6   | 23.04     |
| 7  | 10.80  | 5378.14 | 6851.4   | 26.67     | 4660.75 | 5937.5   | 23.12     |
| 8  | 12.60  | 5392.36 | 7088.6   | 26.75     | 4676.40 | 6147.4   | 23.19     |
| 9  | 14.40  | 5409.69 | 7244.2   | 26.83     | 4692.25 | 6283.4   | 23.27     |
| 10 | 16.20  | 5430.38 | 7317.9   | 26.93     | 4708.30 | 6344.9   | 23.35     |
| 11 | 18.00  | 5473.06 | 7267.2   | 70.73     | 4744.15 | 6299.3   | 61.31     |
| 12 | 19.80  | 5524.97 | 6995.5   | 71.40     | 4793.42 | 6069.3   | 61.95     |
| 13 | 21.60  | 5584.66 | 6493.0   | 72.17     | 4855.12 | 5644.8   | 62.74     |
| 14 | 23.40  | 5650.13 | 5747.6   | 73.02     | 4927.23 | 5012.3   | 63.68     |
| 15 | 25.20  | 5718.64 | 4746.5   | 73.90     | 5006.11 | 4155.1   | 64.70     |
| 16 | 27.00  | 5786.33 | 3476.8   | 74.78     | 5085.60 | 3055.8   | 65.72     |
| 17 | 28.80  | 5848.47 | 1929.2   | 75.58     | 5156.80 | 1701.0   | 66.64     |
| 18 | 30.60  | 5905.53 | 100.3    | 76.32     | 5230.57 | 88.8     | 67.60     |
| 19 | 32.40  | 5955.25 | -2967.2  | -303.04   | 5259.64 | -2620.7  | -267.64   |
| 20 | 34.20  | 6062.69 | -4520.1  | -308.51   | 5343.11 | -3983.6  | -271.89   |
| 21 | 36.00  | 6187.92 | -5123.6  | -288.08   | 5485.80 | -4542.2  | -255.39   |
| 22 | 38.25  | 6099.63 | -4331.7  | -283.97   | 5347.78 | -3797.8  | -248.97   |
| 23 | 40.50  | 5993.94 | -1187.4  | 60.34     | 5283.14 | -1046.6  | 53.18     |
| 24 | 42.75  | 5944.75 | 1094.4   | 59.84     | 5257.10 | 967.8    | 52.92     |
| 25 | 45.00  | 5875.59 | 3027.9   | 59.14     | 5201.22 | 2680.3   | 52.36     |
| 26 | 47.25  | 5893.32 | 4688.8   | 59.32     | 5169.77 | 4113.1   | 52.04     |
| 27 | 49.50  | 5899.44 | 6046.5   | 59.38     | 5165.42 | 5294.2   | 52.00     |
| 28 | 51.75  | 5907.16 | 7108.0   | 59.46     | 5161.49 | 6210.7   | 51.96     |
| 29 | 54.00  | 5921.86 | 7880.1   | 59.61     | 5163.61 | 6871.1   | 51.98     |
| 30 | 56.25  | 5946.96 | 8368.1   | 59.86     | 5176.25 | 7283.6   | 52.10     |
| 31 | 58.50  | 5985.37 | 8574.6   | 60.25     | 5202.98 | 7453.8   | 52.37     |
| 32 | 60.75  | 6038.02 | 8496.2   | 60.78     | 5245.56 | 7381.1   | 52.80     |
| 33 | 63.00  | 6104.34 | 8122.9   | 61.45     | 5304.44 | 7058.5   | 53.39     |
| 34 | 65.25  | 6182.57 | 7439.4   | 62.23     | 5378.90 | 6472.3   | 54.14     |
| 35 | 67.50  | 6268.82 | 6425.1   | 63.10     | 5465.70 | 5601.9   | 55.02     |
| 36 | 69.75  | 6358.29 | 5058.7   | 64.00     | 5559.37 | 4423.1   | 55.96     |
| 37 | 72.00  | 6443.62 | 3320.6   | 64.86     | 5649.73 | 2911.5   | 56.87     |
| 38 | 74.25  | 6524.03 | 1201.0   | 65.67     | 5749.64 | 1058.5   | 57.88     |
| 39 | 76.50  | 6572.00 | -2390.3  | 66.15     | 5784.80 | -2103.9  | 58.23     |
| 40 | 78.75  | 6679.62 | -4743.6  | -310.97   | 5855.03 | -4158.0  | -272.58   |
| 41 | 81.00  | 6834.56 | -5659.0  | -318.19   | 6031.48 | -4994.1  | -280.80   |
| 42 | 83.25  | 6737.34 | -4784.6  | -313.66   | 5882.69 | -4177.6  | -273.87   |
| 43 | 85.50  | 6624.12 | -1312.3  | 66.68     | 5810.49 | -1151.1  | 58.49     |
| 44 | 87.75  | 6569.81 | 1209.5   | 66.13     | 5772.22 | 1062.6   | 58.10     |
| 45 | 90.00  | 6491.08 | 3345.0   | 65.34     | 5696.18 | 2935.4   | 57.34     |
| 46 | 92.25  | 5893.32 | 4688.8   | 59.32     | 5144.54 | 4093.0   | 51.79     |
| 47 | 94.50  | 5899.44 | 6046.5   | 59.38     | 5147.12 | 5275.4   | 51.81     |
| 48 | 96.75  | 5907.16 | 7108.0   | 59.46     | 5142.64 | 6188.0   | 51.77     |
| 49 | 99.00  | 5921.86 | 7880.1   | 59.61     | 5145.48 | 6847.0   | 51.79     |
| 50 | 101.25 | 5946.96 | 8368.1   | 59.86     | 5159.74 | 7260.4   | 51.94     |

FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 51  | 103.50 | 5985.37 | 8574.6   | 60.25     | 5188.71 | 7433.3   | 52.23     |
| 52  | 105.75 | 6038.02 | 8496.2   | 60.78     | 5233.91 | 7364.7   | 52.68     |
| 53  | 108.00 | 6104.34 | 8122.9   | 61.45     | 5295.63 | 7046.8   | 53.31     |
| 54  | 110.25 | 6182.57 | 7439.4   | 62.23     | 5372.93 | 6465.2   | 54.08     |
| 55  | 112.50 | 6268.82 | 6425.1   | 63.10     | 5462.39 | 5598.5   | 54.98     |
| 56  | 114.75 | 6358.29 | 5058.7   | 64.00     | 5558.23 | 4422.2   | 55.95     |
| 57  | 117.00 | 6443.62 | 3320.6   | 64.86     | 5649.97 | 2911.6   | 56.87     |
| 58  | 119.25 | 6524.03 | 1201.0   | 65.67     | 5750.06 | 1058.5   | 57.88     |
| 59  | 121.50 | 6572.00 | -2390.3  | 66.15     | 5783.46 | -2103.5  | 58.22     |
| 60  | 123.75 | 6679.62 | -4743.6  | -310.97   | 5851.31 | -4155.4  | -272.41   |
| 61  | 126.00 | 6834.56 | -5659.0  | -318.19   | 6025.85 | -4989.4  | -280.54   |
| 62  | 128.25 | 6737.34 | -4784.6  | -313.66   | 5877.75 | -4174.1  | -273.64   |
| 63  | 130.50 | 6624.12 | -1312.3  | 66.68     | 5809.05 | -1150.8  | 58.47     |
| 64  | 132.75 | 6569.81 | 1209.5   | 66.13     | 5773.45 | 1062.9   | 58.12     |
| 65  | 135.00 | 6491.08 | 3345.0   | 65.34     | 5699.30 | 2937.0   | 57.37     |
| 66  | 137.25 | 5893.32 | 4688.8   | 59.32     | 5148.80 | 4096.4   | 51.83     |
| 67  | 139.50 | 5899.44 | 6046.5   | 59.38     | 5151.93 | 5280.3   | 51.86     |
| 68  | 141.75 | 5907.16 | 7108.0   | 59.46     | 5147.54 | 6193.9   | 51.82     |
| 69  | 144.00 | 5921.86 | 7880.1   | 59.61     | 5150.12 | 6853.2   | 51.84     |
| 70  | 146.25 | 5946.96 | 8368.1   | 59.86     | 5163.89 | 7266.2   | 51.98     |
| 71  | 148.50 | 5985.37 | 8574.6   | 60.25     | 5192.20 | 7438.3   | 52.26     |
| 72  | 150.75 | 6038.02 | 8496.2   | 60.78     | 5236.65 | 7368.6   | 52.71     |
| 73  | 153.00 | 6104.34 | 8122.9   | 61.45     | 5297.57 | 7049.4   | 53.33     |
| 74  | 155.25 | 6182.57 | 7439.4   | 62.23     | 5374.09 | 6466.5   | 54.10     |
| 75  | 157.50 | 6268.82 | 6425.1   | 63.10     | 5462.85 | 5599.0   | 54.99     |
| 76  | 159.75 | 6358.29 | 5058.7   | 64.00     | 5558.16 | 4422.1   | 55.95     |
| 77  | 162.00 | 6443.62 | 3320.6   | 64.86     | 5649.63 | 2911.4   | 56.87     |
| 78  | 164.25 | 6524.03 | 1201.0   | 65.67     | 5749.85 | 1058.5   | 57.88     |
| 79  | 166.50 | 6572.00 | -2390.3  | 66.15     | 5784.01 | -2103.7  | 58.22     |
| 80  | 168.75 | 6679.62 | -4743.6  | -310.97   | 5852.70 | -4156.3  | -272.48   |
| 81  | 171.00 | 6834.56 | -5659.0  | -318.19   | 6027.84 | -4991.1  | -280.63   |
| 82  | 173.25 | 6737.34 | -4784.6  | -313.66   | 5879.42 | -4175.3  | -273.72   |
| 83  | 175.50 | 6624.12 | -1312.3  | 66.68     | 5809.52 | -1150.9  | 58.48     |
| 84  | 177.75 | 6569.81 | 1209.5   | 66.13     | 5773.07 | 1062.8   | 58.11     |
| 85  | 180.00 | 6491.08 | 3345.0   | 65.34     | 5698.40 | 2936.6   | 57.36     |
| 86  | 182.25 | 5893.32 | 4688.8   | 59.32     | 5147.67 | 4095.5   | 51.82     |
| 87  | 184.50 | 5899.44 | 6046.5   | 59.38     | 5150.80 | 5279.2   | 51.85     |
| 88  | 186.75 | 5907.16 | 7108.0   | 59.46     | 5146.57 | 6192.8   | 51.81     |
| 89  | 189.00 | 5921.86 | 7880.1   | 59.61     | 5149.42 | 6852.2   | 51.83     |
| 90  | 191.25 | 5946.96 | 8368.1   | 59.86     | 5163.53 | 7265.7   | 51.98     |
| 91  | 193.50 | 5985.37 | 8574.6   | 60.25     | 5192.22 | 7438.4   | 52.27     |
| 92  | 195.75 | 6038.02 | 8496.2   | 60.78     | 5237.05 | 7369.2   | 52.72     |
| 93  | 198.00 | 6104.34 | 8122.9   | 61.45     | 5298.31 | 7050.4   | 53.33     |
| 94  | 200.25 | 6182.57 | 7439.4   | 62.23     | 5375.10 | 6467.8   | 54.11     |
| 95  | 202.50 | 6268.82 | 6425.1   | 63.10     | 5464.01 | 5600.2   | 55.00     |
| 96  | 204.75 | 6358.29 | 5058.7   | 64.00     | 5559.32 | 4423.0   | 55.96     |
| 97  | 207.00 | 6443.62 | 3320.6   | 64.86     | 5650.54 | 2911.9   | 56.88     |
| 98  | 209.25 | 6524.03 | 1201.0   | 65.67     | 5750.20 | 1058.6   | 57.88     |
| 99  | 211.50 | 6572.00 | -2390.3  | 66.15     | 5783.27 | -2103.4  | 58.21     |
| 100 | 213.75 | 6679.62 | -4743.6  | -310.97   | 5851.12 | -4155.2  | -272.40   |



FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 101 | 216.00 | 6834.56 | -5659.0  | -318.19   | 6025.82 | -4989.4  | -280.54   |
| 102 | 218.25 | 6737.34 | -4784.6  | -313.66   | 5877.90 | -4174.2  | -273.65   |
| 103 | 220.50 | 6624.12 | -1312.3  | 66.68     | 5809.15 | -1150.8  | 58.48     |
| 104 | 222.75 | 6569.81 | 1209.5   | 66.13     | 5773.31 | 1062.8   | 58.11     |
| 105 | 225.00 | 6491.08 | 3345.0   | 65.34     | 5698.75 | 2936.7   | 57.36     |
| 106 | 227.25 | 5893.32 | 4688.8   | 59.32     | 5147.75 | 4095.6   | 51.82     |
| 107 | 229.50 | 5899.44 | 6046.5   | 59.38     | 5150.32 | 5278.7   | 51.84     |
| 108 | 231.75 | 5907.16 | 7108.0   | 59.46     | 5145.39 | 6191.4   | 51.79     |
| 109 | 234.00 | 5921.86 | 7880.1   | 59.61     | 5147.44 | 6849.6   | 51.81     |
| 110 | 236.25 | 5946.96 | 8368.1   | 59.86     | 5160.74 | 7261.8   | 51.95     |
| 111 | 238.50 | 5985.37 | 8574.6   | 60.25     | 5188.64 | 7433.2   | 52.23     |
| 112 | 240.75 | 6038.02 | 8496.2   | 60.78     | 5232.78 | 7363.1   | 52.67     |
| 113 | 243.00 | 6104.34 | 8122.9   | 61.45     | 5293.53 | 7044.0   | 53.29     |
| 114 | 245.25 | 6182.57 | 7439.4   | 62.23     | 5370.06 | 6461.7   | 54.06     |
| 115 | 247.50 | 6268.82 | 6425.1   | 63.10     | 5459.07 | 5595.1   | 54.95     |
| 116 | 249.75 | 6358.29 | 5058.7   | 64.00     | 5554.95 | 4419.6   | 55.92     |
| 117 | 252.00 | 6443.62 | 3320.6   | 64.86     | 5647.36 | 2910.3   | 56.85     |
| 118 | 254.25 | 6524.03 | 1201.0   | 65.67     | 5749.05 | 1058.4   | 57.87     |
| 119 | 256.50 | 6572.00 | -2390.3  | 66.15     | 5785.54 | -2104.2  | 58.24     |
| 120 | 258.75 | 6679.62 | -4743.6  | -310.97   | 5855.78 | -4158.5  | -272.62   |
| 121 | 261.00 | 6834.56 | -5659.0  | -318.19   | 6031.59 | -4994.2  | -280.80   |
| 122 | 263.25 | 6737.34 | -4784.6  | -313.66   | 5882.06 | -4177.2  | -273.84   |
| 123 | 265.50 | 6624.12 | -1312.3  | 66.68     | 5810.07 | -1151.0  | 58.48     |
| 124 | 267.75 | 6569.80 | 1209.5   | 66.13     | 5772.81 | 1062.7   | 58.11     |
| 125 | 270.00 | 6491.08 | 3345.0   | 65.34     | 5698.38 | 2936.5   | 57.36     |
| 126 | 272.25 | 5898.90 | 4693.2   | 59.38     | 5153.72 | 4100.3   | 51.88     |
| 127 | 274.50 | 5905.02 | 6052.2   | 59.44     | 5158.26 | 5286.8   | 51.92     |
| 128 | 276.75 | 5912.75 | 7114.7   | 59.52     | 5155.86 | 6204.0   | 51.90     |
| 129 | 279.00 | 5927.47 | 7887.6   | 59.67     | 5160.69 | 6867.2   | 51.95     |
| 130 | 281.25 | 5952.59 | 8376.0   | 59.92     | 5176.78 | 7284.4   | 52.11     |
| 131 | 283.50 | 5991.04 | 8582.8   | 60.31     | 5207.34 | 7460.0   | 52.42     |
| 132 | 285.75 | 6043.73 | 8504.3   | 60.84     | 5253.80 | 7392.7   | 52.89     |
| 133 | 288.00 | 6110.11 | 8130.6   | 61.50     | 5316.29 | 7074.3   | 53.51     |
| 134 | 290.25 | 6188.42 | 7446.4   | 62.29     | 5393.70 | 6490.1   | 54.29     |
| 135 | 292.50 | 6274.76 | 6431.2   | 63.16     | 5482.36 | 5619.0   | 55.19     |
| 136 | 294.75 | 6364.30 | 5063.5   | 64.06     | 5576.21 | 4436.5   | 56.13     |
| 137 | 297.00 | 6449.72 | 3323.7   | 64.92     | 5664.41 | 2919.0   | 57.02     |
| 138 | 299.25 | 6530.20 | 1202.2   | 65.73     | 5758.85 | 1060.2   | 57.97     |
| 139 | 301.50 | 6578.22 | -2392.5  | 66.22     | 5783.09 | -2103.3  | 58.21     |
| 140 | 303.75 | 6686.18 | -4748.2  | -311.28   | 5844.99 | -4150.9  | -272.12   |
| 141 | 306.00 | 6771.71 | -5607.0  | 0.00      | 5947.63 | -4924.6  | 0.00      |
| 142 | 307.80 | 6623.22 | -5484.0  | 0.00      | 5758.31 | -4767.9  | 0.00      |
| 143 | 309.60 | 6503.79 | -3836.8  | -368.24   | 5679.16 | -3350.3  | -321.55   |
| 144 | 311.40 | 6440.26 | -2158.4  | -364.65   | 5646.80 | -1892.5  | -319.72   |
| 145 | 313.20 | 6377.31 | 321.9    | 105.04    | 5592.94 | 282.3    | 92.12     |
| 146 | 315.00 | 5730.24 | 2268.5   | 94.38     | 5052.79 | 2000.3   | 83.23     |
| 147 | 316.80 | 6122.21 | 4211.5   | 100.84    | 5407.46 | 3719.8   | 89.07     |
| 148 | 318.60 | 6140.99 | 5690.1   | 101.15    | 5397.32 | 5001.0   | 88.90     |
| 149 | 320.40 | 6160.31 | 6849.5   | 101.47    | 5385.60 | 5988.1   | 88.71     |
| 150 | 322.20 | 6185.33 | 7693.4   | 101.88    | 5383.23 | 6695.7   | 88.67     |

FUERZAS EN LOS CABLES (T, m)

| I   | S(m)   | Pi (T)  | Mpi (mT) | Upi (T/m) | Pf (T)  | Mpf (mT) | Upf (T/m) |
|-----|--------|---------|----------|-----------|---------|----------|-----------|
| 151 | 324.00 | 6223.01 | 8229.2   | 102.50    | 5400.17 | 7141.1   | 88.95     |
| 152 | 325.80 | 6219.69 | 8381.6   | 30.85     | 5393.13 | 7267.7   | 26.75     |
| 153 | 327.60 | 6195.71 | 8296.7   | 30.73     | 5373.24 | 7195.4   | 26.65     |
| 154 | 329.40 | 6175.36 | 8117.9   | 30.63     | 5354.81 | 7039.2   | 26.56     |
| 155 | 331.20 | 6158.33 | 7845.3   | 30.54     | 5337.75 | 6800.0   | 26.47     |
| 156 | 333.00 | 6144.19 | 7479.0   | 30.47     | 5322.09 | 6478.3   | 26.40     |
| 157 | 334.80 | 6132.40 | 7018.4   | 30.42     | 5307.99 | 6074.9   | 26.33     |
| 158 | 336.60 | 6123.06 | 6463.8   | 30.37     | 5296.41 | 5591.2   | 26.27     |
| 159 | 338.40 | 6114.15 | 5813.0   | 30.33     | 5286.72 | 5026.4   | 26.22     |
| 160 | 340.20 | 6105.76 | 5066.4   | 30.28     | 5280.45 | 4381.6   | 26.19     |
| 161 | 342.00 | 6104.67 | 4258.6   | 0.00      | 5293.13 | 3692.5   | 0.00      |

## FUERZAS HORIZONTALES DE DESVIACION

| I  | S (m)  | R (m)  | Ti (T)  | Uh (T/m) | Tf (T)  | Uh (T/m) |
|----|--------|--------|---------|----------|---------|----------|
| 1  | 0.00   | 7250.0 | 5338.88 | -0.74    | 4481.41 | -0.63    |
| 2  | 1.80   | 7250.0 | 5338.24 | -0.74    | 4596.59 | -0.63    |
| 3  | 3.60   | 7250.0 | 5344.12 | -0.74    | 4605.50 | -0.64    |
| 4  | 5.40   | 7250.0 | 5350.32 | -0.74    | 4617.20 | -0.64    |
| 5  | 7.20   | 7250.0 | 5357.63 | -0.74    | 4630.75 | -0.64    |
| 6  | 9.00   | 7250.0 | 5366.72 | -0.74    | 4645.44 | -0.64    |
| 7  | 10.80  | 7250.0 | 5378.14 | -0.74    | 4660.75 | -0.64    |
| 8  | 12.60  | 7250.0 | 5392.36 | -0.74    | 4676.40 | -0.65    |
| 9  | 14.40  | 7250.0 | 5409.69 | -0.75    | 4692.25 | -0.65    |
| 10 | 16.20  | 7250.0 | 5430.38 | -0.75    | 4708.30 | -0.65    |
| 11 | 18.00  | 7250.0 | 5473.06 | -0.76    | 4744.15 | -0.66    |
| 12 | 19.80  | 7250.0 | 5524.97 | -0.77    | 4793.42 | -0.67    |
| 13 | 21.60  | 7250.0 | 5584.66 | -0.77    | 4855.12 | -0.67    |
| 14 | 23.40  | 7250.0 | 5650.13 | -0.78    | 4927.23 | -0.69    |
| 15 | 25.20  | 7250.0 | 5718.64 | -0.79    | 5006.11 | -0.70    |
| 16 | 27.00  | 7250.0 | 5786.33 | -0.80    | 5085.60 | -0.71    |
| 17 | 28.80  | 7250.0 | 5848.47 | -0.81    | 5156.80 | -0.72    |
| 18 | 30.60  | 7250.0 | 5905.53 | -0.82    | 5230.57 | -0.72    |
| 19 | 32.40  | 7250.0 | 5955.25 | -0.83    | 5259.64 | -0.73    |
| 20 | 34.20  | 7250.0 | 6062.69 | -0.84    | 5343.11 | -0.75    |
| 21 | 36.00  | 7250.0 | 6187.92 | -0.85    | 5485.80 | -0.75    |
| 22 | 38.25  | 7250.0 | 6099.63 | -0.83    | 5347.78 | -0.73    |
| 23 | 40.50  | 7250.0 | 5993.94 | -0.82    | 5283.14 | -0.73    |
| 24 | 42.75  | 7250.0 | 5944.75 | -0.82    | 5257.10 | -0.72    |
| 25 | 45.00  | 7250.0 | 5875.59 | -0.77    | 5201.22 | -0.68    |
| 26 | 47.25  | 7250.0 | 5893.32 | -0.81    | 5169.77 | -0.71    |
| 27 | 49.50  | 7250.0 | 5899.44 | -0.81    | 5165.42 | -0.71    |
| 28 | 51.75  | 7250.0 | 5907.16 | -0.82    | 5161.49 | -0.71    |
| 29 | 54.00  | 7250.0 | 5921.86 | -0.82    | 5163.61 | -0.71    |
| 30 | 56.25  | 7250.0 | 5946.96 | -0.82    | 5176.25 | -0.72    |
| 31 | 58.50  | 7250.0 | 5985.37 | -0.83    | 5202.98 | -0.72    |
| 32 | 60.75  | 7250.0 | 6038.02 | -0.84    | 5245.56 | -0.73    |
| 33 | 63.00  | 7250.0 | 6104.34 | -0.85    | 5304.44 | -0.74    |
| 34 | 65.25  | 7250.0 | 6182.57 | -0.86    | 5378.90 | -0.75    |
| 35 | 67.50  | 7250.0 | 6268.82 | -0.87    | 5465.70 | -0.76    |
| 36 | 69.75  | 7250.0 | 6358.29 | -0.88    | 5559.37 | -0.77    |
| 37 | 72.00  | 7250.0 | 6443.62 | -0.89    | 5649.73 | -0.79    |
| 38 | 74.25  | 7250.0 | 6524.03 | -0.90    | 5749.64 | -0.80    |
| 39 | 76.50  | 7250.0 | 6572.00 | -0.91    | 5784.80 | -0.80    |
| 40 | 78.75  | 7250.0 | 6679.62 | -0.93    | 5855.03 | -0.82    |
| 41 | 81.00  | 7250.0 | 6834.56 | -0.94    | 6031.48 | -0.82    |
| 42 | 83.25  | 7250.0 | 6737.34 | -0.92    | 5882.69 | -0.81    |
| 43 | 85.50  | 7250.0 | 6624.12 | -0.91    | 5810.49 | -0.80    |
| 44 | 87.75  | 7250.0 | 6569.81 | -0.90    | 5772.22 | -0.79    |
| 45 | 90.00  | 7250.0 | 6491.08 | -0.85    | 5696.18 | -0.75    |
| 46 | 92.25  | 7250.0 | 5893.32 | -0.81    | 5144.54 | -0.71    |
| 47 | 94.50  | 7250.0 | 5899.44 | -0.81    | 5147.12 | -0.71    |
| 48 | 96.75  | 7250.0 | 5907.16 | -0.82    | 5142.64 | -0.71    |
| 49 | 99.00  | 7250.0 | 5921.86 | -0.82    | 5145.48 | -0.71    |
| 50 | 101.25 | 7250.0 | 5946.96 | -0.82    | 5159.74 | -0.71    |
| 51 | 103.50 | 7250.0 | 5985.37 | -0.83    | 5188.71 | -0.72    |
| 52 | 105.75 | 7250.0 | 6038.02 | -0.84    | 5233.91 | -0.73    |
| 53 | 108.00 | 7250.0 | 6104.34 | -0.85    | 5295.63 | -0.74    |
| 54 | 110.25 | 7250.0 | 6182.57 | -0.86    | 5372.93 | -0.75    |
| 55 | 112.50 | 7250.0 | 6268.82 | -0.87    | 5462.39 | -0.76    |

## FUERZAS HORIZONTALES DE DESVIACION

| I   | S (m)  | R (m)  | Ti (T)  | Uh (T/m) | Tf (T)  | Uh (T/m) |
|-----|--------|--------|---------|----------|---------|----------|
| 56  | 114.75 | 7250.0 | 6358.29 | -0.88    | 5558.23 | -0.77    |
| 57  | 117.00 | 7250.0 | 6443.62 | -0.89    | 5649.97 | -0.79    |
| 58  | 119.25 | 7250.0 | 6524.03 | -0.90    | 5750.06 | -0.80    |
| 59  | 121.50 | 7250.0 | 6572.00 | -0.91    | 5783.46 | -0.80    |
| 60  | 123.75 | 7250.0 | 6679.62 | -0.93    | 5851.31 | -0.82    |
| 61  | 126.00 | 7250.0 | 6834.56 | -0.94    | 6025.85 | -0.82    |
| 62  | 128.25 | 7250.0 | 6737.34 | -0.92    | 5877.75 | -0.81    |
| 63  | 130.50 | 7250.0 | 6624.12 | -0.91    | 5809.05 | -0.80    |
| 64  | 132.75 | 7250.0 | 6569.81 | -0.90    | 5773.45 | -0.79    |
| 65  | 135.00 | 7250.0 | 6491.08 | -0.85    | 5699.30 | -0.75    |
| 66  | 137.25 | 7250.0 | 5893.32 | -0.81    | 5148.80 | -0.71    |
| 67  | 139.50 | 7250.0 | 5899.44 | -0.81    | 5151.93 | -0.71    |
| 68  | 141.75 | 7250.0 | 5907.16 | -0.82    | 5147.54 | -0.71    |
| 69  | 144.00 | 7250.0 | 5921.86 | -0.82    | 5150.12 | -0.71    |
| 70  | 146.25 | 7250.0 | 5946.96 | -0.82    | 5163.89 | -0.71    |
| 71  | 148.50 | 7250.0 | 5985.37 | -0.83    | 5192.20 | -0.72    |
| 72  | 150.75 | 7250.0 | 6038.02 | -0.84    | 5236.65 | -0.73    |
| 73  | 153.00 | 7250.0 | 6104.34 | -0.85    | 5297.57 | -0.74    |
| 74  | 155.25 | 7250.0 | 6182.57 | -0.86    | 5374.09 | -0.75    |
| 75  | 157.50 | 7250.0 | 6268.82 | -0.87    | 5462.85 | -0.76    |
| 76  | 159.75 | 7250.0 | 6358.29 | -0.88    | 5558.16 | -0.77    |
| 77  | 162.00 | 7250.0 | 6443.62 | -0.89    | 5649.63 | -0.79    |
| 78  | 164.25 | 7250.0 | 6524.03 | -0.90    | 5749.85 | -0.80    |
| 79  | 166.50 | 7250.0 | 6572.00 | -0.91    | 5784.01 | -0.80    |
| 80  | 168.75 | 7250.0 | 6679.62 | -0.93    | 5852.70 | -0.82    |
| 81  | 171.00 | 7250.0 | 6834.56 | -0.94    | 6027.84 | -0.82    |
| 82  | 173.25 | 7250.0 | 6737.34 | -0.92    | 5879.42 | -0.81    |
| 83  | 175.50 | 7250.0 | 6624.12 | -0.91    | 5809.52 | -0.80    |
| 84  | 177.75 | 7250.0 | 6569.81 | -0.90    | 5773.07 | -0.79    |
| 85  | 180.00 | 7250.0 | 6491.08 | -0.85    | 5698.40 | -0.75    |
| 86  | 182.25 | 7250.0 | 5893.32 | -0.81    | 5147.67 | -0.71    |
| 87  | 184.50 | 7250.0 | 5899.44 | -0.81    | 5150.80 | -0.71    |
| 88  | 186.75 | 7250.0 | 5907.16 | -0.82    | 5146.57 | -0.71    |
| 89  | 189.00 | 7250.0 | 5921.86 | -0.82    | 5149.42 | -0.71    |
| 90  | 191.25 | 7250.0 | 5946.96 | -0.82    | 5163.53 | -0.71    |
| 91  | 193.50 | 7250.0 | 5985.37 | -0.83    | 5192.22 | -0.72    |
| 92  | 195.75 | 7250.0 | 6038.02 | -0.84    | 5237.05 | -0.73    |
| 93  | 198.00 | 7250.0 | 6104.34 | -0.85    | 5298.31 | -0.74    |
| 94  | 200.25 | 7250.0 | 6182.57 | -0.86    | 5375.10 | -0.75    |
| 95  | 202.50 | 7250.0 | 6268.82 | -0.87    | 5464.01 | -0.76    |
| 96  | 204.75 | 7250.0 | 6358.29 | -0.88    | 5559.32 | -0.77    |
| 97  | 207.00 | 7250.0 | 6443.62 | -0.89    | 5650.54 | -0.79    |
| 98  | 209.25 | 7250.0 | 6524.03 | -0.90    | 5750.20 | -0.80    |
| 99  | 211.50 | 7250.0 | 6572.00 | -0.91    | 5783.27 | -0.80    |
| 100 | 213.75 | 7250.0 | 6679.62 | -0.93    | 5851.12 | -0.82    |
| 101 | 216.00 | 7250.0 | 6834.56 | -0.94    | 6025.82 | -0.82    |
| 102 | 218.25 | 7250.0 | 6737.34 | -0.92    | 5877.90 | -0.81    |
| 103 | 220.50 | 7250.0 | 6624.12 | -0.91    | 5809.15 | -0.80    |
| 104 | 222.75 | 7250.0 | 6569.81 | -0.90    | 5773.31 | -0.79    |
| 105 | 225.00 | 7250.0 | 6491.08 | -0.85    | 5698.75 | -0.75    |
| 106 | 227.25 | 7250.0 | 5893.32 | -0.81    | 5147.75 | -0.71    |
| 107 | 229.50 | 7250.0 | 5899.44 | -0.81    | 5150.32 | -0.71    |
| 108 | 231.75 | 7250.0 | 5907.16 | -0.82    | 5145.39 | -0.71    |
| 109 | 234.00 | 7250.0 | 5921.86 | -0.82    | 5147.44 | -0.71    |
| 110 | 236.25 | 7250.0 | 5946.96 | -0.82    | 5160.74 | -0.71    |

FUERZAS HORIZONTALES DE DESVIACION

| I   | S (m)  | R (m)  | Ti (T)  | Uh (T/m) | Tf (T)  | Uh (T/m) |
|-----|--------|--------|---------|----------|---------|----------|
| 111 | 238.50 | 7250.0 | 5985.37 | -0.83    | 5188.64 | -0.72    |
| 112 | 240.75 | 7250.0 | 6038.02 | -0.84    | 5232.78 | -0.73    |
| 113 | 243.00 | 7250.0 | 6104.34 | -0.85    | 5293.53 | -0.74    |
| 114 | 245.25 | 7250.0 | 6182.57 | -0.86    | 5370.06 | -0.75    |
| 115 | 247.50 | 7250.0 | 6268.82 | -0.87    | 5459.07 | -0.76    |
| 116 | 249.75 | 7250.0 | 6358.29 | -0.88    | 5554.95 | -0.77    |
| 117 | 252.00 | 7250.0 | 6443.62 | -0.89    | 5647.36 | -0.79    |
| 118 | 254.25 | 7250.0 | 6524.03 | -0.90    | 5749.05 | -0.80    |
| 119 | 256.50 | 7250.0 | 6572.00 | -0.91    | 5785.54 | -0.80    |
| 120 | 258.75 | 7250.0 | 6679.62 | -0.93    | 5855.78 | -0.82    |
| 121 | 261.00 | 7250.0 | 6834.56 | -0.94    | 6031.59 | -0.82    |
| 122 | 263.25 | 7250.0 | 6737.34 | -0.92    | 5882.06 | -0.81    |
| 123 | 265.50 | 7250.0 | 6624.12 | -0.91    | 5810.07 | -0.80    |
| 124 | 267.75 | 7250.0 | 6569.80 | -0.90    | 5772.81 | -0.79    |
| 125 | 270.00 | 7250.0 | 6491.08 | -0.85    | 5698.38 | -0.75    |
| 126 | 272.25 | 7250.0 | 5898.90 | -0.81    | 5153.72 | -0.71    |
| 127 | 274.50 | 7250.0 | 5905.02 | -0.82    | 5158.26 | -0.71    |
| 128 | 276.75 | 7250.0 | 5912.75 | -0.82    | 5155.86 | -0.71    |
| 129 | 279.00 | 7250.0 | 5927.47 | -0.82    | 5160.69 | -0.71    |
| 130 | 281.25 | 7250.0 | 5952.59 | -0.82    | 5176.78 | -0.72    |
| 131 | 283.50 | 7250.0 | 5991.04 | -0.83    | 5207.34 | -0.72    |
| 132 | 285.75 | 7250.0 | 6043.73 | -0.84    | 5253.80 | -0.73    |
| 133 | 288.00 | 7250.0 | 6110.11 | -0.85    | 5316.29 | -0.74    |
| 134 | 290.25 | 7250.0 | 6188.42 | -0.86    | 5393.70 | -0.75    |
| 135 | 292.50 | 7250.0 | 6274.76 | -0.87    | 5482.36 | -0.76    |
| 136 | 294.75 | 7250.0 | 6364.30 | -0.88    | 5576.21 | -0.78    |
| 137 | 297.00 | 7250.0 | 6449.72 | -0.90    | 5664.41 | -0.79    |
| 138 | 299.25 | 7250.0 | 6530.20 | -0.90    | 5758.85 | -0.80    |
| 139 | 301.50 | 7250.0 | 6578.22 | -0.91    | 5783.09 | -0.80    |
| 140 | 303.75 | 7250.0 | 6686.18 | -0.93    | 5844.99 | -0.81    |
| 141 | 306.00 | 7250.0 | 6771.71 | -0.92    | 5947.63 | -0.81    |
| 142 | 307.80 | 7250.0 | 6623.22 | -0.91    | 5758.31 | -0.79    |
| 143 | 309.60 | 7250.0 | 6503.79 | -0.89    | 5679.16 | -0.78    |
| 144 | 311.40 | 7250.0 | 6440.26 | -0.88    | 5646.80 | -0.78    |
| 145 | 313.20 | 7250.0 | 6377.31 | -0.88    | 5592.94 | -0.77    |
| 146 | 315.00 | 7250.0 | 5730.24 | -0.82    | 5052.79 | -0.72    |
| 147 | 316.80 | 7250.0 | 6122.21 | -0.85    | 5407.46 | -0.75    |
| 148 | 318.60 | 7250.0 | 6140.99 | -0.85    | 5397.32 | -0.74    |
| 149 | 320.40 | 7250.0 | 6160.31 | -0.85    | 5385.60 | -0.74    |
| 150 | 322.20 | 7250.0 | 6185.33 | -0.86    | 5383.23 | -0.74    |
| 151 | 324.00 | 7250.0 | 6223.01 | -0.86    | 5400.17 | -0.74    |
| 152 | 325.80 | 7250.0 | 6219.69 | -0.86    | 5393.13 | -0.74    |
| 153 | 327.60 | 7250.0 | 6195.71 | -0.85    | 5373.24 | -0.74    |
| 154 | 329.40 | 7250.0 | 6175.36 | -0.85    | 5354.81 | -0.74    |
| 155 | 331.20 | 7250.0 | 6158.33 | -0.85    | 5337.75 | -0.74    |
| 156 | 333.00 | 7250.0 | 6144.19 | -0.85    | 5322.09 | -0.73    |
| 157 | 334.80 | 7250.0 | 6132.40 | -0.85    | 5307.99 | -0.73    |
| 158 | 336.60 | 7250.0 | 6123.06 | -0.84    | 5296.41 | -0.73    |
| 159 | 338.40 | 7250.0 | 6114.15 | -0.84    | 5286.72 | -0.73    |
| 160 | 340.20 | 7250.0 | 6105.76 | -0.84    | 5280.45 | -0.73    |
| 161 | 342.00 | 7250.0 | 6104.67 | -0.42    | 5293.13 | -0.37    |

5 VERIFICACIÓN DE LOS ESTADOS LÍMITES DE SERVICIO

5.1 TENSIONES NORMALES (ESTADO LÍMITE DE FISURACIÓN)

Los parámetros mecánicos del hormigón del tablero se han obtenido a partir de los modelos establecidos en la normativa vigente (EHE). Los valores de la resistencia a tracción se pueden determinar a partir de la resistencia característica a compresión  $f_{ck}$  como:

La resistencia a tracción se ha calculado como:

Valor medio  $f_{ctm} = 0,30 \sqrt[3]{f_{ck}^2}$  (MPa)  
Valor característico inferior  $f_{ctk} = 0,21 \sqrt[3]{f_{ck}^2}$  (Mpa)

En nuestro caso para  $f_{ck}=50$  MPa, tenemos:

Valor medio  $f_{ctm} = 4,07$  MPa  
Valor característico inferior  $f_{ctk} = 2,85$  MPa

En el tablero se han comprobado las siguientes condiciones, de acuerdo con la EHE (artículo 49) y el Model Code del CEB de 1990:

a. Hipótesis de carga de construcción:

a.1. Considerando peso propio y el 60 % del pretensado total para el descimbrado del tablero:

$\gamma_{t, \max} < 0$  Kp/cm<sup>2</sup>  
 $\gamma_{c, \max} < 0,60 f_{ck,5} \approx 0,30 f_{ck} = 120$  Kp/cm<sup>2</sup>

(El hormigón deberá alcanzar una resistencia a compresión antes del 1<sup>er</sup> tesado superior a 250 Kp/cm<sup>2</sup>).

a2. Considerando peso propio y el 100 % del pretensado inicial (con su valor característico superior):

$\sigma_{t, \max} < f_{ctk} = 28,5$  Kp/cm<sup>2</sup>  
 $\sigma_{c, \max} < 0,60 f_{ck} = 240$  Kp/cm<sup>2</sup>

b. Hipótesis de carga permanente, considerando peso propio, carga permanente y pretensado final (con su valor característico superior e inferior):

$\sigma_{t, \max} < 0$  Kp/cm<sup>2</sup>  
 $\sigma_{c, \max} < 0,40 f_{ck} = 200$  Kp/cm<sup>2</sup>

c. Hipótesis de combinación frecuente:

$\sigma_{t, \max} < f_{ctk} = 28,5$  Kp/cm<sup>2</sup>

Al tratarse de puentes de ferrocarril se ha procurado que bajo cargas frecuentes las fibras más solicitadas estén siempre comprimidas.

d. Hipótesis de combinación característica:

La normativa EHE exige que se verifique:

$\sigma_{c, \max} < 0,60 f_{ck} = 300$  Kp/cm<sup>2</sup>

Adicionalmente, se debe comprobar el ELS de fisuración, de modo que el máximo ancho de fisura  $w_{\max}$  verifique:

$w_{\max} < w_k = 0,2$  mm

Los puentes de ferrocarril están sometidos a un nivel de cargas importante, mucho más agresivo que en el caso de los puentes de carretera. Por este motivo, se ha dimensionado el pretensado de forma más conservadora a la establecida en la EHE, no admitiendo fisuración bajo la combinación característica de cargas.

$\sigma_{t, \max} < f_{ctm} = 40,7$  Kp/cm<sup>2</sup>

Todas las verificaciones donde aparecen las cargas de uso, se han realizado tanto para las sobrecargas de la normativa IPF como para las definidas en el Eurocódigo 1.

En los siguientes listados se han incluido, además de aquellas combinaciones requeridas por la Normativa, otras combinaciones adicionales con el valor del pretensado característico (sin minorar) para estimar los valores medios en la sección bajo las combinaciones de carga cuasi-permanentes, frecuentes y características.

Los valores representativos de las acciones se han obtenido de acuerdo con las especificaciones de las normativas vigentes, tomándose los siguientes valores de los coeficientes  $\psi$ :

| Acción             | $\psi_0$ | $\psi_1$                | $\psi_2$ |
|--------------------|----------|-------------------------|----------|
| Sobrecargas de uso | 0.8      | 0.8 (a) 0.6 (b) 0.4 (c) | 0        |
| Viento             | 0.6      | 0.5                     | 0.2      |
| Temperatura        | 0.6      | 0.5                     | 0.2      |

(a) Una vía cargada (b) dos vías cargadas (c) 0.4 tres o más vías cargadas

ENVOLVENTES DE ESFUERZOS CON IMPACTO

ENVOL. MIN. CORTANTES -IPF

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|------------|-----------|----------|
| 1     | 0.0003     | -38.1676  | -3.9119 | 98.0979    | 78.9255   | 0.1245   |
| 2     | -32.0461   | -42.2218  | -3.5488 | 111.6684   | 84.0211   | -0.3175  |
| 3     | 11.4167    | -49.8273  | -3.0305 | 59.9041    | 92.6768   | -0.9130  |
| 4     | 111.1881   | -60.9774  | -2.2420 | -38.2822   | 104.8359  | -1.7663  |
| 5     | 248.5960   | -75.6256  | -1.2199 | -117.4709  | 118.1795  | -2.7066  |
| 6     | 358.5317   | -91.4120  | -0.0674 | -247.2899  | 136.7986  | -4.0839  |
| 7     | 510.7189   | -112.3923 | 1.4750  | -370.4535  | 158.7725  | -5.7720  |
| 8     | 648.2366   | -136.7122 | 3.5596  | -469.7484  | 184.0674  | -7.9100  |
| 9     | 754.1931   | -164.3161 | 5.6493  | -528.5967  | 212.5883  | -10.0749 |
| 10    | 812.7556   | -195.0428 | 8.3069  | -531.2010  | 240.5031  | -12.6125 |
| 11    | 808.0083   | -225.1544 | 10.8943 | -409.7054  | 274.0655  | -15.4509 |
| 12    | 673.3234   | -260.7594 | 13.9784 | -259.3732  | 311.2389  | -18.6826 |
| 13    | 504.1855   | -299.9194 | 17.3778 | -12.6274   | 351.2296  | -22.1211 |
| 14    | 233.8021   | -341.7783 | 20.8539 | 342.2975   | 393.8795  | -25.7685 |
| 15    | -149.1046  | -386.2150 | 24.6373 | 815.2455   | 435.2542  | -29.1226 |
| 16    | -653.2439  | -429.2630 | 28.7037 | 1443.9061  | 479.9350  | -33.3905 |
| 17    | -1315.8650 | -475.5016 | 31.0332 | 2172.1743  | 529.2802  | -36.0465 |
| 18    | -2079.5994 | -526.2580 | 36.3454 | 3038.7690  | 580.1255  | -41.1938 |
| 19    | -2982.6958 | -578.3941 | 39.8689 | 4043.6743  | 632.0736  | -44.6374 |
| 20    | -4024.4919 | -631.5142 | 42.7950 | 5194.9707  | 597.4061  | -41.2096 |
| 21    | -238.8102  | -104.6264 | 10.1307 | -627.1606  | 78.0120   | 0.4764   |
| 22    | 657.7478   | -30.0431  | -4.5808 | -533.1794  | 80.6744   | -0.1031  |
| 23    | 620.7930   | -34.7276  | -3.6981 | -485.6849  | 85.3551   | -0.9839  |
| 24    | 628.4695   | -41.6765  | -3.0060 | -477.7359  | 92.3040   | -1.6768  |
| 25    | 672.1178   | -51.0830  | -2.1714 | -561.4849  | 104.1626  | -3.8840  |
| 26    | 802.1581   | -65.5634  | 0.6370  | -685.5775  | 120.1019  | -5.6820  |
| 27    | 965.8173   | -84.2745  | 2.8144  | -809.4978  | 139.2916  | -7.9369  |
| 28    | 1121.4701  | -106.3532 | 4.8926  | -915.9968  | 161.8361  | -10.0370 |
| 29    | 1251.0281  | -131.8281 | 7.4884  | -1035.3514 | 190.6109  | -13.0252 |
| 30    | 1383.9756  | -163.6068 | 11.0707 | -1059.0380 | 220.8984  | -16.8375 |
| 31    | 1411.4996  | -196.9135 | 14.3018 | -1021.3972 | 256.0585  | -19.7964 |
| 32    | 1368.0409  | -235.1228 | 18.5498 | -938.7819  | 295.9453  | -24.3726 |
| 33    | 1270.0380  | -277.9348 | 22.7436 | -676.0283  | 342.2940  | -28.6589 |
| 34    | 982.8219   | -327.1655 | 27.2035 | -274.2995  | 388.2803  | -32.9465 |
| 35    | 548.2711   | -375.9511 | 31.7075 | 283.2663   | 437.4902  | -37.6104 |
| 36    | -49.3850   | -427.8299 | 36.3980 | 978.5168   | 491.7600  | -42.3120 |
| 37    | -790.6633  | -484.6145 | 41.9244 | 1897.4185  | 550.7067  | -47.9220 |
| 38    | -1760.2166 | -545.8666 | 45.6747 | 3009.0784  | 608.3713  | -51.4222 |
| 39    | -2925.1646 | -605.6056 | 51.8462 | 4321.1108  | 668.2227  | -57.4019 |
| 40    | -4292.3726 | -667.3473 | 54.7088 | 5837.9678  | 645.9152  | -53.3797 |
| 41    | 553.1340   | -105.9747 | 2.7246  | -1233.5627 | 96.3684   | 1.3790   |
| 42    | 1266.2642  | -48.4654  | -5.3254 | -1100.2649 | 99.0911   | 0.5909   |
| 43    | 1190.9277  | -53.2425  | -4.4230 | -1014.1147 | 103.8818  | -0.3050  |
| 44    | 1160.4990  | -60.3259  | -3.4379 | -967.8296  | 110.9477  | -1.2626  |
| 45    | 1166.0527  | -69.8724  | -2.5850 | -951.9079  | 120.4932  | -2.1334  |
| 46    | 1196.4365  | -82.0595  | -0.8804 | -992.6434  | 134.1619  | -5.6526  |
| 47    | 1276.6758  | -98.4796  | 2.6676  | -1089.3713 | 153.5547  | -7.7725  |
| 48    | 1404.7443  | -120.7574 | 4.9920  | -1167.7111 | 176.2843  | -10.1764 |
| 49    | 1505.7725  | -146.4436 | 7.7371  | -1258.1150 | 205.2666  | -13.1601 |
| 50    | 1609.3652  | -178.4407 | 10.5962 | -1251.1266 | 235.7336  | -16.3946 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|------------|-----------|----------|
| 51    | 1605.8063  | -211.9211 | 14.7336 | -1182.7695 | 271.1740  | -20.2670 |
| 52    | 1531.1289  | -250.3596 | 18.2674 | -1068.4749 | 311.2933  | -23.9412 |
| 53    | 1400.9149  | -293.4386 | 22.6584 | -772.3892  | 357.8485  | -28.8346 |
| 54    | 1080.0220  | -342.8759 | 27.5798 | -336.1099  | 404.0454  | -33.3632 |
| 55    | 610.5273   | -391.8484 | 32.2200 | 256.6220   | 453.4170  | -37.9351 |
| 56    | -22.5600   | -443.8597 | 36.9881 | 987.7792   | 507.7945  | -42.8698 |
| 57    | -799.9507  | -500.6888 | 41.3335 | 1943.1057  | 566.7863  | -47.4534 |
| 58    | -1806.0089 | -561.9950 | 47.0547 | 3091.0503  | 624.4845  | -52.6922 |
| 59    | -3007.3115 | -621.7614 | 51.3071 | 4439.3027  | 684.3499  | -56.8286 |
| 60    | -4410.6338 | -683.4738 | 54.0530 | 5992.0332  | 661.8877  | -52.8385 |
| 61    | 723.8544   | -110.6716 | 2.0836  | -1421.3527 | 101.7733  | 2.0689   |
| 62    | 1454.2600  | -53.8770  | -5.6122 | -1276.0994 | 104.4989  | 0.8454   |
| 63    | 1367.0476  | -58.6569  | -4.6072 | -1178.0665 | 109.2934  | -0.1274  |
| 64    | 1324.7939  | -65.7515  | -3.5486 | -1119.9338 | 116.3721  | -1.1545  |
| 65    | 1318.5330  | -75.3112  | -2.6621 | -1092.1655 | 125.9329  | -2.0440  |
| 66    | 1337.1458  | -87.4946  | -1.2142 | -1105.4786 | 138.8969  | -5.3328  |
| 67    | 1389.8499  | -103.2606 | 2.7109  | -1191.8964 | 158.3452  | -7.8289  |
| 68    | 1507.6663  | -125.5624 | 4.7559  | -1259.7523 | 181.1076  | -9.8859  |
| 69    | 1597.9246  | -151.3006 | 7.3445  | -1339.5383 | 210.1129  | -12.7914 |
| 70    | 1690.9033  | -183.3096 | 10.6155 | -1321.7534 | 240.6019  | -16.4963 |
| 71    | 1676.5005  | -216.7889 | 14.9566 | -1242.6310 | 276.0299  | -20.5150 |
| 72    | 1591.0248  | -255.2486 | 18.5754 | -1117.4095 | 316.1759  | -24.1877 |
| 73    | 1449.9730  | -298.3180 | 22.7254 | -810.2330  | 362.7512  | -28.8805 |
| 74    | 1117.8086  | -347.7544 | 27.7631 | -362.9240  | 408.9137  | -33.5641 |
| 75    | 637.2079   | -396.7215 | 32.4254 | 240.5695   | 458.2762  | -38.1214 |
| 76    | -6.4460    | -448.6965 | 36.9827 | 983.1647   | 512.6565  | -42.9441 |
| 77    | -795.4998  | -505.5839 | 41.5986 | 1948.8381  | 571.6453  | -47.6937 |
| 78    | -1811.7218 | -566.8460 | 47.7182 | 3108.0789  | 629.3434  | -53.3257 |
| 79    | -3024.3677 | -626.6206 | 51.1031 | 4467.1963  | 689.2000  | -56.6148 |
| 80    | -4438.5332 | -688.3179 | 53.8305 | 6030.7573  | 666.6719  | -52.5497 |
| 81    | 754.1339   | -110.5143 | 2.2049  | -1453.4243 | 101.6256  | 1.9082   |
| 82    | 1486.3406  | -53.7179  | -5.7949 | -1308.4680 | 104.3545  | 1.0549   |
| 83    | 1399.4141  | -58.5326  | -4.9101 | -1210.7913 | 109.1520  | 0.1560   |
| 84    | 1357.5027  | -65.6135  | -3.4269 | -1152.9623 | 116.2298  | -1.2826  |
| 85    | 1351.5895  | -75.1562  | -2.8536 | -1125.4902 | 125.7917  | -1.8706  |
| 86    | 1370.3716  | -87.3844  | -0.6908 | -1138.3605 | 138.7343  | -5.8331  |
| 87    | 1422.7285  | -103.0726 | 2.1526  | -1225.1732 | 158.1554  | -7.2261  |
| 88    | 1540.9329  | -125.3888 | 4.8337  | -1293.4491 | 180.9324  | -10.0940 |
| 89    | 1631.7229  | -151.1284 | 8.0888  | -1373.6194 | 209.9596  | -13.5950 |
| 90    | 1724.9987  | -183.1434 | 11.1322 | -1356.2183 | 240.4504  | -16.8325 |
| 91    | 1710.9431  | -216.6920 | 14.5389 | -1277.2186 | 275.9370  | -20.1396 |
| 92    | 1625.6155  | -255.1151 | 19.1395 | -1152.1299 | 316.0449  | -24.8706 |
| 93    | 1484.5310  | -298.1530 | 22.9288 | -845.4049  | 362.5570  | -28.8749 |
| 94    | 1152.8551  | -347.5925 | 27.7122 | -398.6106  | 408.7335  | -33.5836 |
| 95    | 673.0061   | -396.5067 | 32.4555 | 204.9577   | 458.0885  | -38.2452 |
| 96    | 28.9995    | -448.5285 | 37.1995 | 946.6161   | 512.4543  | -43.1040 |
| 97    | -758.8889  | -505.3593 | 42.0065 | 1912.1399  | 571.4374  | -48.0777 |
| 98    | -1775.0278 | -566.6256 | 46.8800 | 3071.2578  | 629.1353  | -52.5791 |
| 99    | -2987.5681 | -626.4246 | 52.3855 | 4429.5269  | 688.9954  | -57.8593 |
| 100   | -4400.8848 | -688.1200 | 53.7256 | 5992.6748  | 666.4895  | -52.3751 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|------------|-----------|----------|
| 101   | 723.3740   | -106.3141 | 2.3995  | -1432.0876 | 97.4450   | 1.6908   |
| 102   | 1465.0043  | -49.5529  | -6.0454 | -1296.5676 | 100.1748  | 1.3099   |
| 103   | 1387.5044  | -54.3511  | -4.7686 | -1208.2847 | 104.9710  | 0.0061   |
| 104   | 1355.0311  | -61.4210  | -3.6090 | -1159.8341 | 112.0552  | -1.1039  |
| 105   | 1358.4669  | -70.9816  | -2.7406 | -1141.7522 | 121.6155  | -1.9834  |
| 106   | 1386.7126  | -83.1949  | -0.8993 | -1164.0138 | 134.5627  | -5.6518  |
| 107   | 1448.2952  | -98.9286  | 2.6715  | -1260.1823 | 153.9989  | -7.7842  |
| 108   | 1575.9092  | -121.2392 | 5.1255  | -1337.7297 | 176.7901  | -10.2699 |
| 109   | 1675.9700  | -146.9730 | 7.4174  | -1427.1182 | 205.8044  | -12.8750 |
| 110   | 1778.4044  | -178.9973 | 11.0911 | -1418.9600 | 236.2848  | -16.9251 |
| 111   | 1773.6350  | -212.5016 | 14.6629 | -1349.3115 | 271.7600  | -20.1859 |
| 112   | 1697.5685  | -250.9980 | 18.8706 | -1233.4115 | 311.9464  | -24.5662 |
| 113   | 1565.6775  | -294.1198 | 22.8694 | -935.5352  | 358.5608  | -28.9232 |
| 114   | 1242.8511  | -343.6394 | 27.8510 | -497.4365  | 404.7937  | -33.7290 |
| 115   | 771.6336   | -392.5959 | 32.6648 | 97.6320    | 454.1812  | -38.4521 |
| 116   | 136.0430   | -444.6456 | 37.4460 | 831.0409   | 508.5806  | -43.3175 |
| 117   | -643.6260  | -501.4803 | 42.5944 | 1787.8826  | 567.5444  | -48.6230 |
| 118   | -1651.0269 | -562.7742 | 47.4526 | 2938.2603  | 625.2706  | -53.0984 |
| 119   | -2854.7197 | -622.5476 | 51.0000 | 4288.4307  | 685.1297  | -56.6357 |
| 120   | -4259.8008 | -684.2481 | 56.3744 | 5842.9761  | 662.4838  | -55.0492 |
| 121   | -249.8750  | -104.4911 | 10.3172 | -1300.0938 | 79.6075   | 1.6764   |
| 122   | 1333.2091  | -31.7397  | -6.0077 | -1204.8463 | 82.3649   | 1.2717   |
| 123   | 1296.0254  | -36.5866  | -4.7775 | -1156.7682 | 87.2081   | 0.0415   |
| 124   | 1303.6782  | -43.7319  | -4.0644 | -1148.3389 | 94.3544   | -0.6453  |
| 125   | 1347.0240  | -53.3667  | -2.8256 | -1169.9434 | 104.0021  | -1.9250  |
| 126   | 1414.7461  | -65.6711  | -0.9110 | -1231.4019 | 117.0356  | -5.6098  |
| 127   | 1515.1460  | -81.5155  | 2.1991  | -1366.0623 | 136.6068  | -7.3028  |
| 128   | 1680.9714  | -103.9680 | 5.1111  | -1481.3328 | 159.5499  | -10.3061 |
| 129   | 1818.3469  | -129.8822 | 7.5070  | -1607.3691 | 188.7750  | -12.9124 |
| 130   | 1956.9358  | -162.1369 | 10.7351 | -1634.9431 | 219.4711  | -16.6192 |
| 131   | 1987.5128  | -195.8595 | 15.3272 | -1599.6145 | 255.1848  | -20.8927 |
| 132   | 1945.1504  | -234.5876 | 18.8785 | -1516.6359 | 295.6020  | -24.4834 |
| 133   | 1845.8748  | -277.9539 | 23.1315 | -1251.0464 | 342.4304  | -29.2210 |
| 134   | 1555.0928  | -327.6132 | 28.0881 | -844.2988  | 388.8353  | -33.8647 |
| 135   | 1114.8745  | -376.8390 | 32.8408 | -280.1804  | 438.4738  | -38.6505 |
| 136   | 510.3219   | -429.0834 | 37.7530 | 423.2238   | 493.0716  | -43.6849 |
| 137   | -239.1166  | -486.1382 | 42.9750 | 1349.7137  | 552.2437  | -49.0167 |
| 138   | -1215.7124 | -547.5435 | 48.0254 | 2469.2468  | 610.0546  | -53.6890 |
| 139   | -2387.7195 | -607.3914 | 52.6560 | 3787.0713  | 669.9661  | -58.2402 |
| 140   | -3759.2178 | -669.1166 | 56.8436 | 5308.0605  | 647.0422  | -55.5830 |
| 141   | -257.5530  | -104.5839 | 10.3949 | -942.9003  | 27.5708   | 0.9905   |
| 142   | 242.5440   | -7.0919   | -0.2851 | -949.3945  | 29.3024   | 0.3259   |
| 143   | 229.7773   | -7.0916   | -0.2827 | -989.1993  | 32.3241   | 0.2106   |
| 144   | 393.5146   | -12.8586  | 2.1649  | -1059.1478 | 36.7784   | -1.1767  |
| 145   | 611.8486   | -21.2459  | 3.1003  | -1154.8510 | 42.7795   | -1.8767  |
| 146   | 695.7028   | -25.7734  | 3.6061  | -1271.0564 | 50.4411   | -3.2456  |
| 147   | 893.3722   | -35.4258  | 4.5862  | -1401.4346 | 59.8400   | -4.3291  |
| 148   | 1075.0221  | -45.9071  | 5.5899  | -1608.0884 | 74.3754   | -8.5306  |
| 149   | 1235.1138  | -57.1216  | 6.9038  | -1835.4729 | 92.6506   | -11.2091 |
| 150   | 1368.3040  | -69.0590  | 8.0805  | -1993.7965 | 110.6291  | -13.1905 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1 | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|---------|------------|-----------|----------|
| 151   | 2272.9951 | -87.7029  | 12.0798 | -2171.7141 | 133.9687  | -16.5325 |
| 152   | 2455.2395 | -113.2374 | 15.6274 | -2305.4917 | 160.0116  | -20.0561 |
| 153   | 2586.4160 | -141.4914 | 18.6425 | -2403.9211 | 190.6084  | -23.7481 |
| 154   | 2674.7588 | -174.6064 | 22.4162 | -2429.5708 | 224.8869  | -27.2370 |
| 155   | 2682.3125 | -211.2110 | 27.7804 | -2312.3428 | 256.9003  | -32.3212 |
| 156   | 2538.8674 | -245.6209 | 32.3654 | -2138.9614 | 297.0770  | -37.2005 |
| 157   | 2330.6189 | -288.2830 | 35.8074 | -1838.5349 | 340.4740  | -40.6281 |
| 158   | 1986.7084 | -334.1395 | 40.7440 | -1393.4216 | 387.0787  | -45.7591 |
| 159   | 1489.0541 | -383.2666 | 45.8257 | -786.5173  | 436.8845  | -50.7937 |
| 160   | 820.6642  | -435.5884 | 50.8211 | -0.0048    | 482.9102  | -55.1669 |



ENVOLVENTES DE ESFUERZOS CON IMPACTO

ENVOL. MIN. TORSORES -IPF

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 1     | -0.0070   | -0.0080   | -5.1047   | -35.1318  | 1.3097    | 7.6476   |
| 2     | 35.1318   | -1.3097   | -7.6476   | -147.5610 | 5.8770    | 26.7251  |
| 3     | 147.5610  | -5.8770   | -26.7251  | -319.9249 | 13.6629   | 41.8111  |
| 4     | 319.9249  | -13.6629  | -41.8111  | -464.5549 | 21.3958   | 56.8789  |
| 5     | 464.5549  | -21.3958  | -56.8789  | -504.0289 | 25.2303   | 64.3310  |
| 6     | 504.0289  | -25.2303  | -64.3310  | -549.9106 | 28.9079   | 79.8420  |
| 7     | 601.4672  | -32.8237  | -79.2939  | -682.5495 | 39.8969   | 105.1968 |
| 8     | 673.1520  | -40.3130  | -94.1169  | -801.7019 | 52.6871   | 133.4865 |
| 9     | 720.0516  | -47.6641  | -109.0343 | -903.2726 | 66.8736   | 165.9292 |
| 10    | 1032.7688 | -58.9078  | -137.6438 | -961.5284 | 81.6346   | 195.8285 |
| 11    | 1099.8892 | -73.9436  | -170.6638 | -970.2494 | 98.3995   | 234.2614 |
| 12    | 1098.8330 | -91.8950  | -211.0874 | -961.1215 | 117.1362  | 275.7263 |
| 13    | 1083.2896 | -111.4870 | -255.3035 | -906.7753 | 137.1350  | 320.9537 |
| 14    | 983.2706  | -133.9000 | -302.6382 | -761.8464 | 159.9523  | 369.2580 |
| 15    | 835.3242  | -157.0218 | -353.4700 | -567.1986 | 181.5419  | 416.1853 |
| 16    | 674.9329  | -177.5570 | -403.2131 | -346.3929 | 202.8930  | 469.1118 |
| 17    | 373.4026  | -201.9756 | -458.1131 | -9.6740   | 228.8651  | 526.8844 |
| 18    | 60.0278   | -227.2100 | -518.6055 | 354.8862  | 254.1414  | 587.6505 |
| 19    | -331.1255 | -253.3993 | -581.8055 | 797.1223  | 280.2400  | 651.1530 |
| 20    | -787.2872 | -279.9659 | -647.6799 | 1308.0732 | 262.9176  | 627.3243 |
| 21    | -119.2448 | -52.3122  | -138.1370 | 1102.8403 | -34.0156  | 34.0359  |
| 22    | 30.2576   | -0.9340   | -16.5833  | 963.3099  | -31.9680  | 43.3918  |
| 23    | 132.9986  | -4.3433   | -26.0496  | 794.5857  | -28.6031  | 56.6090  |
| 24    | 232.5531  | -8.1589   | -37.5505  | 601.6572  | -23.7420  | 73.2705  |
| 25    | 326.5332  | -12.3713  | -49.7564  | 366.3536  | -16.2919  | 96.4035  |
| 26    | 473.4486  | -19.3860  | -68.4304  | 143.2724  | -7.9874   | 121.5366 |
| 27    | 547.8739  | -24.4595  | -80.6076  | -80.6796  | 2.0846    | 150.3924 |
| 28    | 236.6533  | 14.3911   | -109.2130 | -296.2048 | 13.9515   | 183.1079 |
| 29    | 463.6290  | 1.0437    | -144.9550 | -523.8508 | 29.5037   | 223.8324 |
| 30    | 697.9932  | -16.0306  | -188.5776 | -691.2169 | 45.2780   | 264.4388 |
| 31    | 867.6185  | -33.2656  | -232.7894 | -819.2465 | 62.8358   | 309.4015 |
| 32    | 981.6467  | -53.1208  | -280.0000 | -912.0297 | 83.5360   | 357.9925 |
| 33    | 1077.6182 | -74.5204  | -332.3189 | -925.6324 | 106.6973  | 415.9260 |
| 34    | 1078.9939 | -99.1251  | -393.4024 | -869.8011 | 129.6806  | 472.6837 |
| 35    | 978.3817  | -124.8430 | -452.8568 | -704.7335 | 155.6106  | 532.3912 |
| 36    | 789.1198  | -152.1531 | -515.7283 | -463.5066 | 184.1203  | 597.4053 |
| 37    | 561.5707  | -180.3939 | -584.3517 | -147.5784 | 213.4385  | 669.7533 |
| 38    | 208.0679  | -211.3271 | -659.6335 | 277.7300  | 242.5783  | 740.2911 |
| 39    | -235.6331 | -241.1870 | -733.2278 | 794.9222  | 272.4964  | 814.2496 |
| 40    | -783.1477 | -272.1533 | -810.4690 | 1417.4404 | 261.4411  | 794.5654 |
| 41    | -124.0063 | -52.2422  | -141.0478 | 1196.8467 | -36.8521  | 41.6066  |
| 42    | 30.9577   | -0.9548   | -16.7118  | 1045.4811 | -34.6221  | 50.9310  |
| 43    | 136.3062  | -4.4501   | -26.1755  | 865.4969  | -31.0503  | 63.9502  |
| 44    | 237.7751  | -8.3386   | -37.6854  | 662.1464  | -26.0075  | 80.7866  |
| 45    | 332.9980  | -12.6108  | -49.8470  | 416.0059  | -18.3256  | 103.8691 |
| 46    | 481.0352  | -19.6866  | -68.5049  | 184.4906  | -9.8378   | 128.9971 |
| 47    | -42.4595  | 27.6828   | -84.7617  | -47.1437  | 0.3784    | 157.8519 |
| 48    | 204.8400  | 16.0130   | -116.6855 | -269.3788 | 12.4005   | 190.5267 |
| 49    | 438.4380  | 2.5250    | -152.3899 | -503.4665 | 28.1149   | 231.2711 |
| 50    | 679.0591  | -14.6995  | -196.3496 | -675.9761 | 43.9969   | 272.1672 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 51    | 853.0277  | -32.1260  | -240.0070 | -807.6388 | 61.7511   | 316.5941 |
| 52    | 981.7864  | -51.3430  | -287.8750 | -916.5958 | 81.8065   | 365.9230 |
| 53    | 1070.7136 | -73.5941  | -339.8578 | -920.9835 | 105.8015  | 423.3243 |
| 54    | 1072.4592 | -98.4338  | -400.5312 | -864.8229 | 129.0195  | 479.7976 |
| 55    | 971.0837  | -124.3564 | -460.1886 | -698.5156 | 155.1411  | 539.8127 |
| 56    | 815.5341  | -150.3651 | -523.5366 | -493.9557 | 182.3331  | 605.2272 |
| 57    | 559.8511  | -179.8604 | -591.8203 | -146.9774 | 212.9088  | 677.1710 |
| 58    | 215.4868  | -210.5144 | -667.1876 | 268.4541  | 241.7569  | 747.8950 |
| 59    | -230.5480 | -240.5338 | -740.9677 | 788.1650  | 271.8266  | 821.9966 |
| 60    | -776.1313 | -271.4740 | -818.2144 | 1408.6794 | 260.6842  | 801.8662 |
| 61    | -124.4100 | -52.2606  | -141.0379 | 1125.2744 | -34.4910  | 41.8412  |
| 62    | 31.0421   | -0.9562   | -16.7081  | 981.4841  | -32.3465  | 51.3981  |
| 63    | 136.6291  | -4.4559   | -26.1562  | 806.3082  | -28.7677  | 64.3876  |
| 64    | 238.2733  | -8.3503   | -37.6550  | 613.9576  | -23.9679  | 81.1940  |
| 65    | 333.6288  | -12.6299  | -49.8061  | 372.0029  | -16.2755  | 104.2440 |
| 66    | 481.7758  | -19.7195  | -68.5090  | 154.1796  | -8.2311   | 129.2899 |
| 67    | -37.5525  | 27.2323   | -85.0858  | -51.1525  | 0.8356    | 158.1704 |
| 68    | 209.0036  | 15.5565   | -117.0092 | -272.5867 | 12.8727   | 190.8899 |
| 69    | 441.6852  | 2.0184    | -152.8136 | -505.7081 | 28.6224   | 231.6657 |
| 70    | 681.2760  | -15.2250  | -196.6029 | -677.0695 | 44.5271   | 272.3724 |
| 71    | 852.4401  | -32.7887  | -240.1750 | -805.6276 | 62.4111   | 316.7480 |
| 72    | 979.7883  | -52.0229  | -287.9995 | -913.0784 | 82.4850   | 366.0720 |
| 73    | 1073.0690 | -73.9218  | -340.2028 | -922.5577 | 106.1385  | 423.6957 |
| 74    | 1060.9377 | -99.4388  | -400.6984 | -851.0235 | 130.0166  | 479.9544 |
| 75    | 1005.5295 | -123.1188 | -460.5875 | -735.8860 | 153.8968  | 540.1946 |
| 76    | 798.0259  | -151.4005 | -523.6732 | -473.9371 | 183.3756  | 605.3622 |
| 77    | 560.5364  | -180.1260 | -591.9984 | -147.3374 | 213.1557  | 677.3162 |
| 78    | 219.3094  | -210.6311 | -667.3586 | 265.0436  | 241.8791  | 748.1042 |
| 79    | -226.9525 | -240.6562 | -741.2247 | 784.7780  | 271.9467  | 822.2546 |
| 80    | -772.6874 | -271.5831 | -818.4674 | 1405.4906 | 260.7637  | 802.1341 |
| 81    | -124.4299 | -52.2569  | -141.0352 | 1099.7352 | -33.3396  | 42.0240  |
| 82    | 31.0028   | -0.9564   | -16.7089  | 958.4576  | -31.1705  | 51.3025  |
| 83    | 136.6228  | -4.4580   | -26.1809  | 785.9790  | -27.5851  | 64.2818  |
| 84    | 238.2954  | -8.3566   | -37.6647  | 602.7276  | -23.0215  | 81.2852  |
| 85    | 333.6056  | -12.6338  | -49.8011  | 354.5673  | -14.9750  | 104.2332 |
| 86    | 481.7337  | -19.7235  | -68.4391  | 183.9212  | -8.9532   | 129.3880 |
| 87    | -41.6019  | 26.7694   | -85.0976  | -46.0529  | 1.2995    | 158.1953 |
| 88    | 195.9699  | 15.4941   | -117.0229 | -259.4481 | 12.9327   | 190.8526 |
| 89    | 426.2812  | 2.1155    | -152.6351 | -490.4936 | 28.5384   | 231.4680 |
| 90    | 666.1470  | -15.1299  | -196.4984 | -662.1219 | 44.4339   | 272.3605 |
| 91    | 839.4537  | -32.5502  | -240.5467 | -793.1466 | 62.1729   | 317.1031 |
| 92    | 967.5020  | -51.7535  | -287.7279 | -901.3508 | 82.2196   | 365.7632 |
| 93    | 1067.4595 | -73.2824  | -340.3726 | -918.4286 | 105.4816  | 423.9530 |
| 94    | 1072.3164 | -97.9960  | -400.9931 | -865.7664 | 128.5650  | 480.1979 |
| 95    | 978.1601  | -123.5884 | -460.5435 | -707.2226 | 154.3808  | 540.1476 |
| 96    | 813.1289  | -150.0649 | -523.6974 | -492.2773 | 182.0238  | 605.3733 |
| 97    | 583.0806  | -178.6044 | -592.0942 | -173.1848 | 211.6450  | 677.4450 |
| 98    | 238.6752  | -209.3470 | -667.3921 | 242.9382  | 240.5997  | 748.1136 |
| 99    | -201.1227 | -239.2514 | -741.1084 | 755.6552  | 270.5375  | 822.1382 |
| 100   | -743.3505 | -270.1860 | -818.5244 | 1372.9834 | 259.3756  | 802.2225 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 101   | -124.3971 | -52.2577  | -141.0475 | 1095.6466 | -33.2221  | 42.0630  |
| 102   | 31.0017   | -0.9569   | -16.7096  | 952.1845  | -30.9757  | 51.0677  |
| 103   | 136.6486  | -4.4622   | -26.1916  | 780.1360  | -27.3843  | 64.2916  |
| 104   | 238.2835  | -8.3587   | -37.6722  | 588.2128  | -22.4695  | 81.1479  |
| 105   | 333.5801  | -12.6366  | -49.8153  | 349.5940  | -14.7706  | 104.2221 |
| 106   | 481.7218  | -19.7239  | -68.4671  | 179.6629  | -8.7576   | 129.3171 |
| 107   | -37.6924  | 26.5823   | -85.0821  | -49.5410  | 1.4784    | 158.1480 |
| 108   | 196.1367  | 15.4844   | -116.9570 | -259.5625 | 12.9461   | 190.8301 |
| 109   | 427.7625  | 2.0221    | -152.8119 | -491.7335 | 28.6281   | 231.6796 |
| 110   | 663.8669  | -14.9994  | -196.4961 | -660.1620 | 44.2987   | 272.2996 |
| 111   | 837.4741  | -32.3954  | -240.4741 | -791.4995 | 62.0255   | 317.0710 |
| 112   | 965.6079  | -51.6339  | -287.9402 | -899.7245 | 82.1045   | 365.9711 |
| 113   | 1065.8312 | -73.1916  | -340.3431 | -916.9687 | 105.4134  | 423.8699 |
| 114   | 1070.7543 | -97.9473  | -400.9005 | -864.3041 | 128.5226  | 480.0936 |
| 115   | 1001.5195 | -122.4211 | -460.4190 | -733.1531 | 153.2144  | 540.0279 |
| 116   | 850.1044  | -148.4455 | -523.5717 | -532.7705 | 180.4146  | 605.2639 |
| 117   | 626.4678  | -176.8554 | -592.1229 | -220.5826 | 209.8860  | 677.4771 |
| 118   | 289.1914  | -207.4993 | -667.4213 | 188.0795  | 238.7457  | 748.1504 |
| 119   | -145.9232 | -237.3808 | -741.2151 | 696.4594  | 268.6725  | 822.1866 |
| 120   | -682.1393 | -268.2324 | -818.0359 | 1307.4326 | 257.3532  | 801.7317 |
| 121   | -124.8221 | -52.2464  | -141.0584 | 1096.6857 | -33.4924  | 42.2066  |
| 122   | 31.1126   | -0.9670   | -16.7222  | 952.4722  | -31.2290  | 51.2227  |
| 123   | 136.8885  | -4.5056   | -26.1971  | 783.4633  | -27.7436  | 64.4115  |
| 124   | 238.5234  | -8.4380   | -37.7127  | 587.1966  | -22.6423  | 81.0875  |
| 125   | 333.6845  | -12.7551  | -49.8727  | 352.5952  | -15.0529  | 104.3270 |
| 126   | 481.4525  | -19.8999  | -68.4419  | 179.3146  | -8.8525   | 129.4147 |
| 127   | -37.4638  | 26.6020   | -85.1735  | -49.6805  | 1.4750    | 158.2289 |
| 128   | 191.4948  | 15.6536   | -117.0279 | -255.1156 | 12.8004   | 190.8901 |
| 129   | 423.3425  | 2.0547    | -152.8524 | -486.9807 | 28.6375   | 231.7517 |
| 130   | 660.1984  | -15.2054  | -196.7420 | -655.7078 | 44.5312   | 272.5050 |
| 131   | 831.8094  | -32.6935  | -240.3009 | -784.6926 | 62.3531   | 316.9052 |
| 132   | 957.4579  | -52.0658  | -288.2119 | -889.9197 | 82.5769   | 366.2732 |
| 133   | 1054.5144 | -73.7336  | -340.4515 | -903.9303 | 105.9702  | 423.9689 |
| 134   | 1056.0421 | -98.5609  | -401.2151 | -847.5129 | 129.1722  | 480.4986 |
| 135   | 982.8975  | -123.1799 | -460.9165 | -712.3831 | 153.9960  | 540.5004 |
| 136   | 827.7186  | -149.2923 | -523.8780 | -507.7844 | 181.2844  | 605.5532 |
| 137   | 599.8394  | -177.8223 | -592.4191 | -191.3530 | 210.8735  | 677.7805 |
| 138   | 258.5360  | -208.5215 | -667.7494 | 221.3432  | 239.7765  | 748.4788 |
| 139   | -180.3970 | -238.4411 | -741.5441 | 733.2165  | 269.7299  | 822.5323 |
| 140   | -719.1104 | -269.3142 | -818.5792 | 1346.6736 | 258.2800  | 803.1595 |
| 141   | -128.6305 | -52.2931  | -142.3282 | 1163.6685 | -34.0168  | 49.3964  |
| 142   | -22.6649  | 0.6604    | -16.6502  | 1054.7744 | -32.5413  | 57.5690  |
| 143   | 86.5267   | -2.6740   | -24.8826  | 914.1747  | -29.8595  | 68.3620  |
| 144   | 196.7669  | -6.4359   | -38.8211  | 765.6495  | -26.5753  | 83.4976  |
| 145   | 305.9029  | -10.6290  | -53.4154  | 614.8726  | -22.7639  | 98.8879  |
| 146   | -560.9715 | 40.3411   | -61.1951  | 458.6624  | -18.1869  | 119.8929 |
| 147   | -357.8695 | 33.6995   | -84.4557  | 262.1511  | -11.1702  | 144.1145 |
| 148   | -176.7966 | 26.9855   | -111.1872 | 88.8580   | -4.0775   | 171.7691 |
| 149   | 23.7358   | 18.2709   | -141.1781 | -99.0820  | 5.0409    | 202.7278 |
| 150   | 233.0923  | 7.5314    | -174.5312 | -258.7320 | 14.4019   | 232.3806 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 391.8634 | -2.5439   | -206.4981 | -428.5351 | 26.4748   | 269.4595 |
| 152   | 570.2708 | -16.0991  | -245.9331 | -581.8175 | 40.4334   | 309.8526 |
| 153   | 722.2316 | -31.2011  | -288.8571 | -704.3735 | 55.9236   | 353.7936 |
| 154   | 839.7375 | -47.8866  | -335.2596 | -788.1027 | 73.0294   | 401.0695 |
| 155   | 914.5786 | -66.1724  | -384.4478 | -800.6228 | 89.0170   | 444.3207 |
| 156   | 913.9883 | -83.3631  | -430.2806 | -785.0302 | 109.0921  | 497.6107 |
| 157   | 880.6685 | -104.6990 | -486.5370 | -705.5847 | 130.7929  | 554.8619 |
| 158   | 779.8126 | -127.6280 | -545.7560 | -554.2180 | 154.0994  | 614.5685 |
| 159   | 602.1937 | -152.1961 | -607.9648 | -321.9449 | 179.0047  | 677.1836 |
| 160   | 339.2427 | -178.3592 | -673.0891 | 0.0611    | 202.0224  | 734.5824 |



ENVOL. MAX. FLECTORES -EC1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 1     | 0.0430    | 157.2381  | -562.2398 | -628.3884  | -333.6245 | -38.1442  |
| 2     | 680.1830  | 362.4037  | 59.8699   | -1275.4712 | -304.1262 | -65.8114  |
| 3     | 1275.6101 | 304.1274  | 65.9993   | -1791.0422 | -259.4485 | -53.1256  |
| 4     | 1791.1328 | 259.4289  | 53.3340   | -2224.8330 | -217.8276 | -9.6856   |
| 5     | 2224.8425 | 217.8276  | 9.6910    | -2575.5754 | -173.2458 | -16.8875  |
| 6     | 2575.6646 | 173.2636  | 17.2811   | -2849.0200 | -131.9271 | -37.3372  |
| 7     | 2849.0254 | 131.9207  | 37.3319   | -3036.4189 | -90.4267  | 5.6956    |
| 8     | 3036.5205 | 90.3812   | -4.8795   | -3146.2920 | -35.6275  | -14.0838  |
| 9     | 3146.2522 | 35.6059   | 13.6050   | -3176.4851 | 11.8498   | 12.0572   |
| 10    | 3176.5146 | -11.8946  | -11.0823  | -3130.6240 | 46.6398   | 8.2728    |
| 11    | 3130.6387 | -46.6146  | -8.3684   | -3002.3997 | 82.4804   | 2.5001    |
| 12    | 3002.3792 | -82.4771  | -2.0235   | -2800.2861 | 140.4100  | -4.1659   |
| 13    | 2800.2856 | -140.4088 | 4.1840    | -2524.6689 | 177.3219  | 26.3953   |
| 14    | 2524.6187 | -177.3592 | -25.9914  | -2172.3633 | 213.8454  | 58.2488   |
| 15    | 2172.2915 | -213.8309 | -57.9582  | -1758.0105 | 196.1961  | -14.8127  |
| 16    | 1758.0024 | -196.2046 | 14.3210   | -1353.8347 | 251.6365  | -18.1532  |
| 17    | 1354.1375 | -248.0351 | 18.9068   | -900.4820  | 281.0000  | -21.2178  |
| 18    | 992.2597  | -178.8318 | 13.3597   | -667.4469  | 199.2403  | -14.6628  |
| 19    | 742.2948  | -113.7007 | 9.0058    | -632.3081  | 33.0628   | -136.3798 |
| 20    | 662.9694  | 5.3550    | 35.7648   | -659.6450  | 35.0259   | -90.9000  |
| 21    | 682.1863  | -42.1350  | -6.4378   | -528.9455  | 68.1139   | -6.8322   |
| 22    | 553.2100  | -32.3561  | -2.1186   | -521.8033  | 15.8912   | 2.4278    |
| 23    | 622.0488  | 77.1558   | -8.5771   | -770.9969  | -59.9295  | 7.5291    |
| 24    | 856.8995  | 136.2850  | -13.2427  | -1272.1240 | -191.3410 | -251.6277 |
| 25    | 1330.1592 | 239.3430  | 108.6441  | -1816.4832 | -181.6403 | -73.3466  |
| 26    | 1882.2043 | 230.0794  | 39.5892   | -2359.1609 | -192.2055 | -0.5553   |
| 27    | 2359.3042 | 192.2036  | 1.0682    | -2716.1145 | -141.7574 | 15.3719   |
| 28    | 2716.1038 | 141.7639  | -15.3732  | -2950.1333 | -73.1813  | 5.1386    |
| 29    | 2950.1631 | 73.1867   | -4.7605   | -3057.9163 | -16.9215  | 28.6732   |
| 30    | 3057.9277 | 16.9164   | -27.9262  | -3135.1602 | -46.4450  | -33.8315  |
| 31    | 3135.1453 | 46.4505   | 33.4149   | -3177.7639 | 4.1538    | -17.1564  |
| 32    | 3177.7178 | -4.1765   | 18.3592   | -3100.4111 | 60.3087   | 5.6241    |
| 33    | 3100.4272 | -60.2724  | -5.6206   | -2898.1628 | 116.5048  | 31.2524   |
| 34    | 2898.1721 | -116.4597 | -31.2346  | -2572.9758 | 179.0890  | 12.1827   |
| 35    | 2572.8401 | -179.0864 | -11.5718  | -2126.4512 | 227.9138  | 18.1802   |
| 36    | 2126.2976 | -227.8964 | -17.6549  | -1576.9965 | 230.6368  | -21.0898  |
| 37    | 1614.2544 | -172.1653 | 3.1805    | -1161.2551 | 212.3627  | -5.8394   |
| 38    | 1251.0820 | -134.6292 | 14.4467   | -881.9310  | 198.9090  | -18.7891  |
| 39    | 999.4275  | -102.1285 | 11.1024   | -821.4192  | 70.9088   | -9.2677   |
| 40    | 919.8416  | 21.6933   | 3.2542    | -928.1489  | 21.2945   | -5.6591   |
| 41    | 999.8589  | -68.5156  | -0.5323   | -834.7197  | 67.2350   | 0.7588    |
| 42    | 878.3147  | -33.7919  | -2.6607   | -828.6045  | 3.2467    | 4.4410    |
| 43    | 936.9612  | 89.5398   | -10.6553  | -1064.6051 | -49.6527  | 8.0038    |
| 44    | 1162.3740 | 146.8861  | -15.1731  | -1464.9990 | -195.6264 | -222.1941 |
| 45    | 1506.5533 | 232.7219  | 109.2154  | -1978.2411 | -175.0050 | -73.9361  |
| 46    | 2053.5398 | 223.0250  | 40.2574   | -2514.7241 | -185.1727 | -0.9994   |
| 47    | 2514.7861 | 185.1891  | 1.3138    | -2855.9458 | -134.7696 | 15.1026   |
| 48    | 2855.9761 | 134.7852  | -14.8061  | -3074.0054 | -66.1748  | 4.3030    |
| 49    | 3074.0542 | 66.1522   | -3.8893   | -3204.2231 | -46.0044  | 4.0138    |
| 50    | 3204.1763 | 45.9443   | -4.0205   | -3264.4827 | -4.7914   | 1.1540    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|------------|-----------|-----------|
| 51    | 3264.4912 | 4.7527    | 0.4444   | -3241.6316 | 8.1608    | -27.9001  |
| 52    | 3241.6235 | -8.1902   | 27.9106  | -3150.8455 | 66.2866   | 7.1472    |
| 53    | 3150.7559 | -66.2986  | -6.3865  | -2935.8130 | 122.7498  | 30.9818   |
| 54    | 2935.7441 | -122.7512 | -30.5855 | -2596.5552 | 184.0517  | 2.0128    |
| 55    | 2596.5117 | -184.0553 | -1.7495  | -2135.5933 | 234.4277  | 18.4503   |
| 56    | 2135.5930 | -234.4441 | -18.4402 | -1565.8551 | 242.9961  | -20.3205  |
| 57    | 1621.7185 | -156.5278 | 17.7908  | -1203.9189 | 196.6942  | -20.5148  |
| 58    | 1285.9775 | -122.5902 | 13.9521  | -944.0823  | 186.8364  | -18.2125  |
| 59    | 1063.5146 | -89.6702  | 11.1154  | -913.9478  | 58.3918   | -9.3673   |
| 60    | 1013.4181 | 34.3596   | 3.4812   | -1050.2261 | 8.6056    | -5.8624   |
| 61    | 1122.1366 | -71.8153  | -1.0096  | -961.8728  | 70.8853   | 1.2421    |
| 62    | 1005.6725 | -37.4505  | -2.8597  | -937.1129  | 6.5497    | 4.5890    |
| 63    | 1046.2443 | 86.2201   | -10.7170 | -1166.5382 | -46.3325  | 8.0535    |
| 64    | 1265.6641 | 143.5345  | -15.1582 | -1515.6677 | -193.8632 | -222.4434 |
| 65    | 1595.6121 | 153.1059  | -17.3874 | -2025.5825 | -173.1775 | -74.0079  |
| 66    | 2101.3357 | 220.8269  | 40.2120  | -2557.5664 | -182.9505 | -1.0292   |
| 67    | 2557.7217 | 182.9335  | 1.6751   | -2893.7737 | -132.4615 | 14.7295   |
| 68    | 2893.7795 | 132.4531  | -14.7365 | -3107.6111 | -82.8390  | 7.9056    |
| 69    | 3107.6414 | 82.8844   | -7.2357  | -3256.7827 | -41.7982  | 4.3927    |
| 70    | 3256.7732 | 41.7842   | -3.5090  | -3307.6907 | -0.6431   | 0.5189    |
| 71    | 3307.7134 | 0.6689    | 1.1621   | -3260.3005 | 40.4853   | -4.0327   |
| 72    | 3260.2874 | -40.5359  | 4.0368   | -3162.9028 | 66.8323   | -3.5708   |
| 73    | 3162.8657 | -66.8388  | 3.9903   | -2943.2407 | 124.8289  | 30.7784   |
| 74    | 2943.1155 | -124.8066 | -30.0730 | -2599.4736 | 186.0518  | 1.5358    |
| 75    | 2599.4868 | -186.0390 | -1.5905  | -2134.2705 | 236.3937  | 18.2952   |
| 76    | 2134.1592 | -236.3996 | -17.9515 | -1554.5811 | 246.9483  | -20.9448  |
| 77    | 1616.2871 | -153.6103 | 17.9672  | -1205.3625 | 193.7532  | -20.6266  |
| 78    | 1287.6414 | -119.6026 | 13.7666  | -952.3702  | 183.8562  | -18.0173  |
| 79    | 1072.0103 | -86.6847  | 11.1413  | -929.1724  | 55.4050   | -9.4150   |
| 80    | 1028.7371 | 37.3561   | 3.5180   | -1072.3340 | -2.2617   | -5.7132   |
| 81    | 1144.2537 | -63.8265  | -1.0681  | -984.9851  | 70.7886   | 1.1323    |
| 82    | 1028.7939 | -37.3457  | -2.9900  | -959.8212  | 6.4400    | 4.7582    |
| 83    | 1068.9956 | 86.3142   | -10.9790 | -1189.4767 | -46.4365  | 8.2769    |
| 84    | 1288.5521 | 143.6137  | -15.0087 | -1533.9976 | -79.0425  | 10.7207   |
| 85    | 1618.6138 | 153.1980  | -17.5528 | -2037.0662 | -173.2078 | -74.2033  |
| 86    | 2111.5347 | 219.8833  | 40.8695  | -2565.6257 | -182.0142 | -1.2857   |
| 87    | 2565.5796 | 182.0311  | 1.0014   | -2899.7122 | -131.5855 | 15.5394   |
| 88    | 2899.8416 | 131.5938  | -14.8174 | -3115.9504 | -81.1220  | 7.3161    |
| 89    | 3115.9478 | 81.0638   | -5.7417  | -3261.0005 | -39.9316  | 2.8897    |
| 90    | 3261.0178 | 39.8611   | -2.8648  | -3307.6143 | 1.2955    | 0.2293    |
| 91    | 3307.5891 | -1.3855   | -0.2221  | -3255.5342 | 42.5228   | -2.7568   |
| 92    | 3255.5662 | -42.4405  | 5.2797   | -3157.9155 | 67.7527   | -4.4452   |
| 93    | 3157.9661 | -67.7215  | 4.0220   | -2936.4451 | 125.6958  | 31.4363   |
| 94    | 2936.3545 | -125.6916 | -30.7327 | -2590.8125 | 186.9380  | 1.8659    |
| 95    | 2590.7493 | -186.9147 | -1.5148  | -2123.2993 | 237.2675  | 17.9612   |
| 96    | 2123.2412 | -237.2645 | -17.7270 | -1535.8047 | 283.9247  | 85.5887   |
| 97    | 1593.1537 | -153.4487 | 17.6021  | -1182.4420 | 193.6012  | -20.2972  |
| 98    | 1264.7822 | -119.4677 | 14.0674  | -929.7244  | 183.7330  | -18.3455  |
| 99    | 1049.4504 | -86.5716  | 10.8300  | -906.3016  | 55.3047   | -9.0508   |
| 100   | 1005.8491 | 37.4523   | 3.4213   | -1050.3689 | -2.3767   | -5.6256   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|-----------|------------|-----------|-----------|
| 101   | 1122.2708 | -60.8498  | -0.9032   | -969.6981  | 67.8132   | 0.9769    |
| 102   | 1013.5059 | -34.3801  | -3.1665   | -951.2163  | 3.4651    | 4.9362    |
| 103   | 1060.3750 | 89.2986   | -10.8758  | -1187.5610 | -49.4199  | 8.1933    |
| 104   | 1286.6135 | 146.5819  | -15.2292  | -1538.8004 | -81.9958  | 10.9283   |
| 105   | 1623.4507 | 156.1295  | -17.4564  | -2042.8044 | -174.7029 | -74.2509  |
| 106   | 2112.2095 | 217.9627  | 40.8232   | -2562.1213 | -180.1059 | -1.5350   |
| 107   | 2562.1758 | 180.1008  | 1.8146    | -2891.7004 | -129.6348 | 14.6023   |
| 108   | 2891.7300 | 129.6077  | -14.2333  | -3098.1628 | -61.0186  | 3.9969    |
| 109   | 3098.1372 | 61.0035   | -4.0005   | -3226.5332 | -35.9368  | 4.5607    |
| 110   | 3226.5596 | 35.9750   | -2.9357   | -3264.4294 | 5.1617    | 0.0772    |
| 111   | 3264.4702 | -5.1771   | -0.0632   | -3229.2073 | 13.2921   | -28.0998  |
| 112   | 3229.1887 | -13.3523  | 28.9047   | -3126.8760 | 69.8883   | -4.0196   |
| 113   | 3126.8621 | -69.8927  | 4.0289    | -2900.4600 | 127.9073  | 31.0673   |
| 114   | 2900.3687 | -127.9327 | -30.3779  | -2549.7292 | 189.2200  | 1.5036    |
| 115   | 2549.6582 | -189.2093 | -1.1641   | -2077.0422 | 239.5774  | 17.6057   |
| 116   | 2076.9512 | -239.5812 | -17.4031  | -1484.2573 | 286.2073  | 85.4299   |
| 117   | 1517.0181 | -238.1903 | -119.6252 | -1078.2716 | 197.1023  | -19.8996  |
| 118   | 1161.7668 | -122.8945 | 13.6552   | -819.2226  | 187.1424  | -18.0053  |
| 119   | 940.1466  | -89.9042  | 11.0702   | -777.9372  | 58.9913   | -9.2704   |
| 120   | 878.2503  | 33.7829   | 2.7893    | -927.6445  | 0.9387    | -5.0127   |
| 121   | 999.7572  | -48.1303  | -0.9877   | -875.7512  | 55.1149   | 1.0413    |
| 122   | 919.7517  | -21.7057  | -3.2146   | -886.2662  | -9.1490   | 4.9809    |
| 123   | 996.1569  | 101.7666  | -10.9578  | -1151.4951 | -61.8520  | 8.3233    |
| 124   | 1251.6606 | 158.6388  | -15.7200  | -1530.9535 | -94.0290  | 11.3990   |
| 125   | 1616.0184 | 171.8135  | -3.1414   | -2051.4512 | -180.1350 | -77.5793  |
| 126   | 2103.6475 | 211.5733  | 41.1047   | -2539.7817 | -173.8983 | -1.4416   |
| 127   | 2539.7676 | 173.9305  | 1.3763    | -2855.4355 | -125.3149 | 4.9454    |
| 128   | 2855.5493 | 125.3115  | -4.2047   | -3049.5146 | -55.0884  | 3.8517    |
| 129   | 3049.5037 | 55.0874   | -3.8554   | -3118.1870 | 0.9588    | 28.5183   |
| 130   | 3118.2278 | -0.9902   | -28.1641  | -3117.9272 | -28.4096  | -34.3324  |
| 131   | 3117.9182 | 28.3993   | 35.1618   | -3121.4458 | 20.5013   | -29.6920  |
| 132   | 3121.4414 | -20.5131  | 29.6260   | -3002.9722 | 78.5791   | 5.7909    |
| 133   | 3002.9062 | -78.5818  | -5.4271   | -2759.9839 | 135.0740  | 30.2977   |
| 134   | 2759.9106 | -135.0714 | -29.9531  | -2392.9561 | 196.3662  | 1.3711    |
| 135   | 2392.9058 | -196.3802 | -1.1262   | -1904.4714 | 246.7510  | 17.4081   |
| 136   | 1904.3082 | -246.7439 | -17.0344  | -1296.0535 | 293.3668  | 84.8541   |
| 137   | 1339.4761 | -244.9086 | -118.9969 | -756.4569  | 208.3459  | -19.8010  |
| 138   | 856.1971  | -112.2839 | 11.8163   | -539.0217  | 176.4855  | -16.1274  |
| 139   | 625.0449  | -100.1014 | 10.5422   | -503.0182  | -5.8673   | -162.9020 |
| 140   | 557.6509  | 52.3940   | 36.4034   | -655.3076  | -7.7637   | -102.2623 |
| 141   | 692.5083  | 7.3952    | -14.8113  | -657.8853  | 19.2355   | 1.2192    |
| 142   | 672.8047  | -5.6478   | -35.4400  | -662.7170  | -48.6802  | 4.5192    |
| 143   | 739.8081  | 125.4997  | -9.8966   | -910.9879  | -92.8637  | 7.6723    |
| 144   | 990.1219  | 178.3587  | -12.8503  | -1261.7913 | -123.0834 | 9.0424    |
| 145   | 1353.9081 | 225.2046  | -16.7043  | -1754.1741 | -192.0209 | 14.4600   |
| 146   | 1760.3511 | 195.6342  | -14.3514  | -2108.0635 | -186.5112 | 13.7381   |
| 147   | 2108.0955 | 186.6037  | -13.7386  | -2389.5034 | -152.7860 | 11.4415   |
| 148   | 2389.5137 | 152.7815  | -10.7497  | -2607.4277 | -96.9618  | 6.7961    |
| 149   | 2607.4058 | 96.9421   | -5.9358   | -2766.3191 | -62.6959  | 3.5894    |
| 150   | 2766.3267 | 62.7143   | -3.5647   | -2858.2646 | -28.2091  | 1.2029    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|------------|-----------|-----------|
| 151   | 2858.2874 | 28.1578   | -0.2704  | -2881.7632 | 3.5981    | -2.0835   |
| 152   | 2881.7485 | -3.6231   | 2.9030   | -2838.6440 | 59.7977   | -6.7841   |
| 153   | 2838.6375 | -59.7373  | 6.7972   | -2733.4355 | 70.2521   | -7.3516   |
| 154   | 2733.4456 | -70.3586  | 7.3117   | -2551.1077 | 105.4638  | -9.7680   |
| 155   | 2551.0774 | -105.5136 | 11.2839  | -2324.6562 | 136.4768  | 23.1071   |
| 156   | 2324.5574 | -136.4806 | -22.7419 | -2026.3455 | 182.4884  | 52.3668   |
| 157   | 2026.4368 | -182.4936 | -52.6853 | -1645.3669 | 230.1475  | 78.8828   |
| 158   | 1645.2471 | -230.1441 | -78.6280 | -1179.9910 | 288.3892  | 72.4951   |
| 159   | 1179.8661 | -288.3841 | -72.3335 | -633.1182  | 336.1120  | 98.2658   |
| 160   | 632.9603  | -336.1017 | -98.1720 | -0.0465    | 154.8067  | -517.3674 |

ENVOL. MAX CORTANTES -EC1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 1     | -0.0030    | 395.1685  | 48.5137  | -670.6879  | -365.4604 | -72.7337  |
| 2     | 658.5387   | 365.9088  | 69.6386  | -1207.9990 | -324.8286 | -69.4759  |
| 3     | 1174.1287  | 326.1803  | 64.6846  | -1609.0161 | -285.9683 | -64.7787  |
| 4     | 1556.4106  | 288.1951  | 58.0998  | -1883.4021 | -248.9722 | -56.1682  |
| 5     | 1815.2397  | 252.1062  | 47.4190  | -2158.2471 | -217.7025 | -47.0617  |
| 6     | 2077.8108  | 221.7293  | 36.7209  | -2274.4976 | -189.1012 | -47.5863  |
| 7     | 2184.5771  | 193.9764  | 35.0154  | -2320.8308 | -152.9785 | -26.4651  |
| 8     | 2224.6326  | 158.6725  | 12.5481  | -2137.5332 | -121.3577 | 10.5681   |
| 9     | 1937.6982  | 134.4607  | -11.9550 | -2061.8010 | -99.9773  | 9.5438    |
| 10    | 1860.1787  | 114.6731  | -9.1857  | -1991.2898 | -83.1145  | 6.8751    |
| 11    | 1792.7302  | 99.4917   | -8.0053  | -1841.0630 | -65.4167  | 5.6690    |
| 12    | 1650.4539  | 83.2884   | -6.2538  | -1666.3347 | -49.4935  | 3.9065    |
| 13    | 1487.7542  | 68.8261   | -5.1189  | -1475.8767 | -35.3273  | 2.7937    |
| 14    | 1313.2234  | 56.0454   | -3.7013  | -1278.4149 | -22.8804  | 1.3508    |
| 15    | 1134.9705  | 44.9826   | -2.5017  | -831.6353  | -16.8403  | 30.1465   |
| 16    | 1013.5759  | 37.4968   | -2.2232  | -754.5185  | -12.2125  | 11.0861   |
| 17    | 848.5631   | 29.4280   | -0.7724  | -684.6548  | -8.3733   | -6.2640   |
| 18    | 699.7375   | 22.8463   | -0.4905  | -662.2595  | -6.4197   | -29.0396  |
| 19    | 646.6892   | 19.9470   | 0.5651   | -662.9835  | -5.3564   | -35.6442  |
| 20    | 654.8982   | 19.1372   | -1.4702  | 1054.9597  | -139.3074 | -358.3587 |
| 21    | -3388.6733 | 458.9342  | -28.0321 | 2919.9963  | -526.1792 | -33.6133  |
| 22    | -2929.7363 | 526.4820  | 29.9961  | 1909.9690  | -487.3325 | -44.8651  |
| 23    | -1938.7135 | 488.2732  | 38.9839  | 988.2297   | -447.5252 | -54.0559  |
| 24    | -1035.8896 | 449.1954  | 46.3673  | 164.2162   | -399.4609 | -42.4083  |
| 25    | -229.6846  | 401.9243  | 32.2901  | -516.5490  | -352.5269 | -42.4342  |
| 26    | 434.8853   | 355.8751  | 29.8837  | -1119.4187 | -310.4688 | -38.4315  |
| 27    | 1023.3684  | 314.7367  | 23.4977  | -1603.4204 | -268.3120 | -28.9789  |
| 28    | 1495.3430  | 273.5781  | 11.4674  | -1966.1987 | -218.7928 | 4.4622    |
| 29    | 1280.5464  | 228.8289  | -13.8412 | -1624.5977 | -185.0893 | 10.7804   |
| 30    | 1378.8462  | 199.7589  | -11.2630 | -1696.5447 | -158.6061 | 8.5359    |
| 31    | 1445.9353  | 175.4070  | -10.0519 | -1703.1113 | -134.3223 | 7.1583    |
| 32    | 1454.6377  | 153.2627  | -7.5320  | -1656.8019 | -112.2766 | 4.6162    |
| 33    | 1417.2565  | 133.3821  | -6.1640  | -1519.4688 | -90.1770  | 3.4055    |
| 34    | 1295.6201  | 113.4007  | -5.0296  | -1403.9238 | -72.8441  | 2.2154    |
| 35    | 1202.0996  | 98.0979   | -3.4330  | -591.5121  | -60.0171  | 37.6422   |
| 36    | 1100.1096  | 85.0238   | -1.9943  | -595.7474  | -53.6237  | 16.5567   |
| 37    | 1001.2864  | 74.1152   | -1.6155  | -517.2216  | -49.4793  | -22.4880  |
| 38    | 740.8374   | 67.5981   | 0.0852   | -590.7994  | -46.9435  | -32.9615  |
| 39    | 787.5647   | 64.1523   | 0.0831   | -680.3972  | -45.2161  | -40.6107  |
| 40    | 668.6063   | 62.2386   | -6.0440  | 848.1743   | -153.7136 | -383.4265 |
| 41    | -3780.7202 | 470.1256  | -27.3503 | 3236.6079  | -535.8213 | -35.0353  |
| 42    | -3246.6067 | 536.1326  | 31.3351  | 2179.0256  | -496.1392 | -46.5977  |
| 43    | -2208.5752 | 497.1052  | 40.8625  | 1216.3401  | -455.6096 | -56.3470  |
| 44    | -1264.9070 | 457.3144  | 48.4687  | 357.5275   | -406.9069 | -44.7580  |
| 45    | -424.1744  | 409.4104  | 34.6284  | -359.2229  | -359.1837 | -45.1723  |
| 46    | 276.3083   | 362.5850  | 32.5125  | -986.1538  | -316.7213 | -41.1883  |
| 47    | 888.7756   | 321.0566  | 26.1541  | -1490.9409 | -274.2546 | -31.9458  |
| 48    | 1381.6965  | 279.5736  | 14.4767  | -1317.4137 | -227.7821 | 12.9553   |
| 49    | 1081.1750  | 240.4468  | -13.6310 | -1450.9916 | -196.7204 | 10.7663   |
| 50    | 1203.3279  | 211.4861  | -11.7715 | -1547.1265 | -170.3389 | 8.8900    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|------------|-----------|-----------|
| 51    | 1294.9160  | 187.2522  | -9.5428  | -1578.5017 | -146.1817 | 6.6962    |
| 52    | 1328.6646  | 165.2283  | -8.0184  | -1557.4851 | -124.2613 | 5.1547    |
| 53    | 1316.9564  | 145.4602  | -6.0972  | -1445.9656 | -102.2932 | 3.0861    |
| 54    | 1221.4573  | 125.5833  | -4.4640  | -1357.0203 | -85.0405  | 1.6873    |
| 55    | 1154.7847  | 110.3908  | -3.2844  | -574.7101  | -70.7910  | 42.9019   |
| 56    | 1080.2268  | 97.4186   | -2.5194  | -464.2419  | -64.4465  | -4.7510   |
| 57    | 870.3765   | 86.6210   | 25.4817  | -551.2989  | -61.0389  | -17.6324  |
| 58    | 781.4440   | 81.5626   | -0.2778  | -651.0340  | -58.5346  | -27.7343  |
| 59    | 859.7614   | 78.1545   | 0.2540   | -766.8327  | -56.8306  | -35.7171  |
| 60    | 971.6950   | 76.2135   | 1.0193   | 783.4406   | -160.2317 | -387.7443 |
| 61    | -3888.5256 | 473.0076  | -26.4414 | 3291.9919  | -537.4100 | -35.7850  |
| 62    | -3301.8970 | 537.7190  | 31.6797  | 2229.9275  | -497.7007 | -46.6926  |
| 63    | -2259.5486 | 498.6713  | 40.9357  | 1262.9811  | -457.1324 | -56.4194  |
| 64    | -1311.6489 | 458.8301  | 48.5194  | 400.1357   | -408.3813 | -44.8077  |
| 65    | -466.8946  | 410.8910  | 34.6692  | -320.8012  | -360.5952 | -45.1439  |
| 66    | 237.6766   | 363.9843  | 32.5155  | -951.3605  | -318.0452 | -41.3167  |
| 67    | 853.9130   | 322.3739  | 26.2835  | -1459.4807 | -275.5103 | -32.0195  |
| 68    | 1350.0800  | 280.8388  | 14.4955  | -1260.1025 | -230.5550 | 13.0888   |
| 69    | 1023.6516  | 243.2768  | -13.7890 | -1399.6714 | -199.5745 | 10.8132   |
| 70    | 1151.9868  | 214.3636  | -11.5758 | -1502.2081 | -173.2250 | 8.6013    |
| 71    | 1249.9387  | 190.1674  | -9.3093  | -1540.0626 | -149.1075 | 6.4642    |
| 72    | 1290.1965  | 168.1627  | -7.8289  | -1525.6150 | -127.2042 | 5.0700    |
| 73    | 1285.0927  | 148.4071  | -6.2712  | -1420.7947 | -105.2280 | 3.2501    |
| 74    | 1196.2501  | 128.5488  | -4.4161  | -1338.5195 | -88.0244  | 1.6610    |
| 75    | 1136.3113  | 113.3756  | -3.5407  | -1242.6108 | -73.1117  | 0.8351    |
| 76    | 1068.5139  | 100.4181  | -2.4235  | -462.0641  | -66.0786  | -4.7691   |
| 77    | 726.6562   | 89.6705   | -0.6021  | -552.6961  | -62.6914  | -17.5045  |
| 78    | 783.5708   | 84.6352   | -0.5338  | -656.1956  | -60.1694  | -27.5756  |
| 79    | 868.8333   | 81.2221   | 0.2484   | -775.6718  | -58.4650  | -35.6982  |
| 80    | 987.6781   | 79.2824   | 1.0197   | 772.1013   | -161.6944 | -387.5615 |
| 81    | -3915.4080 | 473.0777  | -26.9640 | 3305.6108  | -537.4269 | -35.3853  |
| 82    | -3315.6475 | 537.7393  | 31.6701  | 2243.1484  | -497.7092 | -47.0048  |
| 83    | -2272.8113 | 498.6823  | 41.3177  | 1276.5710  | -457.1479 | -56.7361  |
| 84    | -1325.0908 | 458.8467  | 48.5923  | 413.5245   | -408.4127 | -44.7693  |
| 85    | -480.3614  | 410.9258  | 34.7491  | -307.7046  | -360.6382 | -45.3796  |
| 86    | 224.7347   | 364.0317  | 32.6314  | -938.3018  | -318.1177 | -41.0916  |
| 87    | 840.6665   | 322.4605  | 26.0398  | -1446.5278 | -275.6122 | -31.8159  |
| 88    | 1337.2706  | 280.9402  | 14.4125  | -1235.0256 | -230.6952 | 12.7596   |
| 89    | 998.5511   | 243.3693  | -13.3451 | -1374.8949 | -199.6403 | 10.4104   |
| 90    | 1127.1436  | 214.4272  | -11.4770 | -1477.5148 | -173.2967 | 8.8066    |
| 91    | 1225.2576  | 190.2163  | -9.9639  | -1515.4724 | -149.1548 | 6.9849    |
| 92    | 1265.6667  | 168.2531  | -7.5691  | -1501.3816 | -127.2935 | 4.7594    |
| 93    | 1260.8594  | 148.5138  | -6.5620  | -1396.7917 | -105.3654 | 3.7162    |
| 94    | 1172.3521  | 128.6647  | -4.8409  | -1314.8125 | -88.1438  | 1.9693    |
| 95    | 1112.6995  | 113.4945  | -3.5116  | -1219.3654 | -73.2026  | 0.7629    |
| 96    | 1045.2196  | 100.5260  | -2.4851  | -450.5602  | -66.1330  | -4.6292   |
| 97    | 703.6777   | 89.7824   | -0.8929  | -541.3835  | -62.7319  | -17.3654  |
| 98    | 760.8620   | 84.7416   | -0.3242  | -645.0008  | -60.2083  | -27.6492  |
| 99    | 846.3943   | 81.3285   | -0.1496  | -764.5465  | -58.5148  | -35.4215  |
| 100   | 965.4534   | 79.3893   | 0.9182   | 783.1252   | -161.7411 | -387.3899 |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
|-------|----------|-----------|---------|----------|-----------|---------|

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|     |            |          |          |            |           |           |
|-----|------------|----------|----------|------------|-----------|-----------|
| 101 | -3888.4434 | 469.6822 | -27.4080 | 3295.5732  | -535.7010 | -35.3017  |
| 102 | -3305.7695 | 536.0127 | 32.0944  | 2237.4341  | -495.9822 | -47.5421  |
| 103 | -2266.9358 | 496.9535 | 41.5042  | 1274.5845  | -455.4179 | -56.7764  |
| 104 | -1323.2012 | 457.1197 | 48.8262  | 415.2220   | -406.6759 | -45.1050  |
| 105 | -481.9938  | 409.1952 | 34.9749  | -302.1401  | -358.8984 | -45.5500  |
| 106 | 219.0790   | 362.2977 | 32.8448  | -928.9615  | -316.3923 | -41.5176  |
| 107 | 831.4294   | 320.7322 | 26.4530  | -1433.0449 | -273.8584 | -32.2401  |
| 108 | 1323.7456  | 279.1741 | 14.7674  | -1200.7839 | -227.2671 | 12.9659   |
| 109 | 964.3295   | 239.9641 | -13.8268 | -1333.0259 | -196.2517 | 10.8497   |
| 110 | 1085.3153  | 211.0690 | -11.4618 | -1428.1497 | -169.9467 | 8.6148    |
| 111 | 1175.9448  | 186.8740 | -9.7781  | -1458.6506 | -145.7941 | 6.9115    |
| 112 | 1208.8835  | 164.8604 | -7.7739  | -1436.8514 | -123.8894 | 4.9380    |
| 113 | 1196.4539  | 145.1068 | -6.4353  | -1324.6941 | -101.9457 | 3.4931    |
| 114 | 1100.3650  | 125.2632 | -4.6817  | -1235.1893 | -84.7373  | 1.8195    |
| 115 | 1033.2222  | 110.1035 | -3.4078  | -514.1842  | -70.8039  | 42.7786   |
| 116 | 958.3604   | 97.1614  | -2.4331  | -404.3172  | -64.5283  | -4.8687   |
| 117 | 610.1704   | 86.4848  | -1.1084  | -491.5971  | -61.1283  | -17.4521  |
| 118 | 660.1265   | 81.4549  | -0.5459  | -591.6928  | -58.6108  | -27.8061  |
| 119 | 738.4220   | 78.0498  | 0.1468   | -707.7658  | -56.9126  | -35.7830  |
| 120 | 850.2586   | 76.1130  | 0.3197   | 840.6177   | -159.9562 | -387.1222 |
| 121 | -3780.1821 | 458.4105 | -27.2494 | 3249.7205  | -529.4368 | -36.0810  |
| 122 | -3259.9336 | 529.7508 | 32.8525  | 2205.0059  | -489.5980 | -48.2796  |
| 123 | -2234.5669 | 490.5766 | 42.2545  | 1256.0842  | -448.9183 | -57.6278  |
| 124 | -1304.8735 | 450.6330 | 49.9297  | 411.6001   | -400.0829 | -46.3097  |
| 125 | -478.2524  | 402.6300 | 36.0324  | -290.9353  | -352.2072 | -46.5606  |
| 126 | 207.9160   | 355.6331 | 33.8350  | -902.6522  | -309.6703 | -42.3312  |
| 127 | 805.1836   | 314.0563 | 27.2690  | -1391.2966 | -267.1647 | -33.1022  |
| 128 | 1282.3702  | 272.5285 | 15.6635  | -1756.5853 | -217.3368 | -0.0852   |
| 129 | 870.5852   | 228.8794 | -13.3875 | -1214.0613 | -185.1168 | 10.5036   |
| 130 | 967.4447   | 200.0155 | -11.3551 | -1285.1935 | -158.8829 | 8.3827    |
| 131 | 1034.4919  | 175.9242 | -9.1902  | -1292.6204 | -134.8370 | 6.3574    |
| 132 | 1044.5735  | 154.0507 | -7.7585  | -1248.2087 | -113.0971 | 5.0168    |
| 133 | 1010.0096  | 134.4238 | -6.3058  | -1114.6027 | -91.2835  | 3.3567    |
| 134 | 892.7032   | 114.7224 | -4.8147  | -1004.4201 | -74.2129  | 2.0191    |
| 135 | 805.0513   | 99.7084  | -3.6708  | -395.9529  | -65.9079  | 41.9629   |
| 136 | 710.3756   | 86.9052  | -2.5200  | -281.1960  | -59.8696  | -5.7101   |
| 137 | 350.9676   | 76.6732  | -1.1815  | -359.5392  | -56.5320  | -18.2705  |
| 138 | 308.7836   | 72.0630  | -23.8393 | -450.7050  | -54.0550  | -28.5201  |
| 139 | 419.5606   | 70.3898  | -16.0474 | -557.6725  | -52.3929  | -36.3232  |
| 140 | 546.8029   | 69.4471  | -10.5144 | 622.7408   | -131.7586 | -294.0897 |
| 141 | -3380.4805 | 424.2577 | -21.5814 | 3145.5505  | -518.7705 | -77.2439  |
| 142 | -3152.2188 | 518.9685 | 73.7756  | 2336.0254  | -480.7269 | -71.3846  |
| 143 | -2356.1169 | 481.3433 | 67.2296  | 1586.6758  | -441.0088 | -64.8653  |
| 144 | -1619.3262 | 442.0772 | 57.8298  | 891.8722   | -400.8160 | -51.7058  |
| 145 | -937.4666  | 402.4044 | 43.4532  | 283.9066   | -372.0872 | -66.0224  |
| 146 | -341.3938  | 374.2116 | 55.6988  | -236.5107  | -328.2850 | -39.9556  |
| 147 | 167.8061   | 331.0107 | 27.8828  | -682.3354  | -283.9772 | -1.9142   |
| 148 | 603.7701   | 287.3394 | -12.0915 | -1043.4155 | -240.1482 | 37.8573   |
| 149 | 956.4484   | 244.1660 | -53.7535 | -728.4910  | -207.4276 | 9.0030    |
| 150 | 541.0411   | 216.8806 | -9.7771  | -816.8365  | -182.1698 | 7.4011    |

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol | Cortantel | Torsorl | Momento2 | Cortante2 | Torsor2 |
|-------|----------|-----------|---------|----------|-----------|---------|
|-------|----------|-----------|---------|----------|-----------|---------|

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|     |           |          |          |           |           |          |
|-----|-----------|----------|----------|-----------|-----------|----------|
| 151 | 619.9454  | 193.1045 | -8.2381  | -845.5135 | -158.1495 | 5.7595   |
| 152 | 643.4679  | 170.6209 | -6.7429  | -819.9461 | -135.5497 | 4.4027   |
| 153 | 617.6713  | 149.5734 | -5.5449  | -746.7644 | -114.3406 | 3.2868   |
| 154 | 549.2637  | 130.0433 | -4.5052  | -694.9840 | -97.9737  | 2.1992   |
| 155 | 507.6915  | 115.3136 | -3.4797  | -553.4485 | -79.9082  | 0.9948   |
| 156 | 382.0718  | 98.9526  | -2.5098  | 67.2943   | -67.9967  | 28.9470  |
| 157 | 237.5403  | 84.2598  | -1.9430  | 218.4384  | -62.0776  | -8.9124  |
| 158 | -167.0584 | 74.1471  | -0.8769  | 160.2413  | -58.9354  | -17.5944 |
| 159 | -204.0375 | 71.0887  | -17.4031 | 89.0503   | -56.6854  | -24.3793 |
| 160 | -112.5633 | 69.7287  | -12.4933 | -0.0004   | -55.3190  | -29.3312 |

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 1     | -0.0454    | 186.1173  | 616.1953 | -310.0340 | -172.2904 | -589.1664 |
| 2     | 310.0340   | 172.2904  | 589.1664 | -525.4484 | -146.0207 | -537.8008 |
| 3     | 525.4484   | 146.0207  | 537.8008 | -656.4987 | -121.6313 | -489.7980 |
| 4     | 656.4987   | 121.6313  | 489.7980 | -713.4500 | -99.1416  | -442.4818 |
| 5     | 713.4500   | 99.1416   | 442.4818 | -797.0518 | -81.1028  | -400.1918 |
| 6     | 797.0518   | 81.1028   | 400.1918 | -744.6987 | -69.0135  | -371.8647 |
| 7     | 744.6987   | 69.0135   | 371.8647 | -645.5278 | -51.2670  | -325.2736 |
| 8     | 645.5278   | 51.2670   | 325.2736 | -509.3552 | -35.3937  | -281.2681 |
| 9     | 509.3552   | 35.3937   | 281.2681 | -345.5175 | -21.3449  | -240.9241 |
| 10    | 345.5175   | 21.3449   | 240.9241 | -162.8303 | -9.0728   | -204.1548 |
| 11    | 162.8303   | 9.0728    | 204.1548 | -70.2968  | -3.5776   | -187.0847 |
| 12    | 70.2968    | 3.5776    | 187.0847 | 133.8249  | 6.1685    | -155.6006 |
| 13    | -133.8249  | -6.1685   | 155.6006 | 335.6046  | 14.3102   | -127.6893 |
| 14    | -335.6046  | -14.3102  | 127.6893 | 528.6014  | 20.9321   | -103.3412 |
| 15    | -528.6014  | -20.9321  | 103.3412 | 707.2654  | 26.1555   | -82.9294  |
| 16    | -207.9049  | -7.6789   | 84.9101  | 815.2670  | 28.2747   | -73.8428  |
| 17    | -815.2670  | -28.2747  | 73.8428  | 967.2642  | 31.5662   | -58.7757  |
| 18    | -967.2642  | -31.5662  | 58.7757  | 1094.4702 | 33.7497   | -47.8322  |
| 19    | -1094.4702 | -33.7497  | 47.8322  | 1194.9786 | 34.9133   | -40.0648  |
| 20    | -1194.9786 | -34.9133  | 40.0648  | 1267.5220 | -123.2622 | -388.0524 |
| 21    | -764.7845  | 183.0798  | 584.2659 | 676.6465  | -254.4430 | -683.3344 |
| 22    | -676.6465  | 254.4430  | 683.3344 | 180.8318  | -227.8775 | -629.1343 |
| 23    | -180.8318  | 227.8775  | 629.1343 | -221.8380 | -202.1386 | -577.9052 |
| 24    | 221.8380   | 202.1386  | 577.9052 | -534.5359 | -169.8994 | -510.9749 |
| 25    | 534.5359   | 169.8994  | 510.9749 | -683.8577 | -142.3575 | -463.2635 |
| 26    | 683.8577   | 142.3575  | 463.2635 | -816.5811 | -120.5331 | -422.5912 |
| 27    | 816.5811   | 120.5331  | 422.5912 | -877.5812 | -100.0299 | -383.6380 |
| 28    | 877.5812   | 100.0299  | 383.6380 | -874.3469 | -73.4268  | -325.8654 |
| 29    | 874.3469   | 73.4268   | 325.8654 | -704.8251 | -55.0014  | -286.7439 |
| 30    | 704.8251   | 55.0014   | 286.7439 | -594.1538 | -39.5954  | -249.0045 |
| 31    | 594.1538   | 39.5954   | 249.0045 | -446.7065 | -25.7246  | -214.3737 |
| 32    | 446.7065   | 25.7246   | 214.3737 | -166.6907 | -7.7782   | -167.8445 |
| 33    | 166.6907   | 7.7782    | 167.8445 | 23.6739   | 2.2987    | -140.4655 |
| 34    | -23.6739   | -2.2987   | 140.4655 | 222.8322  | 10.8948   | -116.0527 |
| 35    | -222.8322  | -10.8948  | 116.0527 | 423.0001  | 18.0551   | -94.4408  |
| 36    | -423.0001  | -18.0551  | 94.4408  | 680.3127  | 26.2386   | -68.0416  |
| 37    | -179.6055  | -6.9823   | 69.6911  | 849.4138  | 30.0953   | -54.1661  |
| 38    | -849.4138  | -30.0953  | 54.1661  | 999.8148  | 32.7979   | -43.4237  |
| 39    | -999.8148  | -32.7979  | 43.4237  | 1127.6106 | 34.4463   | -35.7458  |
| 40    | -1127.6106 | -34.4463  | 35.7458  | 1230.5863 | -122.7602 | -384.6219 |
| 41    | -742.8237  | 182.5278  | 583.3850 | 642.5329  | -253.4416 | -682.9135 |
| 42    | -642.5329  | 253.4416  | 682.9135 | 150.0585  | -226.9142 | -628.7560 |
| 43    | -150.0585  | 226.9142  | 628.7560 | -249.0779 | -201.2442 | -577.6111 |
| 44    | 249.0779   | 201.2442  | 577.6111 | -557.8323 | -169.0557 | -510.7477 |
| 45    | 557.8323   | 169.0557  | 510.7477 | -702.2926 | -141.6331 | -463.0549 |
| 46    | 702.2926   | 141.6331  | 463.0549 | -831.5090 | -119.9124 | -422.2779 |
| 47    | 831.5090   | 119.9124  | 422.2779 | -889.2981 | -99.5106  | -383.3835 |
| 48    | 889.2981   | 99.5106   | 383.3835 | -883.0939 | -72.9707  | -325.7475 |
| 49    | 883.0939   | 72.9707   | 325.7475 | -710.3588 | -54.6740  | -286.4066 |
| 50    | 710.3588   | 54.6740   | 286.4066 | -597.6265 | -39.3633  | -248.8603 |

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 51    | 597.6265   | 39.3633   | 248.8603 | -448.5864 | -25.5708  | -214.2193 |
| 52    | 448.5864   | 25.5708   | 214.2193 | -167.0851 | -7.7418   | -167.7216 |
| 53    | 167.0851   | 7.7418    | 167.7216 | 23.9694   | 2.2568    | -140.3900 |
| 54    | -23.9694   | -2.2568   | 140.3900 | 223.3497  | 10.7798   | -115.9474 |
| 55    | -223.3497  | -10.7798  | 115.9474 | 423.3346  | 17.8625   | -94.5034  |
| 56    | -423.3346  | -17.8625  | 94.5034  | 680.1957  | 25.9795   | -68.0365  |
| 57    | -176.7619  | -6.8077   | 69.5058  | 848.6705  | 29.8074   | -54.1988  |
| 58    | -848.6705  | -29.8074  | 54.1988  | 998.2717  | 32.4813   | -43.6121  |
| 59    | -998.2717  | -32.4813  | 43.6121  | 1125.2493 | 34.1098   | -35.6214  |
| 60    | -1125.2493 | -34.1098  | 35.6214  | 1227.3367 | -122.9062 | -384.6816 |
| 61    | -790.3351  | 183.9959  | 583.5611 | 639.3068  | -253.3873 | -683.0665 |
| 62    | -639.3068  | 253.3873  | 683.0665 | 147.1860  | -226.8679 | -628.8204 |
| 63    | -147.1860  | 226.8679  | 628.8204 | -251.6405 | -201.1938 | -577.6628 |
| 64    | 251.6405   | 201.1938  | 577.6628 | -560.0513 | -168.9893 | -510.7785 |
| 65    | 560.0513   | 168.9893  | 510.7785 | -704.0818 | -141.5526 | -462.9598 |
| 66    | 704.0818   | 141.5526  | 462.9598 | -832.9477 | -119.7896 | -422.2564 |
| 67    | 832.9477   | 119.7896  | 422.2564 | -890.3278 | -99.3934  | -383.3257 |
| 68    | 890.3278   | 99.3934   | 383.3257 | -883.8657 | -72.8787  | -325.5668 |
| 69    | 883.8657   | 72.8787   | 325.5668 | -710.7604 | -54.6324  | -286.3777 |
| 70    | 710.7604   | 54.6324   | 286.3777 | -597.8346 | -39.3365  | -248.9307 |
| 71    | 597.8346   | 39.3365   | 248.9307 | -448.7313 | -25.5630  | -214.2557 |
| 72    | 448.7313   | 25.5630   | 214.2557 | -167.2318 | -7.7476   | -167.6790 |
| 73    | 167.2318   | 7.7476    | 167.6790 | 23.7887   | 2.2470    | -140.3439 |
| 74    | -23.7887   | -2.2470   | 140.3439 | 223.1194  | 10.7699   | -115.9092 |
| 75    | -223.1194  | -10.7699  | 115.9092 | 423.0496  | 17.8568   | -94.4426  |
| 76    | -423.0496  | -17.8568  | 94.4426  | 679.9144  | 25.9627   | -67.8839  |
| 77    | -178.0369  | -6.8521   | 69.4702  | 848.2886  | 29.7950   | -54.1794  |
| 78    | -848.2886  | -29.7950  | 54.1794  | 997.8817  | 32.4705   | -43.5458  |
| 79    | -997.8817  | -32.4705  | 43.5458  | 1124.8523 | 34.1053   | -35.4002  |
| 80    | -1124.8523 | -34.1053  | 35.4002  | 1227.0583 | -122.8729 | -384.4659 |
| 81    | -811.2391  | 184.8802  | 583.4492 | 639.2124  | -253.3338 | -682.9552 |
| 82    | -639.2124  | 253.3338  | 682.9552 | 146.9377  | -226.8131 | -628.8174 |
| 83    | -146.9377  | 226.8131  | 628.8174 | -251.5665 | -201.1445 | -577.7285 |
| 84    | 251.5665   | 201.1445  | 577.7285 | -559.8822 | -168.9609 | -510.8024 |
| 85    | 559.8822   | 168.9609  | 510.8024 | -703.9800 | -141.5741 | -463.1210 |
| 86    | 703.9800   | 141.5741  | 463.1210 | -832.8348 | -119.8071 | -422.1533 |
| 87    | 832.8348   | 119.8071  | 422.1533 | -890.3929 | -99.4111  | -383.2265 |
| 88    | 890.3929   | 99.4111   | 383.2265 | -883.8362 | -72.9066  | -325.8721 |
| 89    | 883.8362   | 72.9066   | 325.8721 | -710.7704 | -54.6471  | -286.5754 |
| 90    | 710.7704   | 54.6471   | 286.5754 | -597.9840 | -39.3260  | -248.7868 |
| 91    | 597.9840   | 39.3260   | 248.7868 | -448.8573 | -25.5576  | -214.2524 |
| 92    | 448.8573   | 25.5576   | 214.2524 | -167.4352 | -7.7603   | -167.6887 |
| 93    | 167.4352   | 7.7603    | 167.6887 | 23.4552   | 2.2334    | -140.3416 |
| 94    | -23.4552   | -2.2334   | 140.3416 | 222.7486  | 10.7549   | -115.9026 |
| 95    | -222.7486  | -10.7549  | 115.9026 | 422.6682  | 17.8499   | -94.3907  |
| 96    | -422.6682  | -17.8499  | 94.3907  | 679.4883  | 25.9582   | -67.9249  |
| 97    | -192.6359  | -7.7900   | 69.5095  | 847.9376  | 29.7917   | -54.0571  |
| 98    | -847.9376  | -29.7917  | 54.0571  | 997.6362  | 32.4710   | -43.4739  |
| 99    | -997.6362  | -32.4710  | 43.4739  | 1124.6671 | 34.1090   | -35.4997  |
| 100   | -1124.6671 | -34.1090  | 35.4997  | 1227.0627 | -122.8673 | -384.3277 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|----------|-----------|-----------|-----------|
| 101   | -813.7153  | 184.8049  | 583.1570 | 639.2422  | -253.3407 | -682.8828 |
| 102   | -639.2422  | 253.3407  | 682.8828 | 147.1787  | -226.8418 | -628.8424 |
| 103   | -147.1787  | 226.8418  | 628.8424 | -251.3123 | -201.1889 | -577.6838 |
| 104   | 251.3123   | 201.1889  | 577.6838 | -559.8640 | -169.0513 | -510.8122 |
| 105   | 559.8640   | 169.0513  | 510.8122 | -704.1799 | -141.6667 | -463.1150 |
| 106   | 704.1799   | 141.6667  | 463.1150 | -833.4534 | -119.9627 | -422.3188 |
| 107   | 833.4534   | 119.9627  | 422.3188 | -891.2769 | -99.5758  | -383.4316 |
| 108   | 891.2769   | 99.5758   | 383.4316 | -885.4318 | -73.0838  | -325.6432 |
| 109   | 885.4318   | 73.0838   | 325.6432 | -713.1873 | -54.8641  | -286.4761 |
| 110   | 713.1873   | 54.8641   | 286.4761 | -601.1522 | -39.5882  | -248.8989 |
| 111   | 601.1522   | 39.5882   | 248.8989 | -452.9390 | -25.8369  | -214.2751 |
| 112   | 452.9390   | 25.8369   | 214.2751 | -172.4536 | -8.0501   | -167.7534 |
| 113   | 172.4536   | 8.0501    | 167.7534 | 17.6365   | 1.9266    | -140.4197 |
| 114   | -17.6365   | -1.9266   | 140.4197 | 216.1244  | 10.4284   | -115.9659 |
| 115   | -216.1244  | -10.4284  | 115.9659 | 415.3235  | 17.5170   | -94.4465  |
| 116   | -415.3235  | -17.5170  | 94.4465  | 671.7197  | 25.6350   | -68.0806  |
| 117   | -229.9624  | -9.3452   | 69.4121  | 839.9724  | 29.4921   | -54.3470  |
| 118   | -839.9724  | -29.4921  | 54.3470  | 989.9875  | 32.2015   | -43.4293  |
| 119   | -989.9875  | -32.2015  | 43.4293  | 1117.9967 | 33.8921   | -35.6250  |
| 120   | -1117.9967 | -33.8921  | 35.6250  | 1223.3335 | -122.7343 | -384.1687 |
| 121   | -820.5679  | 185.4046  | 578.1726 | 638.6840  | -253.2653 | -681.6832 |
| 122   | -638.6840  | 253.2653  | 681.6832 | 148.8058  | -227.1414 | -627.3842 |
| 123   | -148.8058  | 227.1414  | 627.3842 | -249.0626 | -201.9389 | -575.9225 |
| 124   | 249.0626   | 201.9389  | 575.9225 | -558.7762 | -170.3109 | -508.8170 |
| 125   | 558.7762   | 170.3109  | 508.8170 | -707.2101 | -143.8687 | -460.6682 |
| 126   | 707.2101   | 143.8687  | 460.6682 | -844.1945 | -122.8849 | -419.3448 |
| 127   | 844.1945   | 122.8849  | 419.3448 | -913.3449 | -103.3250 | -380.1031 |
| 128   | 913.3449   | 103.3250  | 380.1031 | -923.1965 | -77.7314  | -322.0635 |
| 129   | 923.1965   | 77.7314   | 322.0635 | -777.1775 | -61.0077  | -282.1469 |
| 130   | 777.1775   | 61.0077   | 282.1469 | -692.9207 | -46.8168  | -244.3416 |
| 131   | 692.9207   | 46.8168   | 244.3416 | -673.1797 | -25.3438  | -189.0078 |
| 132   | 673.1797   | 25.3438   | 189.0078 | -412.0411 | -22.0483  | -150.1154 |
| 133   | 411.6686   | 20.8514   | 152.4151 | -257.7786 | -12.2497  | -127.6816 |
| 134   | 257.7786   | 12.2497   | 127.6816 | -89.9421  | -3.6589   | -105.4597 |
| 135   | 89.9421    | 3.6589    | 105.4597 | 163.5676  | 6.9530    | -75.9064  |
| 136   | -51.1165   | -2.9235   | 82.2806  | 327.7336  | 12.5306   | -59.7835  |
| 137   | -200.5742  | -8.2370   | 64.5109  | 482.2639  | 16.9277   | -46.5798  |
| 138   | -482.2639  | -16.9277  | 46.5798  | 620.8885  | 20.1909   | -36.2089  |
| 139   | -620.8885  | -20.1909  | 36.2089  | 760.9365  | 23.0599   | -25.9170  |
| 140   | -760.9365  | -23.0599  | 25.9170  | 835.8951  | -99.3563  | -289.1017 |
| 141   | -773.2199  | 186.6562  | 464.3966 | 1827.9655 | -298.6218 | -550.7805 |
| 142   | -1827.9655 | 298.6218  | 550.7805 | 1360.1532 | -276.7028 | -499.6066 |
| 143   | -1360.1532 | 276.7028  | 499.6066 | 912.8860  | -252.8705 | -448.2808 |
| 144   | -912.8860  | 252.8705  | 448.2808 | 496.6697  | -227.1357 | -396.7241 |
| 145   | -496.6697  | 227.1357  | 396.7241 | 111.7399  | -213.5798 | -370.3317 |
| 146   | -111.7399  | 213.5798  | 370.3317 | -224.1223 | -184.5624 | -305.6054 |
| 147   | 224.1223   | 184.5624  | 305.6054 | -799.3000 | -102.0270 | -241.6904 |
| 148   | 721.4781   | 105.3435  | 255.3079 | -860.7090 | -88.1632  | -208.7011 |
| 149   | 776.0142   | 92.0775   | 224.1479 | -908.4573 | -76.2327  | -180.9055 |
| 150   | 814.7618   | 80.9657   | 197.9316 | -903.2150 | -63.6051  | -151.2797 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|----------|-----------|----------|-----------|-----------|-----------|
| 151   | 814.0510 | 68.5453   | 170.3319 | -876.3954 | -51.0712  | -123.7201 |
| 152   | 776.0437 | 57.2573   | 144.5219 | -813.8044 | -39.7226  | -97.8524  |
| 153   | 712.6552 | 46.7513   | 120.2530 | -726.7612 | -29.1370  | -73.5463  |
| 154   | 628.0514 | 36.9614   | 97.7581  | -650.4058 | -20.9259  | -54.5692  |
| 155   | 556.9354 | 29.5715   | 80.8450  | -529.2537 | -11.8689  | -34.2528  |
| 156   | 443.6112 | 21.3885   | 62.1342  | -395.6124 | -3.6495   | -15.3661  |
| 157   | 320.8049 | 14.0424   | 44.8876  | -4.2140   | 0.7805    | -0.0174   |
| 158   | 98.4565  | 3.3614    | 14.4176  | -2.7996   | 0.7778    | -0.0188   |
| 159   | 47.8195  | 1.1109    | 7.8044   | -1.3999   | 0.7776    | -0.0197   |
| 160   | 13.3941  | -0.2402   | 2.9993   | -0.0001   | 0.7775    | -0.0199   |



ENVOL. MIN. FLECTORES -EC1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 1     | -0.0484    | 186.2099  | 586.5149  | 71.1283   | 39.5201   | -30.3060  |
| 2     | -122.9248  | -68.3005  | 8.5780    | 245.8435  | 68.3008   | -8.5431   |
| 3     | -245.8315  | -68.3018  | 8.4982    | 368.8243  | 68.2951   | -8.4274   |
| 4     | -368.8122  | -68.2849  | 8.3754    | 491.6883  | 68.2766   | -8.3389   |
| 5     | -491.6959  | -68.2765  | 8.3353    | 614.5817  | 68.2857   | -8.2464   |
| 6     | -614.5701  | -68.2942  | 8.1362    | 737.5400  | 68.2971   | -8.0555   |
| 7     | -737.5453  | -68.2965  | 8.0591    | 860.5218  | 68.2768   | -7.8664   |
| 8     | -860.5091  | -68.2495  | 7.5960    | 983.3468  | 68.2096   | -7.5266   |
| 9     | -983.3597  | -68.1990  | 7.6990    | 1106.0822 | 68.1656   | -7.5383   |
| 10    | -1106.0603 | -68.1405  | 7.1497    | 1228.7959 | 68.1441   | -6.8966   |
| 11    | -1228.8118 | -68.1586  | 6.9394    | 1351.4945 | 68.1795   | -6.7911   |
| 12    | -1351.4829 | -68.1884  | 6.5515    | 1474.2253 | 68.1984   | -6.3570   |
| 13    | -1474.2239 | -68.1984  | 6.3458    | 1596.9750 | 68.1877   | -6.1485   |
| 14    | -1596.9707 | -68.1613  | 5.8687    | 1719.6865 | 68.1480   | -5.4740   |
| 15    | -1719.6709 | -68.1610  | 5.2303    | 1842.3225 | 68.1619   | -5.2529   |
| 16    | -1842.3245 | -68.1584  | 5.5132    | 1965.0671 | 68.1641   | -5.0421   |
| 17    | -1965.2063 | -69.9687  | 12.2954   | 2091.1135 | 69.9711   | -11.8486  |
| 18    | -2137.1667 | -121.0589 | 143.4531  | 2651.2690 | 335.8027  | 325.9241  |
| 19    | -2688.8521 | -378.5726 | -218.4414 | 3386.2148 | 389.5731  | 242.9868  |
| 20    | -3417.0312 | -427.9928 | -142.8319 | 4208.0542 | 152.7286  | -304.5552 |
| 21    | -4230.2715 | 215.7107  | -521.0811 | 3135.4492 | -457.3060 | -94.3640  |
| 22    | -3156.0605 | 440.5511  | 137.6747  | 2179.6536 | -430.0360 | -115.5719 |
| 23    | -2229.5281 | 383.5091  | 241.5950  | 1616.3455 | -161.4944 | 303.0805  |
| 24    | -1659.2437 | 123.3184  | -198.4507 | 1381.7765 | -123.3166 | 198.4468  |
| 25    | -1439.8115 | 75.3074   | -55.4655  | 1270.3379 | -75.3136  | 55.7327   |
| 26    | -1335.8889 | 26.8814   | -21.8786  | 1275.3997 | -26.8855  | 22.3931   |
| 27    | -1275.4010 | 26.8777   | -22.7011  | 1216.6699 | 8.5220    | -0.9825   |
| 28    | -1216.6545 | -8.5209   | 0.9898    | 1235.8240 | 8.5224    | -0.9644   |
| 29    | -1235.8162 | -8.5274   | 0.6014    | 1255.0000 | 8.5257    | -0.5279   |
| 30    | -1254.9800 | -8.5245   | -0.1754   | 1290.3208 | 29.0368   | 0.2516    |
| 31    | -1290.3086 | -29.0514  | 0.1378    | 1355.6582 | 29.0511   | -0.0832   |
| 32    | -1355.6536 | -29.0137  | -1.0945   | 1420.9363 | 29.0151   | 1.1741    |
| 33    | -1420.9514 | -29.0606  | -1.1854   | 1486.3425 | 29.0675   | 1.1854    |
| 34    | -1486.3627 | -29.1233  | -1.2074   | 1551.9016 | 29.1265   | 1.2814    |
| 35    | -1551.8950 | -29.1423  | -2.0976   | 1644.0784 | 49.7804   | -21.9415  |
| 36    | -1644.0846 | -49.7866  | 21.5042   | 1756.1179 | 49.7859   | -21.3462  |
| 37    | -1774.7952 | -81.1803  | 58.6616   | 1957.4833 | 81.1661   | -58.2889  |
| 38    | -2007.4243 | -165.3803 | 5.4521    | 2525.4033 | 332.5696  | 355.5028  |
| 39    | -2584.2363 | -380.9603 | -220.6417 | 3455.5845 | 391.0462  | 240.7832  |
| 40    | -3505.0896 | -437.3517 | -115.1314 | 4513.4409 | 155.1881  | -374.1801 |
| 41    | -4549.4736 | 229.2168  | -532.1300 | 3441.9062 | -477.0258 | -117.6354 |
| 42    | -3463.5244 | 460.3044  | 160.8407  | 2450.1226 | -438.8949 | -117.8548 |
| 43    | -2504.1282 | 392.4979  | 244.0275  | 1929.5120 | -172.4674 | 307.2718  |
| 44    | -1978.2401 | 123.8496  | -172.9211 | 1699.5824 | -123.8557 | 173.0854  |
| 45    | -1741.1399 | 86.7504   | -60.1059  | 1545.9175 | -86.7591  | 60.4194   |
| 46    | -1621.0452 | 38.7462   | -26.6613  | 1533.8923 | -38.7330  | 27.1116   |
| 47    | -1533.8849 | 38.7262   | -27.3201  | 1501.7295 | -6.0855   | -1.5790   |
| 48    | -1501.7091 | 6.0595    | 1.2328    | 1488.0735 | -6.0597   | -1.1720   |
| 49    | -1488.0876 | 6.1014    | 0.7213    | 1474.3574 | -6.1046   | -0.6900   |
| 50    | -1474.3262 | 6.1384    | 0.6948    | 1461.4105 | 15.5758   | -0.5652   |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 51    | -1461.4175 | -15.5362  | -0.2474   | 1496.3777 | 15.5317   | 0.2922    |
| 52    | -1496.3810 | -15.4965  | -0.3086   | 1531.2510 | 15.4960   | 0.3671    |
| 53    | -1531.2336 | -15.4823  | -1.1917   | 1566.0562 | 15.4823   | 1.2860    |
| 54    | -1566.0376 | -15.4885  | -1.7582   | 1600.8794 | 15.4874   | 1.8270    |
| 55    | -1600.8870 | -15.4728  | -2.1912   | 1653.9126 | 42.5797   | -26.3268  |
| 56    | -1653.9131 | -42.5696  | 26.3183   | 1749.6636 | 42.5697   | -25.9479  |
| 57    | -1777.6804 | -85.8218  | 59.3252   | 1970.8923 | 85.8253   | -58.9965  |
| 58    | -2037.7590 | -176.0148 | 6.5902    | 2556.1665 | 338.5805  | 354.1430  |
| 59    | -2616.0771 | -387.1686 | -219.9519 | 3500.7788 | 397.2050  | 240.5568  |
| 60    | -3550.8296 | -443.5843 | -114.9488 | 4572.0083 | 161.0033  | -374.9297 |
| 61    | -4608.0205 | 230.4770  | -531.6438 | 3497.8901 | -478.6239 | -118.3805 |
| 62    | -3519.4917 | 461.9026  | 161.1730  | 2501.7458 | -440.4631 | -117.9105 |
| 63    | -2556.1514 | 394.0787  | 244.0326  | 1978.7328 | -174.0375 | 307.4106  |
| 64    | -2028.1628 | 125.4291  | -173.0889 | 1745.9575 | -125.4503 | 173.2463  |
| 65    | -1788.1841 | 88.3759   | -60.2733  | 1589.3075 | -88.3910  | 60.4470   |
| 66    | -1664.9739 | 40.7349   | -26.6014  | 1588.9607 | -9.8724   | -2.1876   |
| 67    | -1588.9916 | 9.8835    | 1.3115    | 1566.7515 | -9.8847   | -1.2337   |
| 68    | -1566.7533 | 9.9035    | 1.2433    | 1544.4702 | -9.9021   | -1.2231   |
| 69    | -1544.4729 | 9.8726    | 0.8577    | 1522.2629 | -9.8729   | -0.8033   |
| 70    | -1522.2444 | 9.8849    | 0.3412    | 1500.0060 | -9.8855   | -0.2706   |
| 71    | -1500.0239 | 9.8830    | -0.6070   | 1526.7876 | 11.9051   | 0.7570    |
| 72    | -1526.7942 | -11.8814  | -0.7612   | 1553.5200 | 11.8774   | 0.7922    |
| 73    | -1553.5144 | -11.8649  | -1.2492   | 1580.2111 | 11.8615   | 1.3493    |
| 74    | -1580.1761 | -11.8897  | -2.1921   | 1606.9343 | 11.8904   | 2.2483    |
| 75    | -1606.9426 | -11.9077  | -2.1768   | 1652.6802 | 40.8099   | -26.2848  |
| 76    | -1652.6791 | -40.8087  | 26.0007   | 1744.5229 | 40.7993   | -25.4974  |
| 77    | -1775.4580 | -87.4948  | 59.2494   | 1972.2607 | 87.4899   | -59.1117  |
| 78    | -2041.3096 | -179.4058 | 6.9687    | 2562.0293 | 340.3078  | 353.7807  |
| 79    | -2622.1094 | -388.8947 | -219.8957 | 3510.5376 | 398.9245  | 240.7176  |
| 80    | -3560.6633 | -445.3066 | -115.0950 | 4585.8110 | 188.0627  | -464.6343 |
| 81    | -4621.5205 | 205.1557  | -442.2569 | 3511.5083 | -478.6479 | -117.9990 |
| 82    | -3533.2446 | 461.9259  | 161.1993  | 2514.9937 | -440.4828 | -118.2758 |
| 83    | -2569.4368 | 394.1073  | 244.4842  | 1992.0613 | -174.1253 | 307.1287  |
| 84    | -2041.3979 | 179.3925  | -7.3656   | 1758.9929 | -125.5251 | 173.3314  |
| 85    | -1801.2114 | 88.4468   | -60.1808  | 1602.1664 | -88.4502  | 60.4854   |
| 86    | -1676.3853 | 41.7675   | -27.0249  | 1607.2573 | -11.9174  | -1.5938   |
| 87    | -1607.2677 | 11.9030   | 1.9784    | 1580.4919 | -11.9030  | -1.9428   |
| 88    | -1580.5352 | 11.9002   | 1.0714    | 1553.7656 | -11.9042  | -0.9500   |
| 89    | -1553.7754 | 11.9406   | 0.0761    | 1526.9043 | -11.9459  | -0.0151   |
| 90    | -1526.9236 | 11.9860   | 0.0072    | 1499.9524 | -11.9925  | -0.0096   |
| 91    | -1499.9293 | 12.0562   | 0.0044    | 1521.7119 | 9.7331    | 0.1456    |
| 92    | -1521.7281 | -9.7945   | -1.4545   | 1543.7852 | 9.7996    | 1.5007    |
| 93    | -1543.7881 | -9.8452   | -1.0331   | 1565.9409 | 9.8494    | 1.0622    |
| 94    | -1565.9442 | -9.8501   | -1.9035   | 1588.1082 | 9.8533    | 2.0092    |
| 95    | -1588.1202 | -9.8903   | -2.4834   | 1640.8511 | 39.8094   | -26.0527  |
| 96    | -1640.8590 | -39.8095  | 25.8547   | 1730.4106 | 39.8116   | -25.5445  |
| 97    | -1762.1699 | -87.4699  | 59.5454   | 1958.9763 | 87.4670   | -59.1756  |
| 98    | -2015.0117 | -179.3014 | 6.2472    | 2548.7910 | 340.2322  | 354.0775  |
| 99    | -2608.7778 | -388.8162 | -219.4086 | 3496.8625 | 398.8502  | 240.0667  |
| 100   | -3547.0784 | -445.2324 | -114.9160 | 4571.9629 | 188.0135  | -464.3540 |



ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2   |
|-------|------------|-----------|-----------|-----------|-----------|-----------|
| 101   | -4607.6919 | 203.4529  | -442.5786 | 3501.4387 | -476.9179 | -117.9500 |
| 102   | -3523.3264 | 460.1997  | 161.6538  | 2509.2271 | -438.7517 | -118.8451 |
| 103   | -2563.5249 | 392.3700  | 244.7062  | 1990.0680 | -172.4280 | 306.9163  |
| 104   | -2039.4309 | 123.8407  | -172.6605 | 1760.7100 | -123.8467 | 172.8655  |
| 105   | -1802.9176 | 86.7850   | -59.8962  | 1607.6130 | -86.7771  | 60.2050   |
| 106   | -1676.8555 | 43.5160   | -26.6948  | 1600.5930 | -15.4110  | -1.9826   |
| 107   | -1600.5806 | 15.4216   | 1.5962    | 1565.8770 | -15.4284  | -1.5314   |
| 108   | -1565.8521 | 15.4651   | 1.0915    | 1531.0454 | -15.4676  | -1.0546   |
| 109   | -1531.0142 | 15.4930   | 1.0594    | 1496.1593 | -15.4923  | -1.0030   |
| 110   | -1496.1726 | 15.4618   | 0.1612    | 1461.3826 | -15.4637  | -0.1054   |
| 111   | -1461.4067 | 15.4778   | 0.0996    | 1474.5344 | 6.2368    | 0.0194    |
| 112   | -1474.5548 | -6.1531   | -0.8482   | 1488.3872 | 6.1479    | 0.8987    |
| 113   | -1488.3745 | -6.1392   | -0.9138   | 1502.1919 | 6.1348    | 0.9834    |
| 114   | -1502.2023 | -6.1021   | -1.7934   | 1515.9399 | 6.1032    | 1.8989    |
| 115   | -1515.9446 | -6.1189   | -2.3548   | 1598.2207 | 37.7644   | -26.1243  |
| 116   | -1598.2097 | -37.7650  | 25.9547   | 1683.1580 | 37.7791   | -25.8198  |
| 117   | -1715.9216 | -85.7861  | 60.0171   | 1908.9165 | 85.7864   | -59.8229  |
| 118   | -1950.8263 | -122.8914 | 172.5294  | 2494.5225 | 338.6429  | 354.0093  |
| 119   | -2555.2625 | -387.2658 | -220.0913 | 3439.7095 | 397.2789  | 240.2529  |
| 120   | -3489.9678 | -443.6645 | -113.7359 | 4512.3286 | 186.8254  | -465.7839 |
| 121   | -4548.4575 | 197.5867  | -441.0716 | 3455.5720 | -470.6467 | -118.6889 |
| 122   | -3477.5474 | 453.9396  | 162.3692  | 2476.9331 | -432.3885 | -119.5279 |
| 123   | -2531.6104 | 386.0773  | 245.3850  | 1975.6960 | -167.2851 | 305.8998  |
| 124   | -2025.6700 | 118.8848  | -171.3654 | 1758.2043 | -118.8889 | 171.5486  |
| 125   | -1800.5681 | 82.1413   | -58.9016  | 1615.7061 | -82.1417  | 59.4000   |
| 126   | -1667.7441 | 50.7025   | -22.8429  | 1553.6733 | -50.6830  | 23.1231   |
| 127   | -1553.6622 | 50.6666   | -23.0788  | 1487.1151 | -29.0109  | -1.6806   |
| 128   | -1487.1184 | 29.0141   | 0.8220    | 1421.8322 | -29.0131  | -0.7489   |
| 129   | -1421.8210 | 29.0178   | 0.7546    | 1356.5283 | -29.0213  | -0.7283   |
| 130   | -1356.5609 | 29.0562   | 0.3832    | 1291.1941 | -29.0604  | -0.3135   |
| 131   | -1291.1826 | 29.0823   | -0.4598   | 1255.6228 | -8.5713   | 0.5953    |
| 132   | -1255.6321 | 8.5870    | -0.5358   | 1236.3167 | -8.5888   | 0.5603    |
| 133   | -1236.2854 | 8.5878    | -0.9127   | 1216.9573 | -8.5866   | 0.9715    |
| 134   | -1216.9298 | 8.5765    | -1.3331   | 1197.6394 | -8.5780   | 1.3981    |
| 135   | -1197.6450 | 8.6063    | -1.6928   | 1178.2849 | -8.6076   | 1.7912    |
| 136   | -1178.2893 | 8.5971    | -2.3553   | 1202.4148 | 19.4118   | -22.7246  |
| 137   | -1245.8398 | -67.8762  | 56.8631   | 1444.2467 | 88.2774   | -1.1641   |
| 138   | -1544.0012 | -184.3344 | 8.9247    | 2218.8242 | 329.3481  | 302.3631  |
| 139   | -2262.0173 | -367.5382 | -197.9709 | 3104.7134 | 377.5077  | 218.3532  |
| 140   | -3159.5122 | -424.0370 | -92.1895  | 4169.8350 | 173.9776  | -449.3926 |
| 141   | -4206.8994 | 187.7241  | -356.9400 | 3357.8416 | -457.3675 | -150.5140 |
| 142   | -3372.6099 | 443.7786  | 184.2865  | 2585.2627 | -432.0968 | -158.5574 |
| 143   | -2623.8887 | 393.6843  | 259.7408  | 2128.7246 | -164.8767 | 251.6906  |
| 144   | -2168.0781 | 122.1174  | -144.6126 | 1948.1497 | -122.1306 | 145.1263  |
| 145   | -1994.1193 | 71.0676   | -13.7612  | 1866.2341 | -71.0481  | 13.9439   |
| 146   | -1869.3264 | 69.2369   | -6.0978   | 1744.7004 | -69.1998  | 6.3263    |
| 147   | -1744.7083 | 69.1735   | -6.3292   | 1620.1647 | -69.1682  | 6.5073    |
| 148   | -1620.1774 | 69.1691   | -6.7410   | 1495.7144 | -69.1784  | 7.1184    |
| 149   | -1495.7214 | 69.1860   | -7.3721   | 1371.1603 | -69.1733  | 7.5607    |
| 150   | -1371.1663 | 69.1604   | -7.5630   | 1246.6721 | -69.1613  | 7.7190    |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|-----------|-----------|----------|
| 151   | -1246.6835 | 69.1772   | -7.9283 | 1122.0645 | -69.1930  | 8.2140   |
| 152   | -1122.0688 | 69.2063   | -8.3790 | 997.4567  | -69.2062  | 8.4960   |
| 153   | -997.4546  | 69.1869   | -8.4981 | 872.9408  | -69.2032  | 8.4979   |
| 154   | -872.9428  | 69.2312   | -8.4903 | 748.2742  | -69.2550  | 8.6617   |
| 155   | -748.2911  | 69.2634   | -8.8890 | 623.5813  | -69.2748  | 9.1490   |
| 156   | -623.5864  | 69.2772   | -9.2510 | 498.8301  | -69.2879  | 9.2615   |
| 157   | -498.8120  | 69.2922   | -9.1800 | 374.1256  | -69.2902  | 9.1599   |
| 158   | -374.1386  | 69.2883   | -9.2225 | 249.3931  | -69.2873  | 9.3043   |
| 159   | -249.4002  | 69.2841   | -9.3405 | 124.7056  | -69.2781  | 9.3821   |
| 160   | -124.7154  | 69.2756   | -9.4033 | 0.0536    | 129.8606  | 545.5164 |



ENVOL. MIN. CORTANTES -EC1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 1     | 0.0012     | -54.3596  | -30.1592  | 110.7807   | 68.7559   | -11.6668 |
| 2     | -87.2925   | -55.7050  | -25.1998  | 200.4993   | 70.1039   | -16.5932 |
| 3     | -156.7115  | -57.9478  | -18.4186  | 167.0893   | 74.1446   | -0.6158  |
| 4     | -213.1656  | -61.0710  | -9.7366   | -252.2289  | 84.9151   | -1.7016  |
| 5     | -52.9173   | -67.3306  | 28.7697   | -327.9454  | 96.2778   | -2.2566  |
| 6     | 499.3688   | -77.2412  | 0.7775    | -457.9898  | 112.6698  | -3.0860  |
| 7     | 645.3203   | -95.3279  | 1.6968    | -560.6569  | 130.6837  | -4.1191  |
| 8     | 758.1834   | -114.9764 | 2.9750    | -628.1456  | 150.1986  | -5.3344  |
| 9     | 830.4091   | -136.1628 | 4.1282    | -653.1513  | 171.2501  | -6.4753  |
| 10    | 855.2256   | -158.7660 | 5.5873    | -585.7123  | 190.6356  | -7.9491  |
| 11    | 782.5510   | -179.7279 | 7.0658    | -509.6979  | 214.5102  | -9.4092  |
| 12    | 1155.1426  | -205.7845 | 26.1719   | -815.1558  | 251.1644  | -15.9746 |
| 13    | 902.2178   | -247.1353 | 0.0908    | -487.8877  | 292.6903  | 10.3989  |
| 14    | 566.4654   | -289.3321 | -24.4331  | -74.9332   | 334.5105  | 30.2081  |
| 15    | 143.5677   | -331.7908 | -42.3489  | 441.1366   | 366.2197  | 29.6923  |
| 16    | -383.4456  | -364.0906 | -39.7394  | 1035.5554  | 400.8491  | 34.4099  |
| 17    | -990.3053  | -399.2720 | -43.3067  | 1690.3606  | 439.3557  | 42.0362  |
| 18    | -1657.3527 | -438.2835 | -48.1448  | 2406.9043  | 476.2946  | 46.9257  |
| 19    | -2387.0789 | -475.6764 | -51.8698  | 3174.1475  | 511.5845  | 51.2025  |
| 20    | -3167.4941 | -511.3863 | -54.6845  | 3409.8887  | 423.1669  | -20.6992 |
| 21    | -863.1146  | -154.0434 | -323.7519 | -538.8457  | 68.4164   | -10.0268 |
| 22    | 549.7233   | -51.3601  | -36.8233  | -413.8805  | 69.3610   | -15.5972 |
| 23    | 445.0483   | -53.0247  | -28.8874  | -381.3812  | 71.6904   | -0.8779  |
| 24    | 356.2478   | -55.4939  | -18.7050  | -350.9952  | 76.6299   | -1.2001  |
| 25    | 280.2451   | -58.8339  | -6.1672   | -720.7831  | 87.3059   | -2.5270  |
| 26    | 402.4707   | -65.0973  | 42.0510   | -815.3853  | 100.1375  | -3.7321  |
| 27    | 1014.6683  | -74.6644  | 2.2762    | -902.7602  | 115.1912  | -5.0849  |
| 28    | 1124.6007  | -91.7517  | 3.4594    | -970.8615  | 132.4756  | -6.1938  |
| 29    | 1209.0903  | -111.1410 | 4.8884    | -1053.8810 | 154.5496  | -7.9281  |
| 30    | 1301.7761  | -135.3576 | 7.0020    | -1043.1467 | 176.4387  | -9.7716  |
| 31    | 1293.7649  | -159.3893 | 8.3813    | -975.4443  | 200.5298  | -11.2115 |
| 32    | 1221.9497  | -185.6276 | 10.6899   | -838.6191  | 226.7968  | -13.6842 |
| 33    | 1674.0413  | -218.4635 | 6.8574    | -1207.1389 | 273.9138  | 3.4903   |
| 34    | 1316.2361  | -268.5352 | -21.0190  | -722.6796  | 314.2932  | 12.3898  |
| 35    | 819.9587   | -309.9211 | -27.4626  | -124.3069  | 354.5899  | 15.7578  |
| 36    | 207.2921   | -351.1479 | -28.4512  | 570.6024   | 398.1846  | 16.4162  |
| 37    | -503.7160  | -395.6461 | -26.4450  | 1365.5823  | 445.7302  | 24.4784  |
| 38    | -1317.1200 | -444.0128 | -32.7885  | 2272.5029  | 483.9226  | 14.1764  |
| 39    | -2242.5547 | -482.9407 | -19.2882  | 3266.7681  | 521.2804  | 0.9754   |
| 40    | -3256.8323 | -520.9679 | -5.0653   | 3811.0840  | 457.2542  | -26.7615 |
| 41    | -890.1703  | -161.5542 | -393.8885 | -850.3730  | 76.1218   | 0.4776   |
| 42    | 700.5135   | -55.9471  | -36.1966  | -738.4983  | 78.0570   | 0.0201   |
| 43    | 586.6088   | -57.6458  | -28.3031  | -660.1497  | 81.4635   | -0.4697  |
| 44    | 488.6498   | -60.1651  | -18.0127  | -610.1514  | 86.4905   | -0.9712  |
| 45    | 403.5262   | -63.5548  | -5.4469   | -968.6443  | 97.5958   | -2.3134  |
| 46    | 1142.5349  | -70.2645  | 0.7961    | -1043.3271 | 110.5596  | -3.6221  |
| 47    | 1245.3054  | -85.1826  | 2.0847    | -1110.1228 | 125.7314  | -4.8785  |
| 48    | 1334.3843  | -102.4091 | 3.4432    | -1156.9723 | 143.1467  | -6.2673  |
| 49    | 1397.3772  | -121.9300 | 5.0418    | -1218.0369 | 165.3553  | -7.9097  |
| 50    | 1467.8146  | -146.2789 | 6.5413    | -1184.5662 | 187.3604  | -9.3718  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 51    | 1436.7742  | -170.4160 | 8.6057    | -1093.4622 | 211.5512  | -11.4728 |
| 52    | 1341.1699  | -196.7540 | 10.4384   | -932.6827  | 237.9163  | -13.2819 |
| 53    | 1169.0747  | -225.2337 | 12.7040   | -1248.5992 | 280.6013  | 2.6705   |
| 54    | 1357.9298  | -275.2756 | -20.1255  | -748.7738  | 320.9595  | 11.3838  |
| 55    | 846.2913   | -316.6153 | -26.4213  | -135.3205  | 361.2151  | 14.9385  |
| 56    | 218.5480   | -357.8211 | -27.5318  | 574.2040   | 404.7008  | 15.6794  |
| 57    | -507.6447  | -402.1761 | -26.1077  | 1384.0114  | 452.1157  | 23.8081  |
| 58    | -1335.2468 | -450.4150 | -31.4609  | 2304.4912  | 490.2143  | 12.9198  |
| 59    | -2274.8540 | -489.2484 | -18.6678  | 3312.1104  | 527.4609  | 0.6939   |
| 60    | -3302.2012 | -527.1505 | -4.8121   | 3919.8960  | 468.5760  | -26.3641 |
| 61    | -832.9795  | -163.3843 | -394.5020 | -965.2793  | 79.4039   | 0.9694   |
| 62    | 757.1262   | -57.5671  | -36.2070  | -846.1634  | 81.3439   | 0.2163   |
| 63    | 639.6880   | -59.2654  | -28.2524  | -760.6261  | 84.7495   | -0.3246  |
| 64    | 538.2277   | -61.7823  | -17.9388  | -703.4787  | 89.7789   | -0.8710  |
| 65    | 449.6075   | -65.1693  | -5.3585   | -1055.6624 | 100.9271  | -2.2473  |
| 66    | 1229.8718  | -73.6023  | 0.5585    | -1123.1316 | 113.9237  | -3.3898  |
| 67    | 1325.3625  | -88.5746  | 2.1106    | -1182.6047 | 129.1374  | -4.9203  |
| 68    | 1407.1597  | -105.8379 | 3.2804    | -1221.9612 | 146.5917  | -6.0051  |
| 69    | 1462.4558  | -125.3989 | 4.7064    | -1275.4546 | 168.7913  | -7.6307  |
| 70    | 1525.3286  | -149.7189 | 6.5350    | -1234.3728 | 190.7895  | -9.4937  |
| 71    | 1486.6335  | -173.8482 | 8.8035    | -1135.6060 | 214.9761  | -11.7006 |
| 72    | 1383.3292  | -200.1977 | 10.6969   | -967.1128  | 241.3608  | -13.4523 |
| 73    | 1203.5928  | -228.6679 | 12.7596   | -1262.0503 | 282.3629  | 2.4769   |
| 74    | 1371.2996  | -277.0333 | -19.8806  | -758.1223  | 322.7204  | 11.1126  |
| 75    | 855.6736   | -318.3789 | -26.1416  | -141.0803  | 362.9616  | 14.7437  |
| 76    | 224.2163   | -359.5650 | -27.4115  | 572.8599   | 406.4540  | 15.4426  |
| 77    | -506.3039  | -403.9425 | -25.7985  | 1385.9974  | 453.8619  | 23.4556  |
| 78    | -1337.1412 | -452.1531 | -30.9607  | 2310.5078  | 491.9437  | 12.5357  |
| 79    | -2280.9966 | -490.9728 | -18.5859  | 3321.9263  | 529.1785  | 0.7870   |
| 80    | -3312.0298 | -528.8671 | -4.9063   | 3946.8516  | 471.9686  | -26.1810 |
| 81    | -822.1303  | -163.2986 | -394.4928 | -987.6517  | 79.2742   | 0.8490   |
| 82    | 768.2421   | -57.4754  | -36.2438  | -868.8008  | 81.2165   | 0.3509   |
| 83    | 650.9633   | -59.1912  | -28.3396  | -783.5727  | 84.6273   | -0.1243  |
| 84    | 549.7126   | -61.7083  | -17.8816  | -726.6851  | 89.6589   | -0.9645  |
| 85    | 461.2838   | -65.0984  | -5.4125   | -1079.0631 | 100.8173  | -2.1628  |
| 86    | 1253.2014  | -73.5092  | 0.9700    | -1146.7642 | 113.8168  | -3.7375  |
| 87    | 1348.9835  | -88.4526  | 1.7070    | -1206.4932 | 129.0039  | -4.4149  |
| 88    | 1431.0347  | -105.6995 | 3.2563    | -1246.1497 | 146.4510  | -6.2391  |
| 89    | 1486.6947  | -125.2481 | 5.3127    | -1299.9232 | 168.6719  | -8.3079  |
| 90    | 1549.7881  | -149.6255 | 7.0237    | -1259.0217 | 190.7200  | -9.6826  |
| 91    | 1511.2727  | -173.8189 | 8.4744    | -1160.2839 | 214.9447  | -11.3950 |
| 92    | 1408.0430  | -200.1452 | 11.0806   | -991.8423  | 241.2838  | -13.9615 |
| 93    | 1228.2410  | -228.5657 | 12.9165   | -1274.3633 | 282.3237  | 2.6449   |
| 94    | 1383.5840  | -276.9917 | -20.0637  | -770.8783  | 322.6411  | 11.1690  |
| 95    | 868.3696   | -318.2991 | -26.1986  | -153.5174  | 362.8858  | 14.6237  |
| 96    | 236.6337   | -359.4840 | -27.2521  | 559.6941   | 406.3606  | 15.3313  |
| 97    | -493.0515  | -403.8386 | -25.6030  | 1372.6914  | 453.7671  | 23.4733  |
| 98    | -1324.0649 | -452.0615 | -31.4092  | 2297.4912  | 491.8574  | 12.7273  |
| 99    | -2267.7090 | -490.8895 | -18.0525  | 3308.1567  | 529.0934  | 0.1967   |
| 100   | -3298.4170 | -528.7843 | -4.7983   | 3919.8909  | 471.8469  | -26.0728 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 101   | -833.0818  | -161.7963 | -394.4652 | -971.8204  | 76.2282   | 0.6556   |
| 102   | 759.6558   | -55.8720  | -36.2094  | -859.8470  | 78.1703   | 0.4966   |
| 103   | 646.0233   | -57.5806  | -28.1963  | -781.4667  | 81.5806   | -0.2679  |
| 104   | 548.3988   | -60.0947  | -17.8538  | -731.4090  | 86.6184   | -0.8682  |
| 105   | 463.5359   | -63.4890  | -5.2769   | -1090.5172 | 97.8504   | -2.2335  |
| 106   | 1264.7051  | -70.5260  | 0.8078    | -1164.9226 | 110.8425  | -3.6303  |
| 107   | 1367.0746  | -85.5001  | 2.0930    | -1231.3157 | 126.0550  | -4.8931  |
| 108   | 1455.8223  | -102.7563 | 3.5445    | -1277.5511 | 143.5128  | -6.2912  |
| 109   | 1518.0642  | -122.3271 | 4.7757    | -1337.7891 | 165.7423  | -7.7022  |
| 110   | 1587.6150  | -146.6801 | 6.8935    | -1303.5018 | 187.7472  | -9.7592  |
| 111   | 1555.7214  | -170.8190 | 8.5612    | -1211.4719 | 211.9622  | -11.4050 |
| 112   | 1459.1050  | -197.2028 | 10.8485   | -1049.5906 | 238.3698  | -13.7295 |
| 113   | 1285.8745  | -225.6936 | 12.8599   | -1307.2444 | 280.8973  | 2.5180   |
| 114   | 1416.4058  | -275.5927 | -19.9058  | -807.2692  | 321.2751  | 10.9825  |
| 115   | 904.6888   | -316.9407 | -25.9910  | -193.4911  | 361.5084  | 14.4170  |
| 116   | 276.5082   | -358.1191 | -27.0291  | 515.7436   | 404.9294  | 15.0746  |
| 117   | -449.0965  | -402.4075 | -25.2112  | 1324.4458  | 452.2844  | 23.0684  |
| 118   | -1275.9047 | -450.5852 | -30.9961  | 2244.6406  | 490.3366  | 12.7508  |
| 119   | -2215.1914 | -489.3700 | -18.7565  | 3251.6177  | 527.5399  | 0.3451   |
| 120   | -3241.4453 | -527.2259 | -3.5658   | 3812.4270  | 469.0214  | -27.9196 |
| 121   | -898.4043  | -155.3297 | -390.2028 | -867.7923  | 62.1998   | 0.7621   |
| 122   | 624.5593   | -37.8378  | -39.9467  | -787.4831  | 64.1605   | 0.5878   |
| 123   | 551.5912   | -39.5597  | -31.9663  | -740.7196  | 67.6030   | -0.1338  |
| 124   | 494.5662   | -42.0990  | -21.7999  | -722.1503  | 72.6885   | -0.4341  |
| 125   | 450.2452   | -45.5244  | -9.1124   | -1110.3979 | 85.4246   | -2.1450  |
| 126   | 1284.4827  | -58.1675  | 0.7540    | -1212.3655 | 98.5161   | -3.5176  |
| 127   | 1414.1382  | -73.2494  | 1.6752    | -1305.8153 | 113.8035  | -4.4517  |
| 128   | 1529.7455  | -90.5934  | 3.4355    | -1378.5409 | 131.3802  | -6.2820  |
| 129   | 1618.1897  | -110.2871 | 4.7967    | -1464.5625 | 153.7505  | -7.6412  |
| 130   | 1713.1329  | -134.8142 | 6.5541    | -1455.4602 | 175.9185  | -9.5004  |
| 131   | 1706.1934  | -159.1236 | 9.0078    | -1387.7822 | 200.2962  | -11.8953 |
| 132   | 1633.4849  | -185.6380 | 10.8369   | -1249.8640 | 226.7980  | -13.5823 |
| 133   | 1891.4202  | -219.5658 | 10.3530   | -1429.8365 | 274.6169  | -0.2306  |
| 134   | 1537.8802  | -269.3585 | -17.1667  | -952.9343  | 314.5237  | 8.6961   |
| 135   | 1049.0841  | -310.2542 | -23.6759  | -366.4521  | 354.2676  | 12.3857  |
| 136   | 448.1054   | -350.9230 | -24.9486  | 302.1300   | 396.7599  | 13.3741  |
| 137   | -236.6807  | -394.3013 | -23.4962  | 1071.8669  | 443.4300  | 21.6543  |
| 138   | -1024.3494 | -441.7616 | -29.5009  | 1946.9395  | 480.6468  | 11.3525  |
| 139   | -1918.0750 | -479.6977 | -16.9628  | 2900.9292  | 516.9104  | -1.0155  |
| 140   | -2891.1931 | -516.6120 | -2.5913   | 3421.6335  | 457.8957  | -28.2365 |
| 141   | -1107.1498 | -140.9561 | -365.2548 | -664.7059  | 19.4345   | -1.6859  |
| 142   | 672.8047   | -5.6478   | -35.4400  | -649.6769  | 20.0511   | -6.4035  |
| 143   | 671.5555   | -6.7294   | -29.1725  | -709.9595  | 23.1994   | -0.2729  |
| 144   | 698.4129   | -8.8373   | -5.3461   | -859.2654  | 29.8369   | -1.3387  |
| 145   | 767.9721   | -12.7181  | 11.7035   | -971.3334  | 35.9822   | -1.7967  |
| 146   | 818.0858   | -16.3753  | 27.4288   | -1145.5303 | 45.4517   | -2.8467  |
| 147   | 1288.9255  | -23.3305  | 1.4033    | -1323.7424 | 56.5227   | -3.6721  |
| 148   | 1486.3313  | -35.7877  | 2.6817    | -1498.1183 | 69.3022   | -5.0781  |
| 149   | 1676.6650  | -49.9680  | 4.3196    | -1660.5082 | 83.7989   | -6.6658  |
| 150   | 1851.1567  | -65.9216  | 5.5700    | -1753.8772 | 97.3391   | -7.7774  |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 151   | 1952.4414 | -81.0228  | 7.3301    | -1868.9023 | 115.2919  | -9.8039  |
| 152   | 2070.5332 | -100.5424 | 9.4630    | -1945.6873 | 135.0384  | -11.8313 |
| 153   | 2145.4536 | -121.8612 | 11.0970   | -1974.7866 | 156.5869  | -13.3358 |
| 154   | 2167.3750 | -145.2087 | 12.6317   | -1946.1028 | 180.1378  | -15.0708 |
| 155   | 2125.8186 | -170.4225 | 15.6697   | -1821.2651 | 202.3491  | -18.1102 |
| 156   | 1982.3433 | -194.3230 | 18.3221   | -1652.3323 | 229.4928  | -20.5908 |
| 157   | 1788.6140 | -223.2422 | 19.7471   | -1395.9832 | 258.5207  | -21.9243 |
| 158   | 1501.3506 | -254.0199 | 22.1217   | -1060.1658 | 294.5179  | 97.9393  |
| 159   | 1094.0656 | -293.1611 | -102.7622 | -607.7114  | 337.5463  | 105.5231 |
| 160   | 619.7043  | -337.0830 | -108.5245 | 0.0000     | 367.1832  | 90.2379  |

ENVOL. MIN. TORSORES -EC1

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|------------|-----------|----------|
| 1     | -0.0027    | -0.0032   | -1.9352   | -24.5970   | 0.3075    | 5.5986   |
| 2     | 14.0445    | -0.5272   | -4.8354   | -94.3362   | 3.1002    | 15.0963  |
| 3     | 78.6983    | -3.1350   | -13.5129  | -200.9106  | 7.8842    | 30.3444  |
| 4     | 182.7629   | -7.8139   | -25.9681  | -328.1789  | 14.3834   | 45.6130  |
| 5     | 315.1808   | -14.5491  | -42.2270  | -416.5499  | 20.0643   | 59.2790  |
| 6     | 371.8318   | -18.6716  | -51.7262  | -532.0095  | 28.2598   | 78.0516  |
| 7     | 517.7305   | -28.4425  | -73.5903  | -663.6344  | 40.1846   | 99.1055  |
| 8     | 663.6344   | -40.1846  | -99.1055  | -799.3610  | 53.8686   | 128.4332 |
| 9     | 799.3610   | -53.8686  | -128.4332 | -915.4379  | 69.4660   | 161.5269 |
| 10    | 915.4379   | -69.4660  | -161.5269 | -1002.6669 | 79.3313   | 179.3482 |
| 11    | 1002.6669  | -79.3313  | -179.3482 | -946.3831  | 96.1937   | 217.8517 |
| 12    | 946.3831   | -96.1937  | -217.8517 | -956.9186  | 116.1252  | 260.2258 |
| 13    | 956.9186   | -116.1252 | -260.2258 | -917.3279  | 137.7740  | 306.4107 |
| 14    | 917.3279   | -137.7740 | -306.4107 | -820.8792  | 160.9365  | 356.2167 |
| 15    | 820.8792   | -160.9365 | -356.2167 | -661.1771  | 177.5215  | 386.5224 |
| 16    | 661.1771   | -177.5215 | -386.5224 | -379.2850  | 196.8000  | 429.8021 |
| 17    | 379.2850   | -196.8000 | -429.8021 | -103.4850  | 219.7348  | 478.7314 |
| 18    | 103.4850   | -219.7348 | -478.7314 | 226.4491   | 241.7601  | 528.0367 |
| 19    | -226.4491  | -241.7601 | -528.0367 | 604.6621   | 263.3447  | 582.1174 |
| 20    | -604.6621  | -263.3447 | -582.1174 | 788.1193   | 186.1355  | 463.1091 |
| 21    | -1061.2048 | -122.1998 | -317.3873 | 907.8484   | -27.5189  | 30.4100  |
| 22    | -907.8484  | 27.5189   | -30.4100  | 760.9190   | -24.7543  | 38.3199  |
| 23    | -760.9190  | 24.7543   | -38.3199  | 600.0582   | -21.0662  | 49.0140  |
| 24    | -600.0582  | 21.0662   | -49.0140  | 429.0005   | -16.3921  | 62.6402  |
| 25    | -429.0005  | 16.3921   | -62.6402  | 171.5297   | -7.3575   | 89.0688  |
| 26    | -171.5297  | 7.3575    | -89.0688  | -12.2738   | 0.0808    | 110.5602 |
| 27    | 12.2738    | -0.0808   | -110.5602 | -188.9850  | 8.6935    | 135.0466 |
| 28    | 188.9850   | -8.6935   | -135.0466 | -352.2365  | 18.5104   | 162.6356 |
| 29    | 352.2365   | -18.5104  | -162.6356 | -597.2963  | 35.5214   | 209.6888 |
| 30    | 597.2963   | -35.5214  | -209.6888 | -713.4861  | 48.4766   | 244.7765 |
| 31    | 713.4861   | -48.4766  | -244.7765 | -798.2166  | 63.0536   | 282.7335 |
| 32    | 798.2166   | -63.0536  | -282.7335 | -944.7495  | 80.3943   | 325.5937 |
| 33    | 944.7495   | -80.3943  | -325.5937 | -931.3585  | 106.3409  | 386.5819 |
| 34    | 931.3585   | -106.3409 | -386.5819 | -857.2793  | 126.2775  | 428.8283 |
| 35    | 857.2793   | -126.2775 | -428.8283 | -714.4661  | 147.6183  | 470.8075 |
| 36    | 714.4661   | -147.6183 | -470.8075 | -559.7570  | 174.5950  | 519.4978 |
| 37    | 559.7570   | -174.5950 | -519.4978 | -241.9020  | 206.5421  | 586.7378 |
| 38    | 241.9020   | -206.5421 | -586.7378 | 164.6195   | 231.9971  | 637.9960 |
| 39    | -164.6195  | -231.9971 | -637.9960 | 663.6466   | 258.3478  | 692.4474 |
| 40    | -663.6466  | -258.3478 | -692.4474 | 835.8403   | 184.8211  | 577.1346 |
| 41    | -1257.2162 | -124.8790 | -389.7603 | 1144.6753  | -34.6987  | 36.0524  |
| 42    | -1144.6753 | 34.6987   | -36.0524  | 1010.6052  | -32.8693  | 43.9166  |
| 43    | -1010.6052 | 32.8693   | -43.9166  | 854.3610   | -29.9966  | 54.6795  |
| 44    | -854.3610  | 29.9966   | -54.6795  | 679.8625   | -25.9554  | 68.4063  |
| 45    | -679.8625  | 25.9554   | -68.4063  | 414.4874   | -17.4870  | 94.8818  |
| 46    | -414.4874  | 17.4870   | -94.8818  | 209.6329   | -10.1395  | 116.4330 |
| 47    | -209.6329  | 10.1395   | -116.4330 | 6.1706     | -1.3343   | 140.8403 |
| 48    | -6.1706    | 1.3343    | -140.8403 | -188.0856  | 8.9590    | 168.1647 |
| 49    | 188.0856   | -8.9590   | -168.1647 | -474.4127  | 27.2691   | 214.7298 |
| 50    | 474.4127   | -27.2691  | -214.7298 | -624.2223  | 41.4077   | 249.3756 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 51    | 624.2223   | -41.4077  | -249.3756 | -736.2535 | 57.0589   | 286.9280 |
| 52    | 736.2535   | -57.0589  | -286.9280 | -908.3622 | 75.8931   | 329.4979 |
| 53    | 908.3622   | -75.8931  | -329.4979 | -910.5340 | 102.7432  | 389.6736 |
| 54    | 910.5340   | -102.7432 | -389.6736 | -847.4268 | 123.4872  | 431.4942 |
| 55    | 847.4268   | -123.4872 | -431.4942 | -711.7115 | 145.5609  | 473.4730 |
| 56    | 711.7115   | -145.5609 | -473.4730 | -560.9800 | 173.4333  | 521.7178 |
| 57    | 560.9800   | -173.4333 | -521.7178 | -244.1260 | 205.8763  | 588.4614 |
| 58    | 244.1260   | -205.8763 | -588.4614 | 163.3111  | 231.7718  | 639.6636 |
| 59    | -163.3111  | -231.7718 | -639.6636 | 664.3748  | 258.4835  | 693.9218 |
| 60    | -664.3748  | -258.4835 | -693.9218 | 831.2730  | 184.3227  | 582.2673 |
| 61    | -1261.1707 | -125.0545 | -390.3100 | 1151.5266 | -34.8741  | 36.0253  |
| 62    | -1151.5266 | 34.8741   | -36.0253  | 1018.4277 | -33.0902  | 44.0363  |
| 63    | -1018.4277 | 33.0902   | -44.0363  | 862.5413  | -30.2550  | 54.7887  |
| 64    | -862.5413  | 30.2550   | -54.7887  | 687.9089  | -26.2492  | 68.5002  |
| 65    | -687.9089  | 26.2492   | -68.5002  | 422.1096  | -17.8034  | 94.8911  |
| 66    | -422.1096  | 17.8034   | -94.8911  | 216.4467  | -10.4606  | 116.4521 |
| 67    | -216.4467  | 10.4606   | -116.4521 | 12.0988   | -1.6454   | 140.8636 |
| 68    | -12.0988   | 1.6454    | -140.8636 | -183.0468 | 8.6714    | 168.2179 |
| 69    | 183.0468   | -8.6714   | -168.2179 | -470.4362 | 27.0162   | 214.7702 |
| 70    | 470.4362   | -27.0162  | -214.7702 | -621.1052 | 41.1693   | 249.2996 |
| 71    | 621.1052   | -41.1693  | -249.2996 | -733.8754 | 56.8547   | 286.8088 |
| 72    | 733.8754   | -56.8547  | -286.8088 | -906.6984 | 75.7032   | 329.4747 |
| 73    | 906.6984   | -75.7032  | -329.4747 | -909.3179 | 102.5802  | 389.6743 |
| 74    | 909.3179   | -102.5802 | -389.6743 | -846.6049 | 123.3538  | 431.4580 |
| 75    | 846.6049   | -123.3538 | -431.4580 | -711.3836 | 145.4626  | 473.4532 |
| 76    | 711.3836   | -145.4626 | -473.4532 | -560.7640 | 173.3642  | 521.5424 |
| 77    | 560.7640   | -173.3642 | -521.5424 | -244.1603 | 205.8183  | 588.3374 |
| 78    | 244.1603   | -205.8183 | -588.3374 | 163.3892  | 231.7330  | 639.5930 |
| 79    | -163.3892  | -231.7330 | -639.5930 | 664.3779  | 258.4619  | 693.8638 |
| 80    | -664.3779  | -258.4619 | -693.8638 | 828.7148  | 184.3740  | 582.4414 |
| 81    | -1261.3762 | -125.0296 | -390.3727 | 1151.9763 | -34.9211  | 36.0600  |
| 82    | -1151.9763 | 34.9211   | -36.0600  | 1018.8544 | -33.1391  | 43.8832  |
| 83    | -1018.8544 | 33.1391   | -43.8832  | 862.9797  | -30.2989  | 54.7701  |
| 84    | -862.9797  | 30.2989   | -54.7701  | 688.3512  | -26.2740  | 68.5179  |
| 85    | -688.3512  | 26.2740   | -68.5179  | 422.5201  | -17.8386  | 94.9642  |
| 86    | -422.5201  | 17.8386   | -94.9642  | 216.8896  | -10.4775  | 116.4672 |
| 87    | -216.8896  | 10.4775   | -116.4672 | 12.5133   | -1.6632   | 140.8824 |
| 88    | -12.5133   | 1.6632    | -140.8824 | -182.7451 | 8.6512    | 168.1841 |
| 89    | 182.7451   | -8.6512   | -168.1841 | -470.1859 | 27.0008   | 214.6315 |
| 90    | 470.1859   | -27.0008  | -214.6315 | -620.7719 | 41.1733   | 249.4083 |
| 91    | 620.7719   | -41.1733  | -249.4083 | -733.5459 | 56.8736   | 286.8712 |
| 92    | 733.5459   | -56.8736  | -286.8712 | -906.3334 | 75.7030   | 329.3408 |
| 93    | 906.3334   | -75.7030  | -329.3408 | -908.9777 | 102.5611  | 389.9003 |
| 94    | 908.9777   | -102.5611 | -389.9003 | -846.4373 | 123.3280  | 431.5660 |
| 95    | 846.4373   | -123.3280 | -431.5660 | -711.0802 | 145.4144  | 473.4098 |
| 96    | 711.0802   | -145.4144 | -473.4098 | -560.6573 | 173.3100  | 521.6002 |
| 97    | 560.6573   | -173.3100 | -521.6002 | -244.0899 | 205.7805  | 588.4052 |
| 98    | 244.0899   | -205.7805 | -588.4052 | 163.5325  | 231.6992  | 639.4980 |
| 99    | -163.5325  | -231.6992 | -639.4980 | 664.4237  | 258.4416  | 693.8354 |
| 100   | -664.4237  | -258.4416 | -693.8354 | 805.6653  | 183.3912  | 582.4967 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|-----------|-----------|-----------|----------|
| 101   | -1261.2892 | -125.0192 | -390.4600 | 1151.8833 | -34.9263  | 35.9376  |
| 102   | -1151.8833 | 34.9263   | -35.9376  | 1018.7686 | -33.1381  | 43.7548  |
| 103   | -1018.7686 | 33.1381   | -43.7548  | 862.8916  | -30.3014  | 54.6833  |
| 104   | -862.8916  | 30.3014   | -54.6833  | 688.2276  | -26.2784  | 68.4315  |
| 105   | -688.2276  | 26.2784   | -68.4315  | 422.3962  | -17.8247  | 94.8953  |
| 106   | -422.3962  | 17.8247   | -94.8953  | 216.7377  | -10.4714  | 116.4364 |
| 107   | -216.7377  | 10.4714   | -116.4364 | 12.3716   | -1.6591   | 140.8383 |
| 108   | -12.3716   | 1.6591    | -140.8383 | -182.7868 | 8.6600    | 168.1833 |
| 109   | 182.7868   | -8.6600   | -168.1833 | -470.1573 | 27.0187   | 214.7236 |
| 110   | 470.1573   | -27.0187  | -214.7236 | -620.7573 | 41.1744   | 249.3469 |
| 111   | 620.7573   | -41.1744  | -249.3469 | -733.4491 | 56.8917   | 286.9086 |
| 112   | 733.4491   | -56.8917  | -286.9086 | -906.0937 | 75.7805   | 329.4250 |
| 113   | 906.0937   | -75.7805  | -329.4250 | -908.5224 | 102.6680  | 389.8096 |
| 114   | 908.5224   | -102.6680 | -389.8096 | -845.6504 | 123.4578  | 431.4677 |
| 115   | 845.6504   | -123.4578 | -431.4677 | -709.8339 | 145.5519  | 473.2973 |
| 116   | 709.8339   | -145.5519 | -473.2973 | -558.6640 | 173.4785  | 521.5757 |
| 117   | 558.6640   | -173.4785 | -521.5757 | -241.6712 | 205.9406  | 588.4892 |
| 118   | 241.6712   | -205.9406 | -588.4892 | 166.1014  | 231.8565  | 639.6572 |
| 119   | -166.1014  | -231.8565 | -639.6572 | 667.7076  | 258.5857  | 693.7081 |
| 120   | -667.7076  | -258.5857 | -693.7081 | 758.5559  | 181.9659  | 582.1746 |
| 121   | -1265.0588 | -124.9231 | -390.3065 | 1154.5627 | -35.2634  | 36.0906  |
| 122   | -1154.5627 | 35.2634   | -36.0906  | 1020.5977 | -33.4707  | 43.9098  |
| 123   | -1020.5977 | 33.4707   | -43.9098  | 863.8954  | -30.5991  | 54.6936  |
| 124   | -863.8954  | 30.5991   | -54.6936  | 688.5482  | -26.5355  | 68.4317  |
| 125   | -688.5482  | 26.5355   | -68.4317  | 422.2603  | -18.0079  | 95.0031  |
| 126   | -422.2603  | 18.0079   | -95.0031  | 216.4691  | -10.5866  | 116.4982 |
| 127   | -216.4691  | 10.5866   | -116.4982 | 12.2915   | -1.6966   | 140.9163 |
| 128   | -12.2915   | 1.6966    | -140.9163 | -182.3179 | 8.6943    | 168.2473 |
| 129   | 182.3179   | -8.6943   | -168.2473 | -468.1965 | 27.1730   | 214.8449 |
| 130   | 468.1965   | -27.1730  | -214.8449 | -617.2726 | 41.4438   | 249.3960 |
| 131   | 617.2726   | -41.4438  | -249.3960 | -727.8411 | 57.2329   | 286.9180 |
| 132   | 727.8411   | -57.2329  | -286.9180 | -897.0742 | 76.2603   | 329.6396 |
| 133   | 897.0742   | -76.2603  | -329.6396 | -896.3954 | 103.2240  | 389.9951 |
| 134   | 896.3954   | -103.2240 | -389.9951 | -829.9451 | 124.1430  | 431.8255 |
| 135   | 829.9451   | -124.1430 | -431.8255 | -690.5162 | 146.3133  | 473.6453 |
| 136   | 690.5162   | -146.3133 | -473.6453 | -534.4529 | 174.3951  | 521.8190 |
| 137   | 534.4529   | -174.3951 | -521.8190 | -213.3886 | 206.9377  | 588.7395 |
| 138   | 213.3886   | -206.9377 | -588.7395 | 198.4025  | 232.8901  | 639.9113 |
| 139   | -198.4025  | -232.8901 | -639.9113 | 703.3564  | 259.6631  | 694.0927 |
| 140   | -703.3564  | -259.6631 | -694.0927 | 781.2740  | 182.5543  | 583.0743 |
| 141   | -1303.6443 | -125.4437 | -393.9310 | 1225.9573 | -35.8364  | 41.0625  |
| 142   | -1225.9573 | 35.8364   | -41.0625  | 1119.6499 | -34.5432  | 48.4027  |
| 143   | -1119.6499 | 34.5432   | -48.4027  | 986.2311  | -32.2162  | 59.5429  |
| 144   | -986.2311  | 32.2162   | -59.5429  | 827.7405  | -28.7420  | 74.6499  |
| 145   | -827.7405  | 28.7420   | -74.6499  | 716.1747  | -26.5132  | 83.5591  |
| 146   | -716.1747  | 26.5132   | -83.5591  | 531.1672  | -21.0537  | 104.0975 |
| 147   | -531.1672  | 21.0537   | -104.0975 | 332.1061  | -14.1546  | 128.3709 |
| 148   | -332.1061  | 14.1546   | -128.3709 | 124.5400  | -5.7298   | 156.3165 |
| 149   | -124.5400  | 5.7298    | -156.3165 | -84.8927  | 4.3183    | 187.7900 |
| 150   | -84.8927   | -4.3183   | -187.7900 | -179.0656 | 9.9749    | 204.8492 |

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1 | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|----------|-----------|-----------|-----------|-----------|----------|
| 151   | 179.0656 | -9.9749   | -204.8492 | -365.7914 | 22.6066   | 241.5882 |
| 152   | 365.7914 | -22.6066  | -241.5882 | -532.7279 | 37.0162   | 281.9324 |
| 153   | 532.7279 | -37.0162  | -281.9324 | -670.7902 | 53.2696   | 326.0031 |
| 154   | 670.7902 | -53.2696  | -326.0031 | -770.6218 | 71.3936   | 373.4540 |
| 155   | 770.6218 | -71.3936  | -373.4540 | -730.2091 | 81.1741   | 398.1732 |
| 156   | 730.2091 | -81.1741  | -398.1732 | -734.9380 | 102.1596  | 448.7567 |
| 157   | 734.9380 | -102.1596 | -448.7567 | -674.6247 | 125.0252  | 499.8096 |
| 158   | 674.6247 | -125.0252 | -499.8096 | -538.9282 | 149.8198  | 550.6345 |
| 159   | 538.9282 | -149.8198 | -550.6345 | -317.5173 | 176.4709  | 602.3461 |
| 160   | 317.5173 | -176.4709 | -602.3461 | 0.0447    | 190.4884  | 629.4503 |

**CÁLCULO ESTRUCTURAL DEL TABLERO CON ASIENTOS**

# CÁLCULO DE LOS MOMENTOS FLECTORES PROVOCADOS POR EL ASIENTO EN LOS APOYOS DE LOS ESTRIBOS

Coeficiente de Fluencia:  $\phi = 2.05$

| SECCIÓN | X      | M <sub>pp</sub> | Esfuerzos conjuntos                   |                                       |                                          | Esfuerzos Instantáneos |                      |                         | Esfuerzos a largo plazo |                      |                         |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|------------------------|----------------------|-------------------------|-------------------------|----------------------|-------------------------|
|         |        |                 | M <sub>pp</sub> +M <sub>desc,E1</sub> | M <sub>pp</sub> +M <sub>desc,E2</sub> | M <sub>pp</sub> +M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub>   | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub>    | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> |
| 1       | 0.00   | 30.85           | 33.58                                 | 30.84                                 | 33.46                                    | 2.73                   | -0.01                | 2.61                    | 1.16                    | 0.00                 | 1.11                    |
| 2       | 1.80   | 559.55          | 626.61                                | 559.61                                | 626.82                                   | 67.06                  | 0.06                 | 67.27                   | 28.50                   | 0.03                 | 28.59                   |
| 3       | 3.60   | 1009.92         | 1141.66                               | 1010.01                               | 1141.85                                  | 131.74                 | 0.09                 | 131.93                  | 55.99                   | 0.04                 | 56.07                   |
| 4       | 5.40   | 1382.03         | 1578.70                               | 1382.20                               | 1578.83                                  | 196.67                 | 0.17                 | 196.80                  | 83.59                   | 0.07                 | 83.64                   |
| 5       | 7.20   | 1675.67         | 1937.19                               | 1675.87                               | 1937.43                                  | 261.52                 | 0.20                 | 261.76                  | 111.15                  | 0.09                 | 111.25                  |
| 6       | 9.00   | 1890.87         | 2217.41                               | 1891.11                               | 2217.74                                  | 326.54                 | 0.24                 | 326.87                  | 138.78                  | 0.10                 | 138.92                  |
| 7       | 10.80  | 2027.84         | 2419.38                               | 2028.15                               | 2419.88                                  | 391.54                 | 0.31                 | 392.04                  | 166.41                  | 0.13                 | 166.62                  |
| 8       | 12.60  | 2086.32         | 2543.20                               | 2086.74                               | 2543.63                                  | 456.88                 | 0.42                 | 457.31                  | 194.18                  | 0.18                 | 194.36                  |
| 9       | 14.40  | 2066.40         | 2588.89                               | 2066.82                               | 2589.30                                  | 522.49                 | 0.42                 | 522.90                  | 222.06                  | 0.18                 | 222.24                  |
| 10      | 16.20  | 1968.03         | 2556.16                               | 1968.52                               | 2556.62                                  | 588.13                 | 0.49                 | 588.59                  | 249.96                  | 0.21                 | 250.16                  |
| 11      | 18.00  | 1791.28         | 2445.02                               | 1791.79                               | 2445.56                                  | 653.74                 | 0.51                 | 654.28                  | 277.84                  | 0.22                 | 278.07                  |
| 12      | 19.80  | 1536.40         | 2255.50                               | 1537.02                               | 2256.11                                  | 719.10                 | 0.62                 | 719.71                  | 305.62                  | 0.26                 | 305.88                  |
| 13      | 21.60  | 1203.23         | 1987.54                               | 1203.87                               | 1988.17                                  | 784.31                 | 0.64                 | 784.94                  | 333.34                  | 0.27                 | 333.61                  |
| 14      | 23.40  | 791.75          | 1641.14                               | 792.41                                | 1641.83                                  | 849.39                 | 0.66                 | 850.08                  | 361.00                  | 0.28                 | 361.29                  |
| 15      | 25.20  | 301.64          | 1216.27                               | 302.40                                | 1217.01                                  | 914.63                 | 0.76                 | 915.37                  | 388.72                  | 0.32                 | 389.04                  |
| 16      | 27.00  | -266.48         | 713.19                                | -265.70                               | 713.99                                   | 979.67                 | 0.78                 | 980.47                  | 416.37                  | 0.33                 | 416.71                  |
| 17      | 28.80  | -913.28         | 131.42                                | -912.44                               | 132.26                                   | 1044.70                | 0.84                 | 1045.54                 | 444.01                  | 0.36                 | 444.36                  |
| 18      | 30.60  | -1638.02        | -528.34                               | -1637.13                              | -527.44                                  | 1109.68                | 0.89                 | 1110.58                 | 471.62                  | 0.38                 | 472.00                  |
| 19      | 32.40  | -2441.47        | -1266.79                              | -2440.52                              | -1265.84                                 | 1174.68                | 0.95                 | 1175.63                 | 499.25                  | 0.40                 | 499.65                  |
| 20      | 34.20  | -3328.17        | -2088.53                              | -3327.17                              | -2087.52                                 | 1239.64                | 1.00                 | 1240.65                 | 526.86                  | 0.43                 | 527.29                  |
| 21      | 36.00  | -4304.07        | -2999.41                              | -4303.02                              | -2998.36                                 | 1304.66                | 1.05                 | 1305.71                 | 554.49                  | 0.45                 | 554.94                  |
| 22      | 38.25  | -3033.82        | -1812.56                              | -3033.01                              | -1811.73                                 | 1221.26                | 0.81                 | 1222.09                 | 519.04                  | 0.34                 | 519.40                  |
| 23      | 40.50  | -1902.15        | -764.28                               | -1901.57                              | -763.70                                  | 1137.87                | 0.58                 | 1138.45                 | 483.60                  | 0.25                 | 483.85                  |
| 24      | 42.75  | -901.25         | 153.22                                | -900.91                               | 153.54                                   | 1054.47                | 0.34                 | 1054.79                 | 448.16                  | 0.14                 | 448.29                  |
| 25      | 45.00  | -50.34          | 920.70                                | -50.24                                | 920.80                                   | 971.04                 | 0.10                 | 971.14                  | 412.70                  | 0.04                 | 412.74                  |
| 26      | 47.25  | 623.00          | 1510.65                               | 622.83                                | 1510.51                                  | 887.65                 | -0.17                | 887.51                  | 377.26                  | -0.07                | 377.20                  |
| 27      | 49.50  | 1146.25         | 1950.48                               | 1145.86                               | 1950.10                                  | 804.23                 | -0.39                | 803.85                  | 341.80                  | -0.17                | 341.64                  |
| 28      | 51.75  | 1547.00         | 2267.86                               | 1546.44                               | 2267.21                                  | 720.86                 | -0.56                | 720.21                  | 306.37                  | -0.24                | 306.09                  |
| 29      | 54.00  | 1825.38         | 2462.75                               | 1824.56                               | 2461.98                                  | 637.37                 | -0.82                | 636.60                  | 270.89                  | -0.35                | 270.56                  |
| 30      | 56.25  | 1981.48         | 2535.46                               | 1980.38                               | 2534.38                                  | 553.98                 | -1.10                | 552.90                  | 235.45                  | -0.47                | 234.99                  |
| 31      | 58.50  | 2015.05         | 2485.60                               | 2013.68                               | 2484.29                                  | 470.55                 | -1.37                | 469.24                  | 199.99                  | -0.58                | 199.43                  |
| 32      | 60.75  | 1926.15         | 2313.38                               | 1924.59                               | 2311.79                                  | 387.23                 | -1.56                | 385.64                  | 164.58                  | -0.66                | 163.90                  |
| 33      | 63.00  | 1714.82         | 2018.56                               | 1713.03                               | 2016.76                                  | 303.74                 | -1.79                | 301.94                  | 129.09                  | -0.76                | 128.33                  |
| 34      | 65.25  | 1380.97         | 1601.30                               | 1378.94                               | 1599.25                                  | 220.33                 | -2.03                | 218.28                  | 93.64                   | -0.86                | 92.77                   |
| 35      | 67.50  | 924.67          | 1061.55                               | 922.40                                | 1059.29                                  | 136.88                 | -2.27                | 134.62                  | 58.18                   | -0.96                | 57.21                   |
| 36      | 69.75  | 346.00          | 399.42                                | 343.50                                | 396.95                                   | 53.42                  | -2.50                | 50.95                   | 22.70                   | -1.06                | 21.65                   |
| 37      | 72.00  | -355.05         | -385.02                               | -357.77                               | -387.74                                  | -29.97                 | -2.72                | -32.69                  | -12.74                  | -1.16                | -13.89                  |
| 38      | 74.25  | -1178.80        | -1292.22                              | -1181.76                              | -1295.18                                 | -113.42                | -2.96                | -116.38                 | -48.20                  | -1.26                | -49.46                  |
| 39      | 76.50  | -2124.63        | -2321.48                              | -2127.83                              | -2324.67                                 | -196.85                | -3.20                | -200.04                 | -83.66                  | -1.36                | -85.02                  |
| 40      | 78.75  | -3201.49        | -3481.78                              | -3204.92                              | -3485.21                                 | -280.29                | -3.43                | -283.72                 | -119.13                 | -1.46                | -120.58                 |
| 41      | 81.00  | -4417.57        | -4781.33                              | -4421.24                              | -4784.99                                 | -363.76                | -3.67                | -367.42                 | -154.60                 | -1.56                | -156.16                 |
| 42      | 83.25  | -3140.20        | -3480.72                              | -3143.03                              | -3483.55                                 | -340.52                | -2.83                | -343.35                 | -144.72                 | -1.20                | -145.93                 |
| 43      | 85.50  | -2001.38        | -2318.65                              | -2003.36                              | -2320.64                                 | -317.27                | -1.98                | -319.26                 | -134.84                 | -0.84                | -135.69                 |
| 44      | 87.75  | -992.97         | -1286.99                              | -994.10                               | -1288.13                                 | -294.02                | -1.13                | -295.16                 | -124.96                 | -0.48                | -125.45                 |
| 45      | 90.00  | -134.93         | -405.69                               | -135.22                               | -406.01                                  | -270.76                | -0.29                | -271.08                 | -115.07                 | -0.12                | -115.21                 |
| 46      | 92.25  | 545.60          | 298.08                                | 546.14                                | 298.61                                   | -247.52                | 0.54                 | -246.99                 | -105.20                 | 0.23                 | -104.97                 |
| 47      | 94.50  | 1076.17         | 851.86                                | 1077.55                               | 853.25                                   | -224.31                | 1.38                 | -222.92                 | -95.33                  | 0.59                 | -94.74                  |
| 48      | 96.75  | 1484.44         | 1283.39                               | 1486.68                               | 1285.62                                  | -201.05                | 2.24                 | -198.82                 | -85.45                  | 0.95                 | -84.50                  |
| 49      | 99.00  | 1770.22         | 1592.37                               | 1773.26                               | 1595.43                                  | -177.85                | 3.04                 | -174.79                 | -75.59                  | 1.29                 | -74.29                  |
| 50      | 101.25 | 1933.58         | 1779.00                               | 1937.47                               | 1782.89                                  | -154.58                | 3.89                 | -150.69                 | -65.70                  | 1.65                 | -64.04                  |



| SECCIÓN | X      | M <sub>pp</sub> | M <sub>pp</sub> +M <sub>desc,E1</sub> | M <sub>pp</sub> +M <sub>desc,E2</sub> | M <sub>pp</sub> +M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub> | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub> | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 51      | 103.50 | 1974.50         | 1843.16                               | 1979.21                               | 1847.91                                  | -131.34              | 4.71                 | -126.59                 | -55.82               | 2.00                 | -53.80                  |
| 52      | 105.75 | 1892.89         | 1784.82                               | 1898.44                               | 1790.38                                  | -108.07              | 5.55                 | -102.51                 | -45.93               | 2.36                 | -43.57                  |
| 53      | 108.00 | 1688.70         | 1603.87                               | 1695.13                               | 1610.33                                  | -84.83               | 6.43                 | -78.37                  | -36.05               | 2.73                 | -33.31                  |
| 54      | 110.25 | 1362.13         | 1300.54                               | 1369.39                               | 1307.80                                  | -61.59               | 7.26                 | -54.33                  | -26.18               | 3.09                 | -23.09                  |
| 55      | 112.50 | 912.96          | 874.68                                | 921.07                                | 882.77                                   | -38.28               | 8.11                 | -30.19                  | -16.27               | 3.45                 | -12.83                  |
| 56      | 114.75 | 341.57          | 326.52                                | 350.52                                | 335.47                                   | -15.05               | 8.95                 | -6.10                   | -6.40                | 3.80                 | -2.59                   |
| 57      | 117.00 | -352.27         | -344.05                               | -342.47                               | -334.25                                  | 8.22                 | 9.80                 | 18.02                   | 3.49                 | 4.17                 | 7.66                    |
| 58      | 119.25 | -1168.96        | -1137.48                              | -1158.34                              | -1126.85                                 | 31.48                | 10.62                | 42.11                   | 13.38                | 4.51                 | 17.90                   |
| 59      | 121.50 | -2107.61        | -2052.86                              | -2096.15                              | -2041.39                                 | 54.75                | 11.46                | 66.22                   | 23.27                | 4.87                 | 28.14                   |
| 60      | 123.75 | -3177.21        | -3099.18                              | -3164.90                              | -3086.88                                 | 78.03                | 12.31                | 90.33                   | 33.16                | 5.23                 | 38.39                   |
| 61      | 126.00 | -4385.64        | -4284.35                              | -4372.50                              | -4271.20                                 | 101.29               | 13.14                | 114.44                  | 43.05                | 5.58                 | 48.64                   |
| 62      | 128.25 | -3109.98        | -3015.15                              | -3099.85                              | -3005.03                                 | 94.83                | 10.13                | 104.95                  | 40.30                | 4.31                 | 44.60                   |
| 63      | 130.50 | -1973.30        | -1884.94                              | -1966.19                              | -1877.84                                 | 88.36                | 7.11                 | 95.46                   | 37.55                | 3.02                 | 40.57                   |
| 64      | 132.75 | -967.02         | -885.12                               | -962.92                               | -881.03                                  | 81.90                | 4.10                 | 85.99                   | 34.81                | 1.74                 | 36.55                   |
| 65      | 135.00 | -111.12         | -35.68                                | -110.04                               | -34.60                                   | 75.44                | 1.08                 | 76.52                   | 32.06                | 0.46                 | 32.52                   |
| 66      | 137.25 | 567.30          | 636.23                                | 565.35                                | 634.27                                   | 68.93                | -1.95                | 66.97                   | 29.30                | -0.83                | 28.46                   |
| 67      | 139.50 | 1095.84         | 1158.31                               | 1090.88                               | 1153.33                                  | 62.47                | -4.96                | 57.49                   | 26.55                | -2.11                | 24.43                   |
| 68      | 141.75 | 1501.89         | 1557.88                               | 1493.90                               | 1549.88                                  | 55.99                | -7.99                | 47.99                   | 23.80                | -3.40                | 20.40                   |
| 69      | 144.00 | 1785.44         | 1834.91                               | 1774.45                               | 1823.94                                  | 49.47                | -10.99               | 38.50                   | 21.03                | -4.67                | 16.36                   |
| 70      | 146.25 | 1946.52         | 1989.54                               | 1932.48                               | 1975.53                                  | 43.02                | -14.04               | 29.01                   | 18.28                | -5.97                | 12.33                   |
| 71      | 148.50 | 1985.17         | 2021.74                               | 1968.11                               | 2004.70                                  | 36.57                | -17.06               | 19.53                   | 15.54                | -7.25                | 8.30                    |
| 72      | 150.75 | 1901.39         | 1931.49                               | 1881.34                               | 1911.46                                  | 30.10                | -20.05               | 10.07                   | 12.79                | -8.52                | 4.28                    |
| 73      | 153.00 | 1695.18         | 1718.80                               | 1672.14                               | 1695.74                                  | 23.62                | -23.04               | 0.56                    | 10.04                | -9.79                | 0.24                    |
| 74      | 155.25 | 1366.46         | 1383.59                               | 1340.36                               | 1357.51                                  | 17.13                | -26.10               | -8.95                   | 7.28                 | -11.09               | -3.80                   |
| 75      | 157.50 | 915.32          | 925.95                                | 886.22                                | 896.86                                   | 10.63                | -29.10               | -18.46                  | 4.52                 | -12.37               | -7.85                   |
| 76      | 159.75 | 342.15          | 346.32                                | 310.02                                | 314.19                                   | 4.17                 | -32.13               | -27.96                  | 1.77                 | -13.66               | -11.88                  |
| 77      | 162.00 | -354.06         | -356.36                               | -389.20                               | -391.49                                  | -2.30                | -35.14               | -37.43                  | -0.98                | -14.93               | -15.91                  |
| 78      | 164.25 | -1172.24        | -1181.00                              | -1210.39                              | -1219.16                                 | -8.76                | -38.15               | -46.92                  | -3.72                | -16.21               | -19.94                  |
| 79      | 166.50 | -2113.13        | -2128.38                              | -2154.28                              | -2169.54                                 | -15.25               | -41.15               | -56.41                  | -6.48                | -17.49               | -23.97                  |
| 80      | 168.75 | -3184.65        | -3206.38                              | -3228.83                              | -3250.56                                 | -21.73               | -44.18               | -65.91                  | -9.24                | -18.78               | -28.01                  |
| 81      | 171.00 | -4395.00        | -4423.22                              | -4442.20                              | -4470.41                                 | -28.22               | -47.20               | -75.41                  | -11.99               | -20.06               | -32.05                  |
| 82      | 173.25 | -3118.69        | -3145.09                              | -3155.04                              | -3181.46                                 | -26.40               | -36.35               | -62.77                  | -11.22               | -15.45               | -26.68                  |
| 83      | 175.50 | -1980.98        | -2005.58                              | -2006.50                              | -2031.10                                 | -24.60               | -25.52               | -50.12                  | -10.46               | -10.85               | -21.30                  |
| 84      | 177.75 | -974.31         | -997.10                               | -988.99                               | -1011.79                                 | -22.79               | -14.68               | -37.48                  | -9.69                | -6.24                | -15.93                  |
| 85      | 180.00 | -117.66         | -138.67                               | -121.48                               | -142.50                                  | -21.01               | -3.82                | -24.84                  | -8.93                | -1.62                | -10.56                  |
| 86      | 182.25 | 561.71          | 542.51                                | 568.70                                | 549.51                                   | -19.20               | 6.99                 | -12.20                  | -8.16                | 2.97                 | -5.19                   |
| 87      | 184.50 | 1090.80         | 1073.45                               | 1108.63                               | 1091.26                                  | -17.35               | 17.83                | 0.46                    | -7.37                | 7.58                 | 0.20                    |
| 88      | 186.75 | 1497.67         | 1482.08                               | 1526.35                               | 1510.75                                  | -15.59               | 28.68                | 13.08                   | -6.63                | 12.19                | 5.56                    |
| 89      | 189.00 | 1782.04         | 1768.28                               | 1821.56                               | 1807.76                                  | -13.76               | 39.52                | 25.72                   | -5.85                | 16.80                | 10.93                   |
| 90      | 191.25 | 1943.90         | 1931.92                               | 1994.26                               | 1982.29                                  | -11.98               | 50.36                | 38.39                   | -5.09                | 21.40                | 16.32                   |
| 91      | 193.50 | 1983.27         | 1973.10                               | 2044.41                               | 2034.26                                  | -10.17               | 61.14                | 50.99                   | -4.32                | 25.98                | 21.67                   |
| 92      | 195.75 | 1900.08         | 1891.73                               | 1972.08                               | 1963.74                                  | -8.35                | 72.00                | 63.66                   | -3.55                | 30.60                | 27.06                   |
| 93      | 198.00 | 1694.47         | 1687.92                               | 1777.30                               | 1770.75                                  | -6.55                | 82.83                | 76.28                   | -2.78                | 35.20                | 32.42                   |
| 94      | 200.25 | 1366.59         | 1361.84                               | 1460.25                               | 1455.49                                  | -4.75                | 93.66                | 88.90                   | -2.02                | 39.81                | 37.78                   |
| 95      | 202.50 | 916.32          | 913.38                                | 1020.81                               | 1017.87                                  | -2.94                | 104.49               | 101.55                  | -1.25                | 44.41                | 43.16                   |
| 96      | 204.75 | 343.52          | 342.37                                | 458.89                                | 457.70                                   | -1.15                | 115.37               | 114.18                  | -0.49                | 49.03                | 48.53                   |
| 97      | 207.00 | -351.48         | -350.83                               | -225.28                               | -224.65                                  | 0.65                 | 126.20               | 126.83                  | 0.28                 | 53.64                | 53.90                   |
| 98      | 209.25 | -1169.08        | -1166.63                              | -1032.04                              | -1029.60                                 | 2.45                 | 137.04               | 139.48                  | 1.04                 | 58.24                | 59.28                   |
| 99      | 211.50 | -2109.39        | -2105.14                              | -1961.49                              | -1957.25                                 | 4.25                 | 147.90               | 152.14                  | 1.81                 | 62.86                | 64.66                   |
| 100     | 213.75 | -3179.77        | -3173.72                              | -3021.03                              | -3014.98                                 | 6.05                 | 158.74               | 164.79                  | 2.57                 | 67.47                | 70.04                   |
| 101     | 216.00 | -4389.27        | -4381.42                              | -4219.68                              | -4211.83                                 | 7.85                 | 169.59               | 177.44                  | 3.34                 | 72.08                | 75.41                   |
| 102     | 218.25 | -3113.80        | -3106.44                              | -2983.16                              | -2975.81                                 | 7.36                 | 130.64               | 137.99                  | 3.13                 | 55.52                | 58.65                   |
| 103     | 220.50 | -1977.21        | -1970.36                              | -1885.53                              | -1878.68                                 | 6.85                 | 91.68                | 98.53                   | 2.91                 | 38.96                | 41.88                   |
| 104     | 222.75 | -971.32         | -964.97                               | -918.60                               | -912.25                                  | 6.35                 | 52.72                | 59.07                   | 2.70                 | 22.41                | 25.11                   |
| 105     | 225.00 | -115.22         | -109.39                               | -101.47                               | -95.62                                   | 5.83                 | 13.75                | 19.60                   | 2.48                 | 5.84                 | 8.33                    |
| 106     | 227.25 | 563.25          | 568.59                                | 538.06                                | 543.39                                   | 5.34                 | -25.19               | -19.86                  | 2.27                 | -10.71               | -8.44                   |

| SECCIÓN | X      | M <sub>pp</sub> | M <sub>pp</sub> +M <sub>desc,E1</sub> | M <sub>pp</sub> +M <sub>desc,E2</sub> | M <sub>pp</sub> +M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub> | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> | M <sub>desc,E1</sub> | M <sub>desc,E2</sub> | M <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 107     | 229.50 | 1091.62         | 1096.45                               | 1027.48                               | 1032.32                                  | 4.83                 | -64.14               | -59.30                  | 2.05                 | -27.26               | -25.20                  |
| 108     | 231.75 | 1497.36         | 1501.69                               | 1394.32                               | 1398.64                                  | 4.33                 | -103.04              | -98.72                  | 1.84                 | -43.79               | -41.96                  |
| 109     | 234.00 | 1780.67         | 1784.56                               | 1638.72                               | 1642.56                                  | 3.89                 | -141.95              | -138.11                 | 1.65                 | -60.33               | -58.70                  |
| 110     | 236.25 | 1941.49         | 1944.85                               | 1760.67                               | 1764.00                                  | 3.36                 | -180.82              | -177.49                 | 1.43                 | -76.85               | -75.43                  |
| 111     | 238.50 | 1979.95         | 1982.81                               | 1760.16                               | 1762.99                                  | 2.86                 | -219.79              | -216.96                 | 1.22                 | -93.41               | -92.21                  |
| 112     | 240.75 | 1895.90         | 1898.23                               | 1637.20                               | 1639.56                                  | 2.33                 | -258.70              | -256.34                 | 0.99                 | -109.95              | -108.95                 |
| 113     | 243.00 | 1689.38         | 1691.19                               | 1391.79                               | 1393.65                                  | 1.81                 | -297.59              | -295.73                 | 0.77                 | -126.48              | -125.69                 |
| 114     | 245.25 | 1360.47         | 1361.79                               | 1023.98                               | 1025.31                                  | 1.32                 | -336.49              | -335.16                 | 0.56                 | -143.01              | -142.45                 |
| 115     | 247.50 | 909.03          | 909.83                                | 533.69                                | 534.52                                   | 0.80                 | -375.34              | -374.51                 | 0.34                 | -159.52              | -159.17                 |
| 116     | 249.75 | 335.01          | 335.34                                | -79.21                                | -78.88                                   | 0.33                 | -414.22              | -413.89                 | 0.14                 | -176.05              | -175.91                 |
| 117     | 252.00 | -361.18         | -361.36                               | -814.28                               | -814.46                                  | -0.18                | -453.10              | -453.28                 | -0.08                | -192.57              | -192.65                 |
| 118     | 254.25 | -1179.71        | -1180.40                              | -1671.72                              | -1672.41                                 | -0.69                | -492.01              | -492.70                 | -0.29                | -209.11              | -209.40                 |
| 119     | 256.50 | -2120.94        | -2122.13                              | -2651.86                              | -2653.04                                 | -1.19                | -530.92              | -532.10                 | -0.51                | -225.64              | -226.15                 |
| 120     | 258.75 | -3192.81        | -3194.51                              | -3762.64                              | -3764.32                                 | -1.70                | -569.83              | -571.51                 | -0.72                | -242.18              | -242.90                 |
| 121     | 261.00 | -4403.53        | -4405.73                              | -5012.26                              | -5014.44                                 | -2.20                | -608.73              | -610.91                 | -0.94                | -258.71              | -259.64                 |
| 122     | 263.25 | -3125.05        | -3127.10                              | -3594.18                              | -3596.23                                 | -2.05                | -469.13              | -471.18                 | -0.87                | -199.38              | -200.25                 |
| 123     | 265.50 | -1985.49        | -1987.38                              | -2314.99                              | -2316.91                                 | -1.89                | -329.50              | -331.42                 | -0.80                | -140.04              | -140.86                 |
| 124     | 267.75 | -976.62         | -978.40                               | -1166.55                              | -1168.34                                 | -1.78                | -189.93              | -191.72                 | -0.76                | -80.72               | -81.48                  |
| 125     | 270.00 | -117.74         | -119.35                               | -168.03                               | -169.69                                  | -1.61                | -50.29               | -51.95                  | -0.68                | -21.37               | -22.08                  |
| 126     | 272.25 | 563.84          | 562.36                                | 653.18                                | 651.70                                   | -1.48                | 89.34                | 87.86                   | -0.63                | 37.97                | 37.34                   |
| 127     | 274.50 | 1095.35         | 1093.97                               | 1324.41                               | 1323.04                                  | -1.38                | 229.06               | 227.69                  | -0.59                | 97.35                | 96.77                   |
| 128     | 276.75 | 1504.15         | 1503.00                               | 1872.88                               | 1871.66                                  | -1.15                | 368.73               | 367.51                  | -0.49                | 156.71               | 156.19                  |
| 129     | 279.00 | 1790.87         | 1789.82                               | 2299.21                               | 2298.16                                  | -1.05                | 508.34               | 507.29                  | -0.45                | 216.05               | 215.60                  |
| 130     | 281.25 | 1955.00         | 1954.10                               | 2603.05                               | 2602.12                                  | -0.90                | 648.05               | 647.12                  | -0.38                | 275.43               | 275.03                  |
| 131     | 283.50 | 1996.66         | 1995.90                               | 2784.26                               | 2783.47                                  | -0.76                | 787.60               | 786.81                  | -0.32                | 334.74               | 334.40                  |
| 132     | 285.75 | 1915.78         | 1915.17                               | 2843.05                               | 2842.37                                  | -0.61                | 927.27               | 926.59                  | -0.26                | 394.10               | 393.81                  |
| 133     | 288.00 | 1712.53         | 1712.05                               | 2779.42                               | 2778.88                                  | -0.48                | 1066.89              | 1066.35                 | -0.20                | 453.44               | 453.21                  |
| 134     | 290.25 | 1386.82         | 1386.44                               | 2593.23                               | 2592.84                                  | -0.38                | 1206.41              | 1206.02                 | -0.16                | 512.73               | 512.57                  |
| 135     | 292.50 | 938.51          | 938.29                                | 2284.57                               | 2284.30                                  | -0.22                | 1346.06              | 1345.79                 | -0.09                | 572.09               | 571.97                  |
| 136     | 294.75 | 367.86          | 367.80                                | 1853.39                               | 1853.33                                  | -0.06                | 1485.53              | 1485.47                 | -0.03                | 631.36               | 631.34                  |
| 137     | 297.00 | -325.12         | -325.06                               | 1299.94                               | 1300.03                                  | 0.06                 | 1625.06              | 1625.15                 | 0.03                 | 690.66               | 690.70                  |
| 138     | 299.25 | -1140.57        | -1140.36                              | 624.07                                | 624.23                                   | 0.21                 | 1764.64              | 1764.80                 | 0.09                 | 749.98               | 750.05                  |
| 139     | 301.50 | -2078.67        | -2078.33                              | -174.47                               | -174.11                                  | 0.34                 | 1904.20              | 1904.56                 | 0.14                 | 809.30               | 809.45                  |
| 140     | 303.75 | -3147.10        | -3146.61                              | -1103.30                              | -1102.81                                 | 0.49                 | 2043.80              | 2044.29                 | 0.21                 | 868.63               | 868.84                  |
| 141     | 306.00 | -4354.69        | -4354.07                              | -2171.30                              | -2170.67                                 | 0.62                 | 2183.39              | 2184.02                 | 0.26                 | 927.96               | 928.22                  |
| 142     | 307.80 | -3307.29        | -3306.70                              | -1233.40                              | -1232.80                                 | 0.59                 | 2073.89              | 2074.49                 | 0.25                 | 881.42               | 881.67                  |
| 143     | 309.60 | -2348.43        | -2347.86                              | -384.08                               | -383.49                                  | 0.57                 | 1964.35              | 1964.94                 | 0.24                 | 834.86               | 835.11                  |
| 144     | 311.40 | -1473.54        | -1472.98                              | 381.38                                | 381.93                                   | 0.56                 | 1854.92              | 1855.47                 | 0.24                 | 788.35               | 788.59                  |
| 145     | 313.20 | -698.51         | -698.00                               | 1046.96                               | 1047.51                                  | 0.51                 | 1745.47              | 1746.02                 | 0.22                 | 741.84               | 742.07                  |
| 146     | 315.00 | -46.62          | -46.13                                | 1589.63                               | 1590.16                                  | 0.49                 | 1636.25              | 1636.78                 | 0.21                 | 695.42               | 695.64                  |
| 147     | 316.80 | 505.14          | 505.60                                | 2032.15                               | 2032.61                                  | 0.46                 | 1527.01              | 1527.47                 | 0.20                 | 648.99               | 649.19                  |
| 148     | 318.60 | 978.57          | 979.02                                | 2396.15                               | 2396.52                                  | 0.45                 | 1417.58              | 1417.95                 | 0.19                 | 602.48               | 602.64                  |
| 149     | 320.40 | 1373.49         | 1373.92                               | 2681.57                               | 2681.95                                  | 0.43                 | 1308.08              | 1308.46                 | 0.18                 | 555.94               | 556.11                  |
| 150     | 322.20 | 1690.19         | 1690.55                               | 2888.87                               | 2889.21                                  | 0.36                 | 1198.68              | 1199.02                 | 0.15                 | 509.45               | 509.59                  |
| 151     | 324.00 | 1928.52         | 1928.83                               | 3017.82                               | 3018.28                                  | 0.31                 | 1089.30              | 1089.76                 | 0.13                 | 462.96               | 463.16                  |
| 152     | 325.80 | 2088.38         | 2088.77                               | 3068.64                               | 3068.92                                  | 0.39                 | 980.26               | 980.54                  | 0.17                 | 416.62               | 416.74                  |
| 153     | 327.60 | 2169.77         | 2170.05                               | 3041.42                               | 3041.64                                  | 0.28                 | 871.65               | 871.87                  | 0.12                 | 370.46               | 370.55                  |
| 154     | 329.40 | 2172.85         | 2173.09                               | 2935.64                               | 2935.87                                  | 0.24                 | 762.79               | 763.02                  | 0.10                 | 324.19               | 324.29                  |
| 155     | 331.20 | 2097.51         | 2097.68                               | 2751.77                               | 2751.63                                  | 0.17                 | 654.26               | 654.12                  | 0.07                 | 278.07               | 278.01                  |
| 156     | 333.00 | 1943.80         | 1943.99                               | 2489.41                               | 2489.80                                  | 0.19                 | 545.61               | 546.00                  | 0.08                 | 231.89               | 232.05                  |
| 157     | 334.80 | 1711.77         | 1711.85                               | 2148.75                               | 2148.66                                  | 0.08                 | 436.98               | 436.89                  | 0.03                 | 185.72               | 185.68                  |
| 158     | 336.60 | 1401.33         | 1401.47                               | 1729.98                               | 1730.11                                  | 0.14                 | 328.65               | 328.78                  | 0.06                 | 139.68               | 139.73                  |
| 159     | 338.40 | 1012.54         | 1012.62                               | 1232.06                               | 1231.81                                  | 0.08                 | 219.52               | 219.27                  | 0.03                 | 93.30                | 93.19                   |
| 160     | 340.20 | 545.52          | 545.56                                | 655.66                                | 655.86                                   | 0.04                 | 110.14               | 110.34                  | 0.02                 | 46.81                | 46.90                   |
| 161     | 342.00 | 0.00            | 0.00                                  | 0.00                                  | 0.00                                     | 0.00                 | 0.00                 | 0.00                    | 0.00                 | 0.00                 | 0.00                    |



# CÁLCULO DE LOS ESFUERZOS CORTANTES PROVOCADOS POR EL ASIENTO EN LOS APOYOS DE LOS ESTRIBOS

Coefficiente de Fluencia:

$\phi = 2.05$

| SECCIÓN | X      | V <sub>pp</sub> | Esfuerzos conjuntos                   |                                       |                                          | Esfuerzos Instantáneos |                      |                         | Esfuerzos a largo plazo |                      |                         |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|------------------------|----------------------|-------------------------|-------------------------|----------------------|-------------------------|
|         |        |                 | V <sub>pp</sub> +V <sub>desc,E1</sub> | V <sub>pp</sub> +V <sub>desc,E2</sub> | V <sub>pp</sub> +V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub>   | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub>    | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> |
| 1       | 0.00   | 315.53          | 351.11                                | 315.56                                | 351.58                                   | 35.58                  | 0.03                 | 36.05                   | 15.12                   | 0.01                 | 15.32                   |
| 2       | 1.80   | 272.00          | 308.15                                | 272.04                                | 307.80                                   | 36.15                  | 0.04                 | 35.80                   | 15.36                   | 0.02                 | 15.22                   |
| 3       | 3.60   | 228.46          | 264.65                                | 228.49                                | 264.54                                   | 36.19                  | 0.03                 | 36.08                   | 15.38                   | 0.01                 | 15.33                   |
| 4       | 5.40   | 184.96          | 220.95                                | 184.98                                | 221.03                                   | 35.99                  | 0.02                 | 36.07                   | 15.30                   | 0.01                 | 15.33                   |
| 5       | 7.20   | 141.34          | 177.49                                | 141.41                                | 177.43                                   | 36.15                  | 0.07                 | 36.09                   | 15.36                   | 0.03                 | 15.34                   |
| 6       | 9.00   | 97.84           | 134.08                                | 97.87                                 | 134.11                                   | 36.24                  | 0.03                 | 36.27                   | 15.40                   | 0.01                 | 15.42                   |
| 7       | 10.80  | 54.25           | 90.62                                 | 54.30                                 | 90.53                                    | 36.37                  | 0.05                 | 36.28                   | 15.46                   | 0.02                 | 15.42                   |
| 8       | 12.60  | 10.70           | 47.14                                 | 10.65                                 | 47.08                                    | 36.44                  | -0.05                | 36.38                   | 15.49                   | -0.02                | 15.46                   |
| 9       | 14.40  | -32.88          | 3.57                                  | -32.83                                | 3.61                                     | 36.45                  | 0.05                 | 36.49                   | 15.49                   | 0.02                 | 15.51                   |
| 10      | 16.20  | -76.35          | -39.90                                | -76.36                                | -39.92                                   | 36.45                  | -0.01                | 36.43                   | 15.49                   | 0.00                 | 15.48                   |
| 11      | 18.00  | -119.87         | -83.54                                | -119.85                               | -83.50                                   | 36.33                  | 0.02                 | 36.37                   | 15.44                   | 0.01                 | 15.46                   |
| 12      | 19.80  | -163.33         | -127.11                               | -163.33                               | -127.12                                  | 36.22                  | 0.00                 | 36.21                   | 15.39                   | 0.00                 | 15.39                   |
| 13      | 21.60  | -206.85         | -170.69                               | -206.82                               | -170.63                                  | 36.16                  | 0.03                 | 36.22                   | 15.37                   | 0.01                 | 15.39                   |
| 14      | 23.40  | -250.40         | -214.22                               | -250.35                               | -214.18                                  | 36.18                  | 0.05                 | 36.22                   | 15.38                   | 0.02                 | 15.39                   |
| 15      | 25.20  | -293.92         | -257.78                               | -293.91                               | -257.77                                  | 36.14                  | 0.01                 | 36.15                   | 15.36                   | 0.00                 | 15.36                   |
| 16      | 27.00  | -337.45         | -301.32                               | -337.42                               | -301.28                                  | 36.13                  | 0.03                 | 36.17                   | 15.36                   | 0.01                 | 15.37                   |
| 17      | 28.80  | -380.98         | -344.86                               | -380.94                               | -344.85                                  | 36.12                  | 0.04                 | 36.13                   | 15.35                   | 0.02                 | 15.36                   |
| 18      | 30.60  | -424.50         | -388.38                               | -424.47                               | -388.35                                  | 36.12                  | 0.03                 | 36.15                   | 15.35                   | 0.01                 | 15.36                   |
| 19      | 32.40  | -468.04         | -431.93                               | -468.01                               | -431.90                                  | 36.11                  | 0.03                 | 36.14                   | 15.35                   | 0.01                 | 15.36                   |
| 20      | 34.20  | -517.42         | -481.31                               | -517.39                               | -481.28                                  | 36.11                  | 0.03                 | 36.14                   | 15.35                   | 0.01                 | 15.36                   |
| 21      | 36.00  | 595.50          | 558.44                                | 595.40                                | 558.33                                   | -37.06                 | -0.10                | -37.17                  | -15.75                  | -0.04                | -15.80                  |
| 22      | 38.25  | 533.78          | 496.72                                | 533.68                                | 496.60                                   | -37.06                 | -0.10                | -37.18                  | -15.75                  | -0.04                | -15.80                  |
| 23      | 40.50  | 472.03          | 434.97                                | 471.92                                | 434.86                                   | -37.06                 | -0.11                | -37.17                  | -15.75                  | -0.05                | -15.80                  |
| 24      | 42.75  | 417.61          | 380.54                                | 417.51                                | 380.43                                   | -37.07                 | -0.10                | -37.18                  | -15.76                  | -0.04                | -15.80                  |
| 25      | 45.00  | 338.69          | 301.68                                | 338.58                                | 301.55                                   | -37.01                 | -0.11                | -37.14                  | -15.73                  | -0.05                | -15.78                  |
| 26      | 47.25  | 259.77          | 222.70                                | 259.68                                | 222.63                                   | -37.07                 | -0.09                | -37.14                  | -15.76                  | -0.04                | -15.78                  |
| 27      | 49.50  | 205.34          | 168.26                                | 205.25                                | 168.19                                   | -37.08                 | -0.09                | -37.15                  | -15.76                  | -0.04                | -15.79                  |
| 28      | 51.75  | 150.95          | 113.84                                | 150.83                                | 113.75                                   | -37.11                 | -0.12                | -37.20                  | -15.77                  | -0.05                | -15.81                  |
| 29      | 54.00  | 96.58           | 59.52                                 | 96.45                                 | 59.38                                    | -37.06                 | -0.13                | -37.20                  | -15.75                  | -0.06                | -15.81                  |
| 30      | 56.25  | 42.15           | 5.09                                  | 42.04                                 | 4.97                                     | -37.06                 | -0.11                | -37.18                  | -15.75                  | -0.05                | -15.80                  |
| 31      | 58.50  | -12.34          | -49.39                                | -12.37                                | -49.46                                   | -37.05                 | -0.03                | -37.12                  | -15.75                  | -0.01                | -15.78                  |
| 32      | 60.75  | -66.72          | -103.86                               | -66.81                                | -103.91                                  | -37.14                 | -0.09                | -37.19                  | -15.78                  | -0.04                | -15.81                  |
| 33      | 63.00  | -121.18         | -158.22                               | -121.26                               | -158.33                                  | -37.04                 | -0.08                | -37.15                  | -15.74                  | -0.03                | -15.79                  |
| 34      | 65.25  | -175.59         | -212.69                               | -175.69                               | -212.72                                  | -37.10                 | -0.10                | -37.13                  | -15.77                  | -0.04                | -15.78                  |
| 35      | 67.50  | -229.99         | -267.08                               | -230.09                               | -267.16                                  | -37.09                 | -0.10                | -37.17                  | -15.76                  | -0.04                | -15.80                  |
| 36      | 69.75  | -284.40         | -321.48                               | -284.50                               | -321.58                                  | -37.08                 | -0.10                | -37.18                  | -15.76                  | -0.04                | -15.80                  |
| 37      | 72.00  | -338.82         | -375.87                               | -338.93                               | -376.00                                  | -37.05                 | -0.11                | -37.18                  | -15.75                  | -0.05                | -15.80                  |
| 38      | 74.25  | -393.25         | -430.34                               | -393.35                               | -430.44                                  | -37.09                 | -0.10                | -37.19                  | -15.76                  | -0.04                | -15.81                  |
| 39      | 76.50  | -447.65         | -484.73                               | -447.76                               | -484.84                                  | -37.08                 | -0.11                | -37.19                  | -15.76                  | -0.05                | -15.81                  |
| 40      | 78.75  | -509.40         | -546.48                               | -509.50                               | -546.59                                  | -37.08                 | -0.10                | -37.19                  | -15.76                  | -0.04                | -15.81                  |
| 41      | 81.00  | 598.73          | 609.06                                | 599.11                                | 609.43                                   | 10.33                  | 0.38                 | 10.70                   | 4.39                    | 0.16                 | 4.55                    |
| 42      | 83.25  | 537.01          | 547.34                                | 537.38                                | 547.71                                   | 10.33                  | 0.37                 | 10.70                   | 4.39                    | 0.16                 | 4.55                    |
| 43      | 85.50  | 475.28          | 485.60                                | 475.64                                | 485.97                                   | 10.32                  | 0.36                 | 10.69                   | 4.39                    | 0.15                 | 4.54                    |
| 44      | 87.75  | 420.83          | 431.16                                | 421.20                                | 431.54                                   | 10.33                  | 0.37                 | 10.71                   | 4.39                    | 0.16                 | 4.55                    |
| 45      | 90.00  | 341.93          | 352.26                                | 342.29                                | 352.63                                   | 10.33                  | 0.36                 | 10.70                   | 4.39                    | 0.15                 | 4.55                    |
| 46      | 92.25  | 263.03          | 273.36                                | 263.40                                | 273.75                                   | 10.33                  | 0.37                 | 10.72                   | 4.39                    | 0.16                 | 4.56                    |
| 47      | 94.50  | 208.66          | 218.99                                | 208.99                                | 219.36                                   | 10.33                  | 0.33                 | 10.70                   | 4.39                    | 0.14                 | 4.55                    |
| 48      | 96.75  | 154.26          | 164.57                                | 154.60                                | 164.91                                   | 10.31                  | 0.34                 | 10.65                   | 4.38                    | 0.14                 | 4.53                    |
| 49      | 99.00  | 99.81           | 110.15                                | 100.17                                | 110.52                                   | 10.34                  | 0.36                 | 10.71                   | 4.39                    | 0.15                 | 4.55                    |
| 50      | 101.25 | 45.37           | 55.72                                 | 45.76                                 | 56.09                                    | 10.35                  | 0.39                 | 10.72                   | 4.40                    | 0.17                 | 4.56                    |

| SECCIÓN | X      | V <sub>pp</sub> | V <sub>pp</sub> +V <sub>desc,E1</sub> | V <sub>pp</sub> +V <sub>desc,E2</sub> | V <sub>pp</sub> +V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub> | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub> | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 51      | 103.50 | -9.07           | 1.25                                  | -8.66                                 | 1.63                                     | 10.32                | 0.41                 | 10.70                   | 4.39                 | 0.17                 | 4.55                    |
| 52      | 105.75 | -63.56          | -53.22                                | -63.14                                | -52.84                                   | 10.34                | 0.42                 | 10.72                   | 4.39                 | 0.18                 | 4.56                    |
| 53      | 108.00 | -117.94         | -107.59                               | -117.59                               | -107.24                                  | 10.35                | 0.35                 | 10.70                   | 4.40                 | 0.15                 | 4.55                    |
| 54      | 110.25 | -172.37         | -162.01                               | -172.00                               | -161.64                                  | 10.36                | 0.37                 | 10.73                   | 4.40                 | 0.16                 | 4.56                    |
| 55      | 112.50 | -226.78         | -216.46                               | -226.42                               | -216.09                                  | 10.32                | 0.36                 | 10.69                   | 4.39                 | 0.15                 | 4.54                    |
| 56      | 114.75 | -281.20         | -270.87                               | -280.85                               | -270.50                                  | 10.33                | 0.35                 | 10.70                   | 4.39                 | 0.15                 | 4.55                    |
| 57      | 117.00 | -335.61         | -325.26                               | -335.24                               | -324.90                                  | 10.35                | 0.37                 | 10.71                   | 4.40                 | 0.16                 | 4.55                    |
| 58      | 119.25 | -390.06         | -379.71                               | -389.68                               | -379.35                                  | 10.35                | 0.38                 | 10.71                   | 4.40                 | 0.16                 | 4.55                    |
| 59      | 121.50 | -444.47         | -434.13                               | -444.09                               | -433.76                                  | 10.34                | 0.38                 | 10.71                   | 4.39                 | 0.16                 | 4.55                    |
| 60      | 123.75 | -506.21         | -495.87                               | -505.84                               | -495.50                                  | 10.34                | 0.37                 | 10.71                   | 4.39                 | 0.16                 | 4.55                    |
| 61      | 126.00 | 597.83          | 594.96                                | 596.49                                | 593.61                                   | -2.87                | -1.34                | -4.22                   | -1.22                | -0.57                | -1.79                   |
| 62      | 128.25 | 536.09          | 533.22                                | 534.75                                | 531.88                                   | -2.87                | -1.34                | -4.21                   | -1.22                | -0.57                | -1.79                   |
| 63      | 130.50 | 474.35          | 471.49                                | 473.01                                | 470.15                                   | -2.86                | -1.34                | -4.20                   | -1.22                | -0.57                | -1.79                   |
| 64      | 132.75 | 419.91          | 417.03                                | 418.57                                | 415.68                                   | -2.88                | -1.34                | -4.23                   | -1.22                | -0.57                | -1.80                   |
| 65      | 135.00 | 341.00          | 338.10                                | 339.66                                | 336.76                                   | -2.90                | -1.34                | -4.24                   | -1.23                | -0.57                | -1.80                   |
| 66      | 137.25 | 262.10          | 259.22                                | 260.75                                | 257.87                                   | -2.88                | -1.35                | -4.23                   | -1.22                | -0.57                | -1.80                   |
| 67      | 139.50 | 207.66          | 204.76                                | 206.31                                | 203.44                                   | -2.90                | -1.35                | -4.22                   | -1.23                | -0.57                | -1.79                   |
| 68      | 141.75 | 153.21          | 150.37                                | 151.88                                | 149.01                                   | -2.84                | -1.33                | -4.20                   | -1.21                | -0.57                | -1.79                   |
| 69      | 144.00 | 98.82           | 95.96                                 | 97.45                                 | 94.62                                    | -2.86                | -1.37                | -4.20                   | -1.22                | -0.58                | -1.79                   |
| 70      | 146.25 | 44.39           | 41.50                                 | 43.04                                 | 40.16                                    | -2.89                | -1.35                | -4.23                   | -1.23                | -0.57                | -1.80                   |
| 71      | 148.50 | -9.99           | -12.90                                | -11.34                                | -14.23                                   | -2.91                | -1.35                | -4.24                   | -1.24                | -0.57                | -1.80                   |
| 72      | 150.75 | -64.42          | -67.34                                | -65.77                                | -68.68                                   | -2.92                | -1.35                | -4.26                   | -1.24                | -0.57                | -1.81                   |
| 73      | 153.00 | -118.86         | -121.75                               | -120.22                               | -123.08                                  | -2.89                | -1.36                | -4.22                   | -1.23                | -0.58                | -1.79                   |
| 74      | 155.25 | -173.26         | -176.14                               | -174.59                               | -177.47                                  | -2.88                | -1.33                | -4.21                   | -1.22                | -0.57                | -1.79                   |
| 75      | 157.50 | -227.70         | -230.54                               | -229.02                               | -231.89                                  | -2.84                | -1.32                | -4.19                   | -1.21                | -0.56                | -1.78                   |
| 76      | 159.75 | -282.07         | -284.97                               | -283.40                               | -286.27                                  | -2.90                | -1.33                | -4.20                   | -1.23                | -0.57                | -1.79                   |
| 77      | 162.00 | -336.53         | -339.42                               | -337.86                               | -340.75                                  | -2.89                | -1.33                | -4.22                   | -1.23                | -0.57                | -1.79                   |
| 78      | 164.25 | -390.92         | -393.81                               | -392.26                               | -395.15                                  | -2.89                | -1.34                | -4.23                   | -1.23                | -0.57                | -1.80                   |
| 79      | 166.50 | -445.35         | -448.23                               | -446.70                               | -449.58                                  | -2.88                | -1.35                | -4.23                   | -1.22                | -0.57                | -1.80                   |
| 80      | 168.75 | -507.09         | -509.97                               | -508.43                               | -511.31                                  | -2.88                | -1.34                | -4.22                   | -1.22                | -0.57                | -1.79                   |
| 81      | 171.00 | 598.14          | 598.95                                | 602.96                                | 603.76                                   | 0.81                 | 4.82                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 82      | 173.25 | 536.41          | 537.21                                | 541.22                                | 542.03                                   | 0.80                 | 4.81                 | 5.62                    | 0.34                 | 2.04                 | 2.39                    |
| 83      | 175.50 | 474.66          | 475.46                                | 479.48                                | 480.29                                   | 0.80                 | 4.82                 | 5.63                    | 0.34                 | 2.05                 | 2.39                    |
| 84      | 177.75 | 420.25          | 421.04                                | 425.06                                | 425.87                                   | 0.79                 | 4.81                 | 5.62                    | 0.34                 | 2.04                 | 2.39                    |
| 85      | 180.00 | 341.35          | 342.16                                | 346.14                                | 346.99                                   | 0.81                 | 4.79                 | 5.64                    | 0.34                 | 2.04                 | 2.40                    |
| 86      | 182.25 | 262.41          | 263.22                                | 267.21                                | 268.00                                   | 0.81                 | 4.80                 | 5.59                    | 0.34                 | 2.04                 | 2.38                    |
| 87      | 184.50 | 208.00          | 208.81                                | 212.86                                | 213.66                                   | 0.81                 | 4.86                 | 5.66                    | 0.34                 | 2.07                 | 2.41                    |
| 88      | 186.75 | 153.57          | 154.40                                | 158.41                                | 159.23                                   | 0.83                 | 4.84                 | 5.66                    | 0.35                 | 2.06                 | 2.41                    |
| 89      | 189.00 | 99.15           | 99.95                                 | 103.98                                | 104.80                                   | 0.80                 | 4.83                 | 5.65                    | 0.34                 | 2.05                 | 2.40                    |
| 90      | 191.25 | 44.70           | 45.51                                 | 49.48                                 | 50.28                                    | 0.81                 | 4.78                 | 5.58                    | 0.34                 | 2.03                 | 2.37                    |
| 91      | 193.50 | -9.82           | -8.98                                 | -4.97                                 | -4.18                                    | 0.84                 | 4.85                 | 5.64                    | 0.36                 | 2.06                 | 2.40                    |
| 92      | 195.75 | -64.13          | -63.36                                | -59.33                                | -58.56                                   | 0.77                 | 4.80                 | 5.57                    | 0.33                 | 2.04                 | 2.37                    |
| 93      | 198.00 | -118.53         | -117.75                               | -113.66                               | -112.93                                  | 0.78                 | 4.87                 | 5.60                    | 0.33                 | 2.07                 | 2.38                    |
| 94      | 200.25 | -172.91         | -172.16                               | -168.11                               | -167.33                                  | 0.75                 | 4.80                 | 5.58                    | 0.32                 | 2.04                 | 2.37                    |
| 95      | 202.50 | -227.33         | -226.54                               | -222.50                               | -221.71                                  | 0.79                 | 4.83                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 96      | 204.75 | -281.75         | -280.95                               | -276.93                               | -276.11                                  | 0.80                 | 4.82                 | 5.64                    | 0.34                 | 2.05                 | 2.40                    |
| 97      | 207.00 | -336.13         | -335.34                               | -331.31                               | -330.51                                  | 0.79                 | 4.82                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 98      | 209.25 | -390.54         | -389.74                               | -385.72                               | -384.92                                  | 0.80                 | 4.82                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 99      | 211.50 | -444.99         | -444.19                               | -440.17                               | -439.37                                  | 0.80                 | 4.82                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 100     | 213.75 | -506.71         | -505.91                               | -501.89                               | -501.09                                  | 0.80                 | 4.82                 | 5.62                    | 0.34                 | 2.05                 | 2.39                    |
| 101     | 216.00 | 597.77          | 597.55                                | 580.46                                | 580.23                                   | -0.22                | -17.31               | -17.54                  | -0.09                | -7.36                | -7.45                   |
| 102     | 218.25 | 536.03          | 535.81                                | 518.72                                | 518.50                                   | -0.22                | -17.31               | -17.53                  | -0.09                | -7.36                | -7.45                   |
| 103     | 220.50 | 474.31          | 474.08                                | 456.99                                | 456.77                                   | -0.23                | -17.32               | -17.54                  | -0.10                | -7.36                | -7.45                   |
| 104     | 222.75 | 419.86          | 419.66                                | 402.57                                | 402.34                                   | -0.20                | -17.29               | -17.52                  | -0.09                | -7.35                | -7.45                   |
| 105     | 225.00 | 340.94          | 340.73                                | 323.64                                | 323.42                                   | -0.21                | -17.30               | -17.52                  | -0.09                | -7.35                | -7.45                   |
| 106     | 227.25 | 262.03          | 261.78                                | 244.70                                | 244.51                                   | -0.25                | -17.33               | -17.52                  | -0.11                | -7.37                | -7.45                   |

| SECCIÓN | X      | V <sub>pp</sub> | V <sub>pp</sub> +V <sub>desc,E1</sub> | V <sub>pp</sub> +V <sub>desc,E2</sub> | V <sub>pp</sub> +V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub> | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> | V <sub>desc,E1</sub> | V <sub>desc,E2</sub> | V <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 107     | 229.50 | 207.56          | 207.35                                | 190.29                                | 190.07                                   | -0.21                | -17.27               | -17.49                  | -0.09                | -7.34                | -7.43                   |
| 108     | 231.75 | 153.12          | 152.92                                | 135.84                                | 135.62                                   | -0.20                | -17.28               | -17.50                  | -0.09                | -7.34                | -7.44                   |
| 109     | 234.00 | 98.71           | 98.47                                 | 81.41                                 | 81.20                                    | -0.24                | -17.30               | -17.51                  | -0.10                | -7.35                | -7.44                   |
| 110     | 236.25 | 44.33           | 44.08                                 | 26.98                                 | 26.77                                    | -0.25                | -17.35               | -17.56                  | -0.11                | -7.37                | -7.46                   |
| 111     | 238.50 | -10.16          | -10.39                                | -27.43                                | -27.64                                   | -0.23                | -17.27               | -17.48                  | -0.10                | -7.34                | -7.43                   |
| 112     | 240.75 | -64.57          | -64.79                                | -81.85                                | -82.12                                   | -0.22                | -17.28               | -17.55                  | -0.09                | -7.34                | -7.46                   |
| 113     | 243.00 | -118.96         | -119.21                               | -136.27                               | -136.53                                  | -0.25                | -17.31               | -17.57                  | -0.11                | -7.36                | -7.47                   |
| 114     | 245.25 | -173.46         | -173.67                               | -190.72                               | -190.94                                  | -0.21                | -17.26               | -17.48                  | -0.09                | -7.34                | -7.43                   |
| 115     | 247.50 | -227.85         | -228.08                               | -245.14                               | -245.36                                  | -0.23                | -17.29               | -17.51                  | -0.10                | -7.35                | -7.44                   |
| 116     | 249.75 | -282.27         | -282.49                               | -299.56                               | -299.79                                  | -0.22                | -17.29               | -17.52                  | -0.09                | -7.35                | -7.45                   |
| 117     | 252.00 | -336.65         | -336.88                               | -353.95                               | -354.17                                  | -0.23                | -17.30               | -17.52                  | -0.10                | -7.35                | -7.45                   |
| 118     | 254.25 | -391.07         | -391.29                               | -408.36                               | -408.58                                  | -0.22                | -17.29               | -17.51                  | -0.09                | -7.35                | -7.44                   |
| 119     | 256.50 | -445.49         | -445.71                               | -462.78                               | -463.00                                  | -0.22                | -17.29               | -17.51                  | -0.09                | -7.35                | -7.44                   |
| 120     | 258.75 | -507.23         | -507.46                               | -524.52                               | -524.75                                  | -0.23                | -17.29               | -17.52                  | -0.10                | -7.35                | -7.45                   |
| 121     | 261.00 | 599.08          | 599.14                                | 661.12                                | 661.18                                   | 0.06                 | 62.04                | 62.10                   | 0.03                 | 26.37                | 26.39                   |
| 122     | 263.25 | 537.34          | 537.41                                | 599.38                                | 599.45                                   | 0.07                 | 62.04                | 62.11                   | 0.03                 | 26.37                | 26.40                   |
| 123     | 265.50 | 475.61          | 475.67                                | 537.66                                | 537.72                                   | 0.06                 | 62.05                | 62.11                   | 0.03                 | 26.37                | 26.40                   |
| 124     | 267.75 | 421.20          | 421.26                                | 483.28                                | 483.32                                   | 0.06                 | 62.08                | 62.12                   | 0.03                 | 26.38                | 26.40                   |
| 125     | 270.00 | 342.29          | 342.36                                | 404.35                                | 404.43                                   | 0.07                 | 62.06                | 62.14                   | 0.03                 | 26.38                | 26.41                   |
| 126     | 272.25 | 263.39          | 263.45                                | 325.50                                | 325.56                                   | 0.06                 | 62.11                | 62.17                   | 0.03                 | 26.40                | 26.42                   |
| 127     | 274.50 | 208.99          | 209.04                                | 271.01                                | 271.08                                   | 0.05                 | 62.02                | 62.09                   | 0.02                 | 26.36                | 26.39                   |
| 128     | 276.75 | 154.64          | 154.66                                | 216.64                                | 216.75                                   | 0.02                 | 62.00                | 62.11                   | 0.01                 | 26.35                | 26.40                   |
| 129     | 279.00 | 100.13          | 100.21                                | 162.25                                | 162.28                                   | 0.08                 | 62.12                | 62.15                   | 0.03                 | 26.40                | 26.41                   |
| 130     | 281.25 | 45.72           | 45.72                                 | 107.75                                | 107.84                                   | 0.00                 | 62.03                | 62.12                   | 0.00                 | 26.36                | 26.40                   |
| 131     | 283.50 | -8.76           | -8.71                                 | 53.29                                 | 53.39                                    | 0.05                 | 62.05                | 62.15                   | 0.02                 | 26.37                | 26.41                   |
| 132     | 285.75 | -63.15          | -63.14                                | -1.16                                 | -1.09                                    | 0.01                 | 61.99                | 62.06                   | 0.00                 | 26.35                | 26.38                   |
| 133     | 288.00 | -117.54         | -117.50                               | -55.61                                | -55.48                                   | 0.04                 | 61.93                | 62.06                   | 0.02                 | 26.32                | 26.38                   |
| 134     | 290.25 | -171.98         | -171.89                               | -109.99                               | -109.87                                  | 0.09                 | 61.99                | 62.11                   | 0.04                 | 26.35                | 26.40                   |
| 135     | 292.50 | -226.42         | -226.35                               | -164.41                               | -164.33                                  | 0.07                 | 62.01                | 62.09                   | 0.03                 | 26.35                | 26.39                   |
| 136     | 294.75 | -280.81         | -280.77                               | -218.79                               | -218.73                                  | 0.04                 | 62.02                | 62.08                   | 0.02                 | 26.36                | 26.38                   |
| 137     | 297.00 | -335.25         | -335.19                               | -273.21                               | -273.21                                  | 0.06                 | 62.04                | 62.04                   | 0.03                 | 26.37                | 26.37                   |
| 138     | 299.25 | -389.64         | -389.58                               | -327.63                               | -327.54                                  | 0.06                 | 62.01                | 62.10                   | 0.03                 | 26.35                | 26.39                   |
| 139     | 301.50 | -444.07         | -444.01                               | -382.01                               | -381.96                                  | 0.06                 | 62.06                | 62.11                   | 0.03                 | 26.38                | 26.40                   |
| 140     | 303.75 | -505.80         | -505.74                               | -443.76                               | -443.70                                  | 0.06                 | 62.04                | 62.10                   | 0.03                 | 26.37                | 26.39                   |
| 141     | 306.00 | 606.71          | 606.70                                | 545.85                                | 545.83                                   | -0.01                | -60.86               | -60.88                  | 0.00                 | -25.87               | -25.87                  |
| 142     | 307.80 | 557.33          | 557.32                                | 496.50                                | 496.49                                   | -0.01                | -60.83               | -60.84                  | 0.00                 | -25.85               | -25.86                  |
| 143     | 309.60 | 507.93          | 507.92                                | 447.11                                | 447.08                                   | -0.01                | -60.82               | -60.85                  | 0.00                 | -25.85               | -25.86                  |
| 144     | 311.40 | 464.39          | 464.35                                | 403.62                                | 403.59                                   | -0.04                | -60.77               | -60.80                  | -0.02                | -25.83               | -25.84                  |
| 145     | 313.20 | 396.29          | 396.29                                | 335.64                                | 335.56                                   | 0.00                 | -60.65               | -60.73                  | 0.00                 | -25.78               | -25.81                  |
| 146     | 315.00 | 328.29          | 328.26                                | 267.61                                | 267.51                                   | -0.03                | -60.68               | -60.78                  | -0.01                | -25.79               | -25.83                  |
| 147     | 316.80 | 284.75          | 284.74                                | 223.88                                | 223.95                                   | -0.01                | -60.87               | -60.80                  | 0.00                 | -25.87               | -25.84                  |
| 148     | 318.60 | 241.21          | 241.15                                | 180.36                                | 180.37                                   | -0.06                | -60.85               | -60.84                  | -0.03                | -25.86               | -25.86                  |
| 149     | 320.40 | 197.75          | 197.69                                | 137.01                                | 136.87                                   | -0.06                | -60.74               | -60.88                  | -0.03                | -25.81               | -25.87                  |
| 150     | 322.20 | 154.19          | 154.12                                | 93.40                                 | 93.37                                    | -0.07                | -60.79               | -60.82                  | -0.03                | -25.84               | -25.85                  |
| 151     | 324.00 | 110.62          | 110.55                                | 50.16                                 | 49.85                                    | -0.07                | -60.46               | -60.77                  | -0.03                | -25.70               | -25.83                  |
| 152     | 325.80 | 66.97           | 66.89                                 | 6.73                                  | 6.83                                     | -0.08                | -60.24               | -60.14                  | -0.03                | -25.60               | -25.56                  |
| 153     | 327.60 | 23.49           | 23.48                                 | -36.97                                | -36.97                                   | -0.01                | -60.46               | -60.46                  | 0.00                 | -25.70               | -25.70                  |
| 154     | 329.40 | -20.11          | -20.14                                | -80.44                                | -80.48                                   | -0.03                | -60.33               | -60.37                  | -0.01                | -25.64               | -25.66                  |
| 155     | 331.20 | -63.68          | -63.60                                | -123.86                               | -123.82                                  | 0.08                 | -60.18               | -60.14                  | 0.03                 | -25.58               | -25.56                  |
| 156     | 333.00 | -107.13         | -107.12                               | -167.38                               | -167.70                                  | 0.01                 | -60.25               | -60.57                  | 0.00                 | -25.61               | -25.74                  |
| 157     | 334.80 | -150.71         | -150.67                               | -211.09                               | -210.84                                  | 0.04                 | -60.38               | -60.13                  | 0.02                 | -25.66               | -25.56                  |
| 158     | 336.60 | -194.12         | -194.22                               | -254.86                               | -255.11                                  | -0.10                | -60.74               | -60.99                  | -0.04                | -25.81               | -25.92                  |
| 159     | 338.40 | -237.75         | -237.78                               | -298.42                               | -298.22                                  | -0.03                | -60.67               | -60.47                  | -0.01                | -25.79               | -25.70                  |
| 160     | 340.20 | -281.25         | -281.26                               | -342.31                               | -342.61                                  | -0.01                | -61.06               | -61.36                  | 0.00                 | -25.95               | -26.08                  |
| 161     | 342.00 | -324.79         | -324.80                               | -385.85                               | -386.15                                  | -0.01                | -61.06               | -61.36                  | 0.00                 | -25.95               | -26.08                  |

# CÁLCULO DE LOS MOMENTOS TORSORES PROVOCADOS POR EL ASIENTO EN LOS APOYOS DE LOS ESTRIBOS

Coefficiente de Fluencia:  $\phi = 2.05$

| SECCIÓN | X      | T <sub>pp</sub> | Esfuerzos conjuntos                   |                                       |                                          | Esfuerzos Instantáneos |                      |                         | Esfuerzos a largo plazo |                      |                         |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|------------------------|----------------------|-------------------------|-------------------------|----------------------|-------------------------|
|         |        |                 | T <sub>pp</sub> +T <sub>desc,E1</sub> | T <sub>pp</sub> +T <sub>desc,E2</sub> | T <sub>pp</sub> +T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub>   | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub>    | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> |
| 1       | 0.00   | 19.06           | 46.28                                 | 19.06                                 | 46.27                                    | 27.22                  | 0.00                 | 27.21                   | 11.57                   | 0.00                 | 11.56                   |
| 2       | 1.80   | 19.07           | 46.05                                 | 19.07                                 | 46.21                                    | 26.98                  | 0.00                 | 27.14                   | 11.47                   | 0.00                 | 11.53                   |
| 3       | 3.60   | 19.53           | 46.65                                 | 19.53                                 | 46.59                                    | 27.12                  | 0.00                 | 27.06                   | 11.53                   | 0.00                 | 11.50                   |
| 4       | 5.40   | 19.98           | 47.23                                 | 19.99                                 | 47.16                                    | 27.25                  | 0.01                 | 27.18                   | 11.58                   | 0.00                 | 11.55                   |
| 5       | 7.20   | 20.00           | 47.22                                 | 19.99                                 | 47.19                                    | 27.22                  | -0.01                | 27.19                   | 11.57                   | 0.00                 | 11.56                   |
| 6       | 9.00   | 20.82           | 48.18                                 | 20.79                                 | 48.20                                    | 27.36                  | -0.03                | 27.38                   | 11.63                   | -0.01                | 11.64                   |
| 7       | 10.80  | 20.81           | 48.17                                 | 20.80                                 | 48.22                                    | 27.36                  | -0.01                | 27.41                   | 11.63                   | 0.00                 | 11.65                   |
| 8       | 12.60  | 22.42           | 50.09                                 | 22.45                                 | 50.16                                    | 27.67                  | 0.03                 | 27.74                   | 11.76                   | 0.01                 | 11.79                   |
| 9       | 14.40  | 21.52           | 49.03                                 | 21.51                                 | 49.07                                    | 27.51                  | -0.01                | 27.55                   | 11.69                   | 0.00                 | 11.71                   |
| 10      | 16.20  | 23.17           | 51.34                                 | 23.18                                 | 51.36                                    | 28.17                  | 0.01                 | 28.19                   | 11.97                   | 0.00                 | 11.98                   |
| 11      | 18.00  | 23.03           | 51.09                                 | 23.03                                 | 51.09                                    | 28.06                  | 0.00                 | 28.06                   | 11.93                   | 0.00                 | 11.93                   |
| 12      | 19.80  | 23.68           | 52.07                                 | 23.71                                 | 52.09                                    | 28.39                  | 0.03                 | 28.41                   | 12.07                   | 0.01                 | 12.07                   |
| 13      | 21.60  | 23.73           | 52.06                                 | 23.72                                 | 52.06                                    | 28.33                  | -0.01                | 28.33                   | 12.04                   | 0.00                 | 12.04                   |
| 14      | 23.40  | 24.09           | 52.77                                 | 24.09                                 | 52.77                                    | 28.68                  | 0.00                 | 28.68                   | 12.19                   | 0.00                 | 12.19                   |
| 15      | 25.20  | 24.20           | 53.17                                 | 24.19                                 | 53.18                                    | 28.97                  | -0.01                | 28.98                   | 12.31                   | 0.00                 | 12.32                   |
| 16      | 27.00  | 24.29           | 52.93                                 | 24.29                                 | 52.93                                    | 28.64                  | 0.00                 | 28.64                   | 12.17                   | 0.00                 | 12.17                   |
| 17      | 28.80  | 23.25           | 53.08                                 | 23.27                                 | 53.08                                    | 29.83                  | 0.02                 | 29.83                   | 12.68                   | 0.01                 | 12.68                   |
| 18      | 30.60  | 23.82           | 53.26                                 | 23.83                                 | 53.26                                    | 29.44                  | 0.01                 | 29.44                   | 12.51                   | 0.00                 | 12.51                   |
| 19      | 32.40  | 22.98           | 52.83                                 | 22.99                                 | 52.83                                    | 29.85                  | 0.01                 | 29.85                   | 12.69                   | 0.00                 | 12.69                   |
| 20      | 34.20  | 21.53           | 51.91                                 | 21.53                                 | 51.92                                    | 30.38                  | 0.00                 | 30.39                   | 12.91                   | 0.00                 | 12.92                   |
| 21      | 36.00  | 0.71            | -0.04                                 | 0.72                                  | -0.03                                    | -0.75                  | 0.01                 | -0.74                   | -0.32                   | 0.00                 | -0.31                   |
| 22      | 38.25  | -0.35           | -0.68                                 | -0.34                                 | -0.67                                    | -0.33                  | 0.01                 | -0.32                   | -0.14                   | 0.00                 | -0.14                   |
| 23      | 40.50  | -1.53           | -1.15                                 | -1.53                                 | -1.14                                    | 0.38                   | 0.00                 | 0.39                    | 0.16                    | 0.00                 | 0.17                    |
| 24      | 42.75  | -1.53           | -1.14                                 | -1.52                                 | -1.13                                    | 0.39                   | 0.01                 | 0.40                    | 0.17                    | 0.00                 | 0.17                    |
| 25      | 45.00  | -1.52           | -1.14                                 | -1.50                                 | -1.12                                    | 0.38                   | 0.02                 | 0.40                    | 0.16                    | 0.01                 | 0.17                    |
| 26      | 47.25  | -1.16           | -0.21                                 | -1.16                                 | -0.19                                    | 0.95                   | 0.00                 | 0.97                    | 0.40                    | 0.00                 | 0.41                    |
| 27      | 49.50  | -0.44           | 0.98                                  | -0.44                                 | 0.99                                     | 1.42                   | 0.00                 | 1.43                    | 0.60                    | 0.00                 | 0.61                    |
| 28      | 51.75  | -0.44           | 1.02                                  | -0.42                                 | 0.97                                     | 1.46                   | 0.02                 | 1.41                    | 0.62                    | 0.01                 | 0.60                    |
| 29      | 54.00  | 0.19            | 1.88                                  | 0.23                                  | 1.88                                     | 1.69                   | 0.04                 | 1.69                    | 0.72                    | 0.02                 | 0.72                    |
| 30      | 56.25  | 1.45            | 3.47                                  | 1.45                                  | 3.51                                     | 2.02                   | 0.00                 | 2.06                    | 0.86                    | 0.00                 | 0.88                    |
| 31      | 58.50  | 0.77            | 2.61                                  | 0.75                                  | 2.64                                     | 1.84                   | -0.02                | 1.87                    | 0.78                    | -0.01                | 0.79                    |
| 32      | 60.75  | 2.63            | 4.88                                  | 2.62                                  | 4.86                                     | 2.25                   | -0.01                | 2.23                    | 0.96                    | 0.00                 | 0.95                    |
| 33      | 63.00  | 2.65            | 4.85                                  | 2.61                                  | 4.84                                     | 2.20                   | -0.04                | 2.19                    | 0.94                    | -0.02                | 0.93                    |
| 34      | 65.25  | 2.66            | 4.88                                  | 2.63                                  | 4.85                                     | 2.22                   | -0.03                | 2.19                    | 0.94                    | -0.01                | 0.93                    |
| 35      | 67.50  | 3.20            | 5.54                                  | 3.19                                  | 5.53                                     | 2.34                   | -0.01                | 2.33                    | 0.99                    | 0.00                 | 0.99                    |
| 36      | 69.75  | 3.42            | 5.76                                  | 3.42                                  | 5.76                                     | 2.34                   | 0.00                 | 2.34                    | 0.99                    | 0.00                 | 0.99                    |
| 37      | 72.00  | 3.51            | 5.86                                  | 3.51                                  | 5.86                                     | 2.35                   | 0.00                 | 2.35                    | 1.00                    | 0.00                 | 1.00                    |
| 38      | 74.25  | 2.44            | 4.70                                  | 2.44                                  | 4.69                                     | 2.26                   | 0.00                 | 2.25                    | 0.96                    | 0.00                 | 0.96                    |
| 39      | 76.50  | 3.03            | 5.34                                  | 3.03                                  | 5.34                                     | 2.31                   | 0.00                 | 2.31                    | 0.98                    | 0.00                 | 0.98                    |
| 40      | 78.75  | 1.03            | 3.16                                  | 1.02                                  | 3.16                                     | 2.13                   | -0.01                | 2.13                    | 0.91                    | 0.00                 | 0.91                    |
| 41      | 81.00  | -0.32           | 0.34                                  | -0.32                                 | 0.33                                     | 0.66                   | 0.00                 | 0.65                    | 0.28                    | 0.00                 | 0.28                    |
| 42      | 83.25  | -1.42           | -0.88                                 | -1.43                                 | -0.89                                    | 0.54                   | -0.01                | 0.53                    | 0.23                    | 0.00                 | 0.23                    |
| 43      | 85.50  | -2.12           | -1.69                                 | -2.13                                 | -1.70                                    | 0.43                   | -0.01                | 0.42                    | 0.18                    | 0.00                 | 0.18                    |
| 44      | 87.75  | -2.39           | -2.04                                 | -2.40                                 | -2.06                                    | 0.35                   | -0.01                | 0.33                    | 0.15                    | 0.00                 | 0.14                    |
| 45      | 90.00  | -2.40           | -2.04                                 | -2.40                                 | -2.06                                    | 0.36                   | 0.00                 | 0.34                    | 0.15                    | 0.00                 | 0.14                    |
| 46      | 92.25  | -2.06           | -1.86                                 | -2.06                                 | -1.88                                    | 0.20                   | 0.00                 | 0.18                    | 0.09                    | 0.00                 | 0.08                    |
| 47      | 94.50  | -1.66           | -1.57                                 | -1.67                                 | -1.56                                    | 0.09                   | -0.01                | 0.10                    | 0.04                    | 0.00                 | 0.04                    |
| 48      | 96.75  | -1.25           | -1.19                                 | -1.26                                 | -1.20                                    | 0.06                   | -0.01                | 0.05                    | 0.03                    | 0.00                 | 0.02                    |
| 49      | 99.00  | -0.63           | -0.63                                 | -0.63                                 | -0.65                                    | 0.00                   | 0.00                 | -0.02                   | 0.00                    | 0.00                 | -0.01                   |
| 50      | 101.25 | -0.65           | -0.64                                 | -0.63                                 | -0.64                                    | 0.01                   | 0.02                 | 0.01                    | 0.00                    | 0.01                 | 0.00                    |

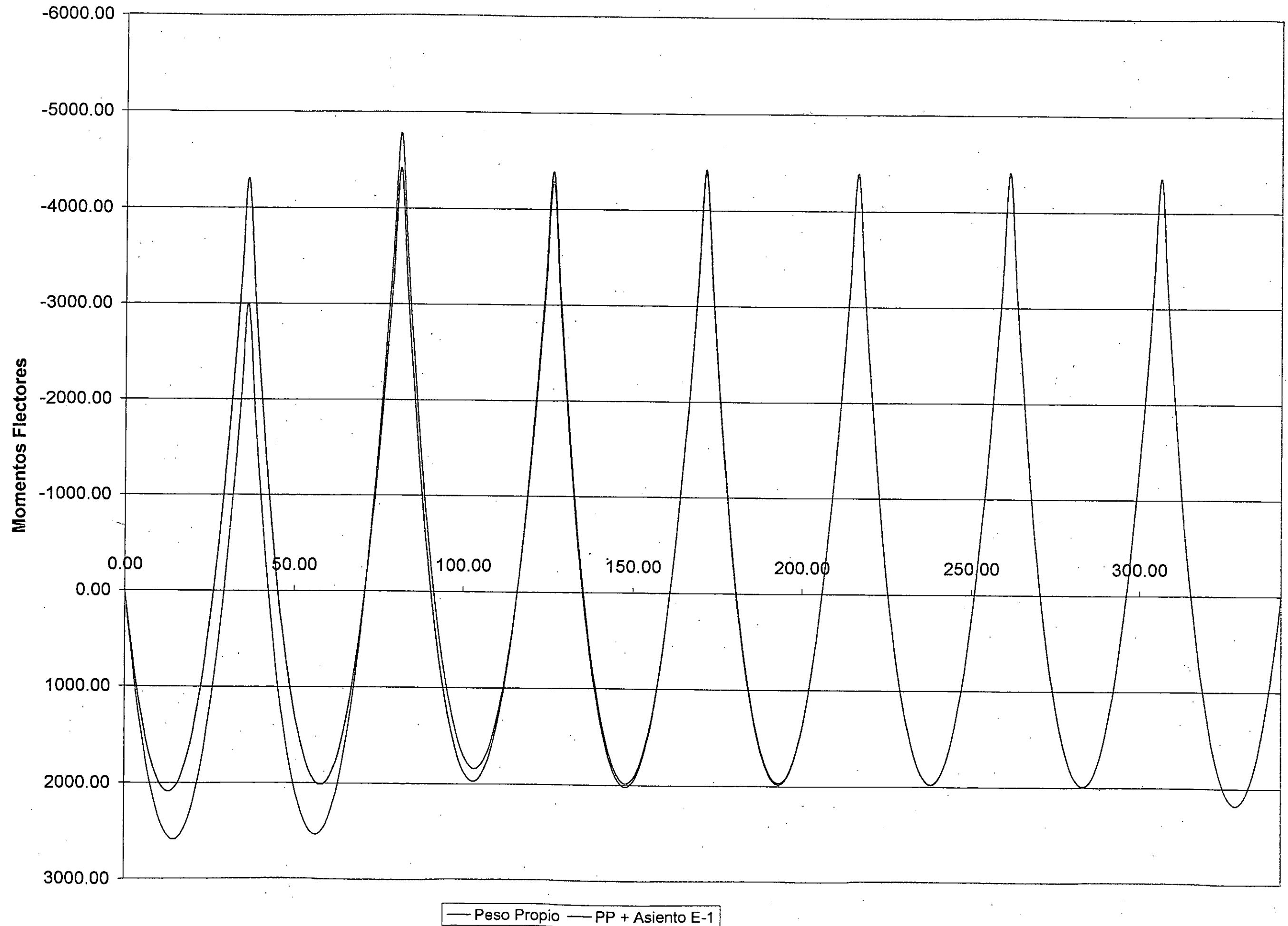
| SECCIÓN | X      | T <sub>pp</sub> | T <sub>pp</sub> +T <sub>desc,E1</sub> | T <sub>pp</sub> +T <sub>desc,E2</sub> | T <sub>pp</sub> +T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub> | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub> | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 51      | 103.50 | 0.59            | 0.52                                  | 0.59                                  | 0.51                                     | -0.07                | 0.00                 | -0.08                   | -0.03                | 0.00                 | -0.03                   |
| 52      | 105.75 | 0.60            | 0.52                                  | 0.58                                  | 0.50                                     | -0.08                | -0.02                | -0.10                   | -0.03                | -0.01                | -0.04                   |
| 53      | 108.00 | 1.63            | 1.48                                  | 1.62                                  | 1.49                                     | -0.15                | -0.01                | -0.14                   | -0.06                | 0.00                 | -0.06                   |
| 54      | 110.25 | 2.10            | 1.93                                  | 2.08                                  | 1.94                                     | -0.17                | -0.02                | -0.16                   | -0.07                | -0.01                | -0.07                   |
| 55      | 112.50 | 2.34            | 2.17                                  | 2.34                                  | 2.18                                     | -0.17                | 0.00                 | -0.16                   | -0.07                | 0.00                 | -0.07                   |
| 56      | 114.75 | 2.34            | 2.18                                  | 2.36                                  | 2.18                                     | -0.16                | 0.02                 | -0.16                   | -0.07                | 0.01                 | -0.07                   |
| 57      | 117.00 | 2.11            | 1.93                                  | 2.12                                  | 1.95                                     | -0.18                | 0.01                 | -0.16                   | -0.08                | 0.00                 | -0.07                   |
| 58      | 119.25 | 2.18            | 2.02                                  | 2.19                                  | 2.03                                     | -0.16                | 0.01                 | -0.15                   | -0.07                | 0.00                 | -0.06                   |
| 59      | 121.50 | 1.46            | 1.32                                  | 1.48                                  | 1.33                                     | -0.14                | 0.02                 | -0.13                   | -0.06                | 0.01                 | -0.06                   |
| 60      | 123.75 | -0.53           | -0.63                                 | -0.51                                 | -0.60                                    | -0.10                | 0.02                 | -0.07                   | -0.04                | 0.01                 | -0.03                   |
| 61      | 126.00 | 0.37            | 0.19                                  | 0.39                                  | 0.21                                     | -0.18                | 0.02                 | -0.16                   | -0.08                | 0.01                 | -0.07                   |
| 62      | 128.25 | -1.56           | -1.68                                 | -1.53                                 | -1.65                                    | -0.12                | 0.03                 | -0.09                   | -0.05                | 0.01                 | -0.04                   |
| 63      | 130.50 | -2.25           | -2.34                                 | -2.22                                 | -2.32                                    | -0.09                | 0.03                 | -0.07                   | -0.04                | 0.01                 | -0.03                   |
| 64      | 132.75 | -2.52           | -2.57                                 | -2.48                                 | -2.55                                    | -0.05                | 0.04                 | -0.03                   | -0.02                | 0.02                 | -0.01                   |
| 65      | 135.00 | -2.51           | -2.57                                 | -2.47                                 | -2.52                                    | -0.06                | 0.04                 | -0.01                   | -0.03                | 0.02                 | 0.00                    |
| 66      | 137.25 | -2.32           | -2.36                                 | -2.28                                 | -2.33                                    | -0.04                | 0.04                 | -0.01                   | -0.02                | 0.02                 | 0.00                    |
| 67      | 139.50 | -1.61           | -1.62                                 | -1.60                                 | -1.60                                    | -0.01                | 0.01                 | 0.01                    | 0.00                 | 0.00                 | 0.00                    |
| 68      | 141.75 | -1.63           | -1.63                                 | -1.60                                 | -1.62                                    | 0.00                 | 0.03                 | 0.01                    | 0.00                 | 0.01                 | 0.00                    |
| 69      | 144.00 | -1.12           | -1.12                                 | -1.08                                 | -1.09                                    | 0.00                 | 0.04                 | 0.03                    | 0.00                 | 0.02                 | 0.01                    |
| 70      | 146.25 | -0.43           | -0.44                                 | -0.44                                 | -0.39                                    | -0.01                | -0.01                | 0.04                    | 0.00                 | 0.00                 | 0.02                    |
| 71      | 148.50 | 0.79            | 0.86                                  | 0.80                                  | 0.85                                     | 0.07                 | 0.01                 | 0.06                    | 0.03                 | 0.00                 | 0.03                    |
| 72      | 150.75 | 0.80            | 0.84                                  | 0.79                                  | 0.86                                     | 0.04                 | -0.01                | 0.06                    | 0.02                 | 0.00                 | 0.03                    |
| 73      | 153.00 | 1.37            | 1.44                                  | 1.37                                  | 1.43                                     | 0.07                 | 0.00                 | 0.06                    | 0.03                 | 0.00                 | 0.03                    |
| 74      | 155.25 | 2.21            | 2.28                                  | 2.18                                  | 2.27                                     | 0.07                 | -0.03                | 0.06                    | 0.03                 | -0.01                | 0.03                    |
| 75      | 157.50 | 2.16            | 2.22                                  | 2.14                                  | 2.20                                     | 0.06                 | -0.02                | 0.04                    | 0.03                 | -0.01                | 0.02                    |
| 76      | 159.75 | 2.29            | 2.36                                  | 2.26                                  | 2.32                                     | 0.07                 | -0.03                | 0.03                    | 0.03                 | -0.01                | 0.01                    |
| 77      | 162.00 | 2.09            | 2.16                                  | 2.04                                  | 2.12                                     | 0.07                 | -0.05                | 0.03                    | 0.03                 | -0.02                | 0.01                    |
| 78      | 164.25 | 2.42            | 2.50                                  | 2.39                                  | 2.46                                     | 0.08                 | -0.03                | 0.04                    | 0.03                 | -0.01                | 0.02                    |
| 79      | 166.50 | 1.10            | 1.16                                  | 1.04                                  | 1.10                                     | 0.06                 | -0.06                | 0.00                    | 0.03                 | -0.03                | 0.00                    |
| 80      | 168.75 | -0.89           | -0.84                                 | -0.98                                 | -0.94                                    | 0.05                 | -0.09                | -0.05                   | 0.02                 | -0.04                | -0.02                   |
| 81      | 171.00 | -0.26           | -0.22                                 | -0.33                                 | -0.29                                    | 0.04                 | -0.07                | -0.03                   | 0.02                 | -0.03                | -0.01                   |
| 82      | 173.25 | -1.33           | -1.30                                 | -1.42                                 | -1.38                                    | 0.03                 | -0.09                | -0.05                   | 0.01                 | -0.04                | -0.02                   |
| 83      | 175.50 | -1.89           | -1.87                                 | -1.99                                 | -1.97                                    | 0.02                 | -0.10                | -0.08                   | 0.01                 | -0.04                | -0.03                   |
| 84      | 177.75 | -2.50           | -2.48                                 | -2.61                                 | -2.59                                    | 0.02                 | -0.11                | -0.09                   | 0.01                 | -0.05                | -0.04                   |
| 85      | 180.00 | -2.47           | -2.46                                 | -2.56                                 | -2.56                                    | 0.01                 | -0.09                | -0.09                   | 0.00                 | -0.04                | -0.04                   |
| 86      | 182.25 | -1.95           | -1.95                                 | -2.05                                 | -2.06                                    | 0.00                 | -0.10                | -0.11                   | 0.00                 | -0.04                | -0.05                   |
| 87      | 184.50 | -2.27           | -2.24                                 | -2.36                                 | -2.36                                    | 0.03                 | -0.09                | -0.09                   | 0.01                 | -0.04                | -0.04                   |
| 88      | 186.75 | -1.30           | -1.33                                 | -1.40                                 | -1.44                                    | -0.03                | -0.10                | -0.14                   | -0.01                | -0.04                | -0.06                   |
| 89      | 189.00 | -0.22           | -0.23                                 | -0.27                                 | -0.30                                    | -0.01                | -0.05                | -0.08                   | 0.00                 | -0.02                | -0.03                   |
| 90      | 191.25 | -0.21           | -0.23                                 | -0.25                                 | -0.27                                    | -0.02                | -0.04                | -0.06                   | -0.01                | -0.02                | -0.03                   |
| 91      | 193.50 | -0.19           | -0.20                                 | -0.27                                 | -0.25                                    | -0.01                | -0.08                | -0.06                   | 0.00                 | -0.03                | -0.03                   |
| 92      | 195.75 | 1.64            | 1.64                                  | 1.65                                  | 1.65                                     | 0.00                 | 0.01                 | 0.01                    | 0.00                 | 0.00                 | 0.00                    |
| 93      | 198.00 | 1.04            | 1.02                                  | 1.02                                  | 1.01                                     | -0.02                | -0.02                | -0.03                   | -0.01                | -0.01                | -0.01                   |
| 94      | 200.25 | 1.88            | 1.88                                  | 1.92                                  | 1.91                                     | 0.00                 | 0.04                 | 0.03                    | 0.00                 | 0.02                 | 0.01                    |
| 95      | 202.50 | 2.22            | 2.20                                  | 2.29                                  | 2.29                                     | -0.02                | 0.07                 | 0.07                    | -0.01                | 0.03                 | 0.03                    |
| 96      | 204.75 | 2.31            | 2.28                                  | 2.43                                  | 2.39                                     | -0.03                | 0.12                 | 0.08                    | -0.01                | 0.05                 | 0.03                    |
| 97      | 207.00 | 2.17            | 2.16                                  | 2.32                                  | 2.31                                     | -0.01                | 0.15                 | 0.14                    | 0.00                 | 0.06                 | 0.06                    |
| 98      | 209.25 | 1.77            | 1.75                                  | 1.96                                  | 1.94                                     | -0.02                | 0.19                 | 0.17                    | -0.01                | 0.08                 | 0.07                    |
| 99      | 211.50 | 1.90            | 1.88                                  | 2.08                                  | 2.06                                     | -0.02                | 0.18                 | 0.16                    | -0.01                | 0.08                 | 0.07                    |
| 100     | 213.75 | -1.17           | -1.19                                 | -0.83                                 | -0.85                                    | -0.02                | 0.34                 | 0.32                    | -0.01                | 0.14                 | 0.14                    |
| 101     | 216.00 | -0.68           | -0.69                                 | -0.37                                 | -0.38                                    | -0.01                | 0.31                 | 0.30                    | 0.00                 | 0.13                 | 0.13                    |
| 102     | 218.25 | -0.66           | -0.67                                 | -0.35                                 | -0.37                                    | -0.01                | 0.31                 | 0.29                    | 0.00                 | 0.13                 | 0.12                    |
| 103     | 220.50 | -1.91           | -1.90                                 | -1.54                                 | -1.55                                    | 0.01                 | 0.37                 | 0.36                    | 0.00                 | 0.16                 | 0.15                    |
| 104     | 222.75 | -2.24           | -2.25                                 | -1.86                                 | -1.86                                    | -0.01                | 0.38                 | 0.38                    | 0.00                 | 0.16                 | 0.16                    |
| 105     | 225.00 | -2.24           | -2.25                                 | -1.86                                 | -1.87                                    | -0.01                | 0.38                 | 0.37                    | 0.00                 | 0.16                 | 0.16                    |
| 106     | 227.25 | -1.88           | -1.91                                 | -1.53                                 | -1.54                                    | -0.03                | 0.35                 | 0.34                    | -0.01                | 0.15                 | 0.14                    |

| SECCIÓN | X      | T <sub>pp</sub> | T <sub>pp</sub> +T <sub>desc,E1</sub> | T <sub>pp</sub> +T <sub>desc,E2</sub> | T <sub>pp</sub> +T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub> | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> | T <sub>desc,E1</sub> | T <sub>desc,E2</sub> | T <sub>desc,E1+E2</sub> |
|---------|--------|-----------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|-------------------------|
| 107     | 229.50 | -1.57           | -1.58                                 | -1.24                                 | -1.24                                    | -0.01                | 0.33                 | 0.33                    | 0.00                 | 0.14                 | 0.14                    |
| 108     | 231.75 | -1.06           | -1.08                                 | -0.76                                 | -0.76                                    | -0.02                | 0.30                 | 0.30                    | -0.01                | 0.13                 | 0.13                    |
| 109     | 234.00 | -1.08           | -1.08                                 | -0.78                                 | -0.76                                    | 0.00                 | 0.30                 | 0.32                    | 0.00                 | 0.13                 | 0.14                    |
| 110     | 236.25 | 0.10            | 0.11                                  | 0.33                                  | 0.32                                     | 0.01                 | 0.23                 | 0.22                    | 0.00                 | 0.10                 | 0.09                    |
| 111     | 238.50 | 0.10            | 0.12                                  | 0.30                                  | 0.33                                     | 0.02                 | 0.20                 | 0.23                    | 0.01                 | 0.09                 | 0.10                    |
| 112     | 240.75 | 1.30            | 1.31                                  | 1.33                                  | 1.35                                     | 0.01                 | 0.03                 | 0.05                    | 0.00                 | 0.01                 | 0.02                    |
| 113     | 243.00 | 1.26            | 1.26                                  | 1.31                                  | 1.34                                     | 0.00                 | 0.05                 | 0.08                    | 0.00                 | 0.02                 | 0.03                    |
| 114     | 245.25 | 2.12            | 2.13                                  | 1.96                                  | 1.96                                     | 0.01                 | -0.16                | -0.16                   | 0.00                 | -0.07                | -0.07                   |
| 115     | 247.50 | 2.42            | 2.43                                  | 2.14                                  | 2.15                                     | 0.01                 | -0.28                | -0.27                   | 0.00                 | -0.12                | -0.11                   |
| 116     | 249.75 | 2.52            | 2.51                                  | 2.12                                  | 2.12                                     | -0.01                | -0.40                | -0.40                   | 0.00                 | -0.17                | -0.17                   |
| 117     | 252.00 | 2.51            | 2.52                                  | 2.11                                  | 2.12                                     | 0.01                 | -0.40                | -0.39                   | 0.00                 | -0.17                | -0.17                   |
| 118     | 254.25 | 2.11            | 2.11                                  | 1.54                                  | 1.54                                     | 0.00                 | -0.57                | -0.57                   | 0.00                 | -0.24                | -0.24                   |
| 119     | 256.50 | 0.78            | 0.79                                  | -0.12                                 | -0.11                                    | 0.01                 | -0.90                | -0.89                   | 0.00                 | -0.38                | -0.38                   |
| 120     | 258.75 | 0.77            | 0.77                                  | -0.14                                 | -0.13                                    | 0.00                 | -0.91                | -0.90                   | 0.00                 | -0.39                | -0.38                   |
| 121     | 261.00 | -1.03           | -1.03                                 | -2.76                                 | -2.75                                    | 0.00                 | -1.73                | -1.72                   | 0.00                 | -0.74                | -0.73                   |
| 122     | 263.25 | -1.06           | -1.06                                 | -2.80                                 | -2.78                                    | 0.00                 | -1.74                | -1.72                   | 0.00                 | -0.74                | -0.73                   |
| 123     | 265.50 | -2.30           | -2.30                                 | -4.24                                 | -4.24                                    | 0.00                 | -1.94                | -1.94                   | 0.00                 | -0.82                | -0.82                   |
| 124     | 267.75 | -2.30           | -2.30                                 | -4.25                                 | -4.22                                    | 0.00                 | -1.95                | -1.92                   | 0.00                 | -0.83                | -0.82                   |
| 125     | 270.00 | -2.33           | -2.35                                 | -4.29                                 | -4.29                                    | -0.02                | -1.96                | -1.96                   | -0.01                | -0.83                | -0.83                   |
| 126     | 272.25 | -1.97           | -1.97                                 | -3.89                                 | -3.86                                    | 0.00                 | -1.92                | -1.89                   | 0.00                 | -0.82                | -0.80                   |
| 127     | 274.50 | -2.03           | -2.06                                 | -3.93                                 | -3.96                                    | -0.03                | -1.90                | -1.93                   | -0.01                | -0.81                | -0.82                   |
| 128     | 276.75 | -1.05           | -1.05                                 | -2.70                                 | -2.69                                    | 0.00                 | -1.65                | -1.64                   | 0.00                 | -0.70                | -0.70                   |
| 129     | 279.00 | -1.02           | -1.03                                 | -2.71                                 | -2.68                                    | -0.01                | -1.69                | -1.66                   | 0.00                 | -0.72                | -0.71                   |
| 130     | 281.25 | -0.48           | -0.47                                 | -1.95                                 | -1.96                                    | 0.01                 | -1.47                | -1.48                   | 0.00                 | -0.62                | -0.63                   |
| 131     | 283.50 | 0.90            | 0.90                                  | -0.07                                 | -0.04                                    | 0.00                 | -0.97                | -0.94                   | 0.00                 | -0.41                | -0.40                   |
| 132     | 285.75 | 0.78            | 0.79                                  | -0.21                                 | -0.24                                    | 0.01                 | -0.99                | -1.02                   | 0.00                 | -0.42                | -0.43                   |
| 133     | 288.00 | 1.33            | 1.34                                  | 0.77                                  | 0.70                                     | 0.01                 | -0.56                | -0.63                   | 0.00                 | -0.24                | -0.27                   |
| 134     | 290.25 | 1.83            | 1.82                                  | 1.60                                  | 1.61                                     | -0.01                | -0.23                | -0.22                   | 0.00                 | -0.10                | -0.09                   |
| 135     | 292.50 | 2.10            | 2.10                                  | 2.28                                  | 2.25                                     | 0.00                 | 0.18                 | 0.15                    | 0.00                 | 0.08                 | 0.06                    |
| 136     | 294.75 | 2.32            | 2.33                                  | 3.41                                  | 3.42                                     | 0.01                 | 1.09                 | 1.10                    | 0.00                 | 0.46                 | 0.47                    |
| 137     | 297.00 | 2.33            | 2.33                                  | 3.42                                  | 3.44                                     | 0.00                 | 1.09                 | 1.11                    | 0.00                 | 0.46                 | 0.47                    |
| 138     | 299.25 | 1.95            | 1.95                                  | 3.65                                  | 3.65                                     | 0.00                 | 1.70                 | 1.70                    | 0.00                 | 0.72                 | 0.72                    |
| 139     | 301.50 | 1.36            | 1.35                                  | 3.59                                  | 3.60                                     | -0.01                | 2.23                 | 2.24                    | 0.00                 | 0.95                 | 0.95                    |
| 140     | 303.75 | 0.27            | 0.27                                  | 3.21                                  | 3.21                                     | 0.00                 | 2.94                 | 2.94                    | 0.00                 | 1.25                 | 1.25                    |
| 141     | 306.00 | -0.98           | -0.99                                 | -11.05                                | -11.06                                   | -0.01                | -10.07               | -10.08                  | 0.00                 | -4.28                | -4.28                   |
| 142     | 307.80 | -2.39           | -2.40                                 | -11.58                                | -11.59                                   | -0.01                | -9.19                | -9.20                   | 0.00                 | -3.91                | -3.91                   |
| 143     | 309.60 | -1.39           | -1.40                                 | -11.42                                | -11.41                                   | -0.01                | -10.03               | -10.02                  | 0.00                 | -4.26                | -4.26                   |
| 144     | 311.40 | -2.65           | -2.66                                 | -11.08                                | -11.09                                   | -0.01                | -8.43                | -8.44                   | 0.00                 | -3.58                | -3.59                   |
| 145     | 313.20 | -2.60           | -2.61                                 | -11.15                                | -11.16                                   | -0.01                | -8.55                | -8.56                   | 0.00                 | -3.63                | -3.64                   |
| 146     | 315.00 | -2.63           | -2.65                                 | -10.46                                | -10.48                                   | -0.02                | -7.83                | -7.85                   | -0.01                | -3.33                | -3.34                   |
| 147     | 316.80 | -2.62           | -2.64                                 | -10.46                                | -10.50                                   | -0.02                | -7.84                | -7.88                   | -0.01                | -3.33                | -3.35                   |
| 148     | 318.60 | -2.27           | -2.26                                 | -9.60                                 | -9.66                                    | 0.01                 | -7.33                | -7.39                   | 0.00                 | -3.12                | -3.14                   |
| 149     | 320.40 | -1.71           | -1.69                                 | -8.43                                 | -8.48                                    | 0.02                 | -6.72                | -6.77                   | 0.01                 | -2.86                | -2.88                   |
| 150     | 322.20 | -1.71           | -1.71                                 | -8.38                                 | -8.45                                    | 0.00                 | -6.67                | -6.74                   | 0.00                 | -2.83                | -2.86                   |
| 151     | 324.00 | -0.89           | -0.90                                 | -7.31                                 | -7.22                                    | -0.01                | -6.42                | -6.33                   | 0.00                 | -2.73                | -2.69                   |
| 152     | 325.80 | -0.15           | -0.15                                 | -6.16                                 | -6.09                                    | 0.00                 | -6.01                | -5.94                   | 0.00                 | -2.55                | -2.52                   |
| 153     | 327.60 | -0.14           | -0.16                                 | -6.02                                 | -6.05                                    | -0.02                | -5.88                | -5.91                   | -0.01                | -2.50                | -2.51                   |
| 154     | 329.40 | -0.17           | -0.13                                 | -6.25                                 | -6.15                                    | 0.04                 | -6.08                | -5.98                   | 0.02                 | -2.58                | -2.54                   |
| 155     | 331.20 | 1.48            | 1.47                                  | -3.89                                 | -3.98                                    | -0.01                | -5.37                | -5.46                   | 0.00                 | -2.28                | -2.32                   |
| 156     | 333.00 | 2.30            | 2.29                                  | -2.85                                 | -2.71                                    | -0.01                | -5.15                | -5.01                   | 0.00                 | -2.19                | -2.13                   |
| 157     | 334.80 | 1.61            | 1.58                                  | -3.76                                 | -3.73                                    | -0.03                | -5.37                | -5.34                   | -0.01                | -2.28                | -2.27                   |
| 158     | 336.60 | 2.17            | 2.18                                  | -2.90                                 | -2.83                                    | 0.01                 | -5.07                | -5.00                   | 0.00                 | -2.15                | -2.13                   |
| 159     | 338.40 | 2.56            | 2.57                                  | -2.50                                 | -2.75                                    | 0.01                 | -5.06                | -5.31                   | 0.00                 | -2.15                | -2.26                   |
| 160     | 340.20 | 2.78            | 2.79                                  | -2.55                                 | -2.28                                    | 0.01                 | -5.33                | -5.06                   | 0.00                 | -2.27                | -2.15                   |
| 161     | 342.00 | 2.78            | 2.79                                  | -2.50                                 | -2.26                                    | 0.01                 | -5.28                | -5.04                   | 0.00                 | -2.24                | -2.14                   |



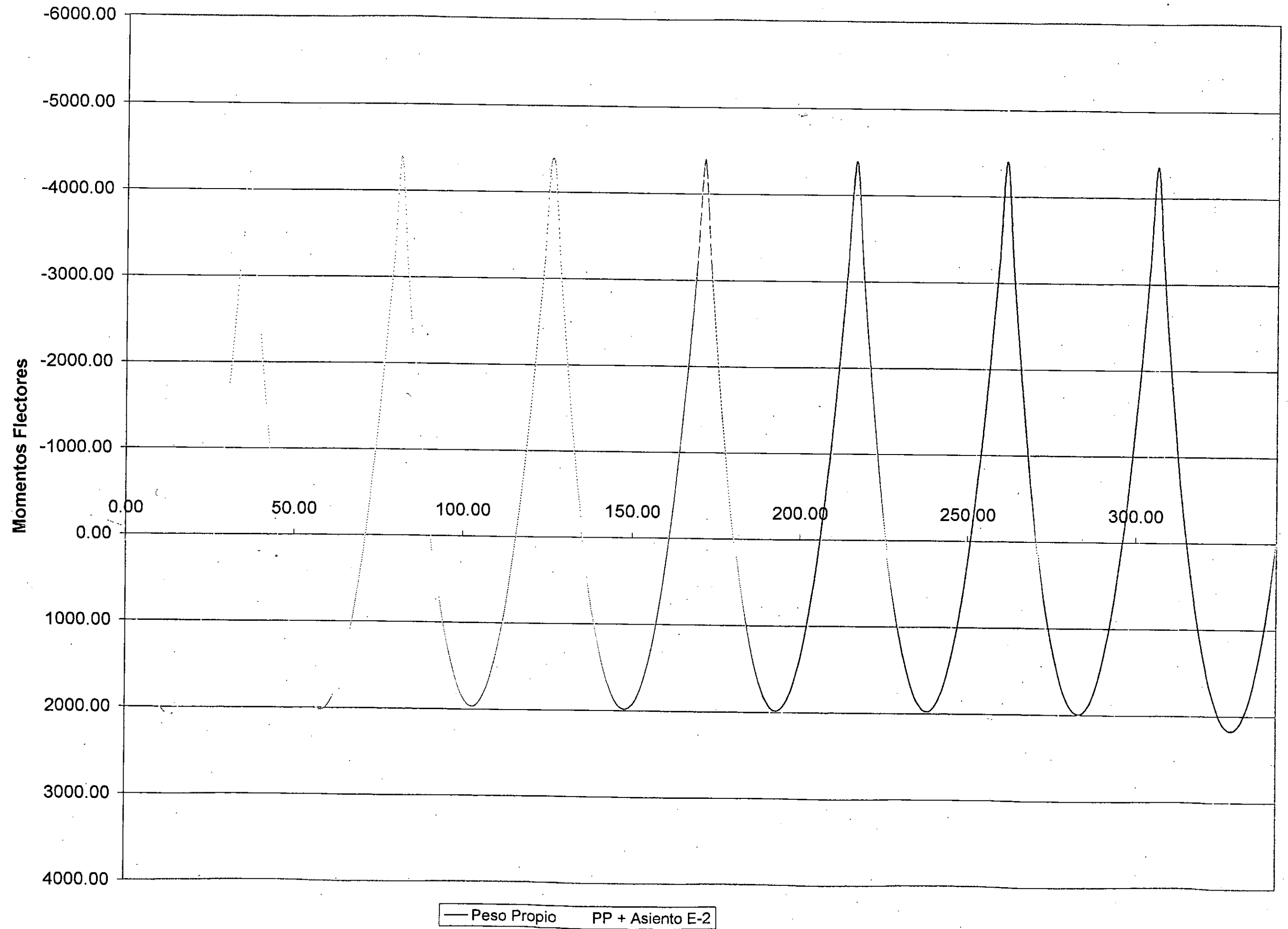
# MOMENTOS POR DESCENSO EN E-1

Distancia a Eje Estribo



# MOMENTOS POR DESCENSO EN E-2

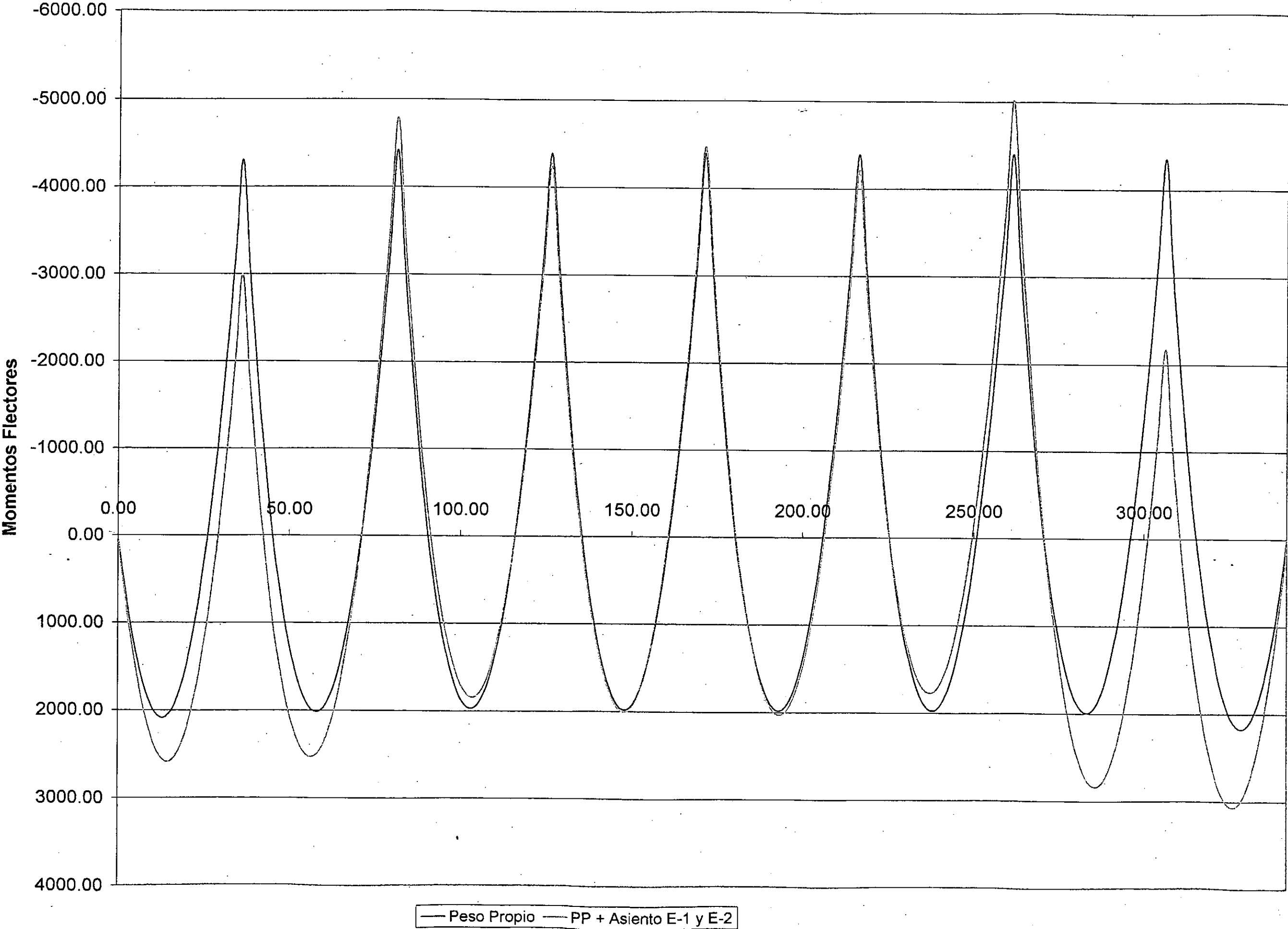
Distancia a Eje Estribo



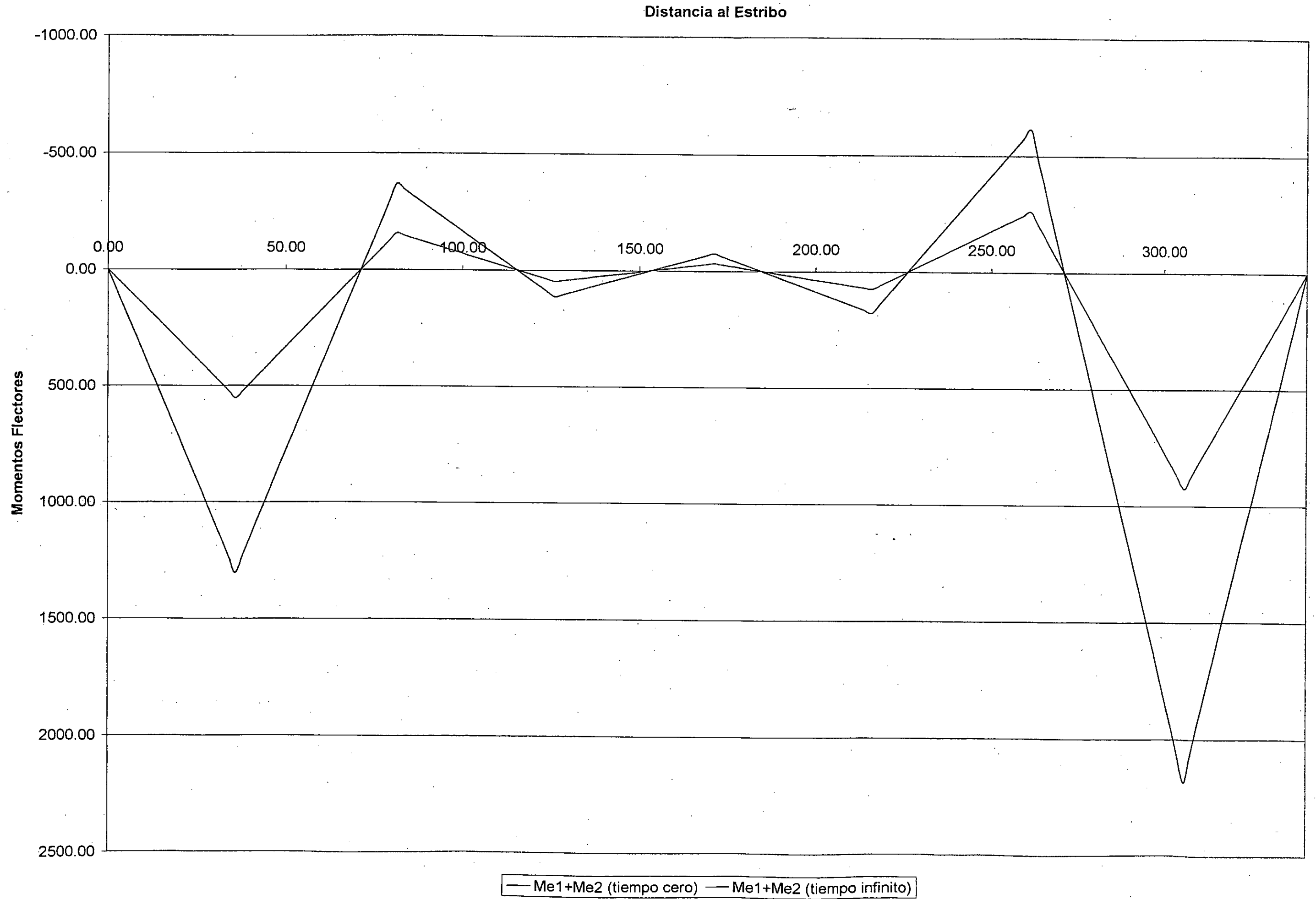


MOMENTOS POR DESCENSO EN E-1 Y E-2

Distancia a Eje Estribo



# MOMENTOS POR DESCENSO EN E-1 Y E-2

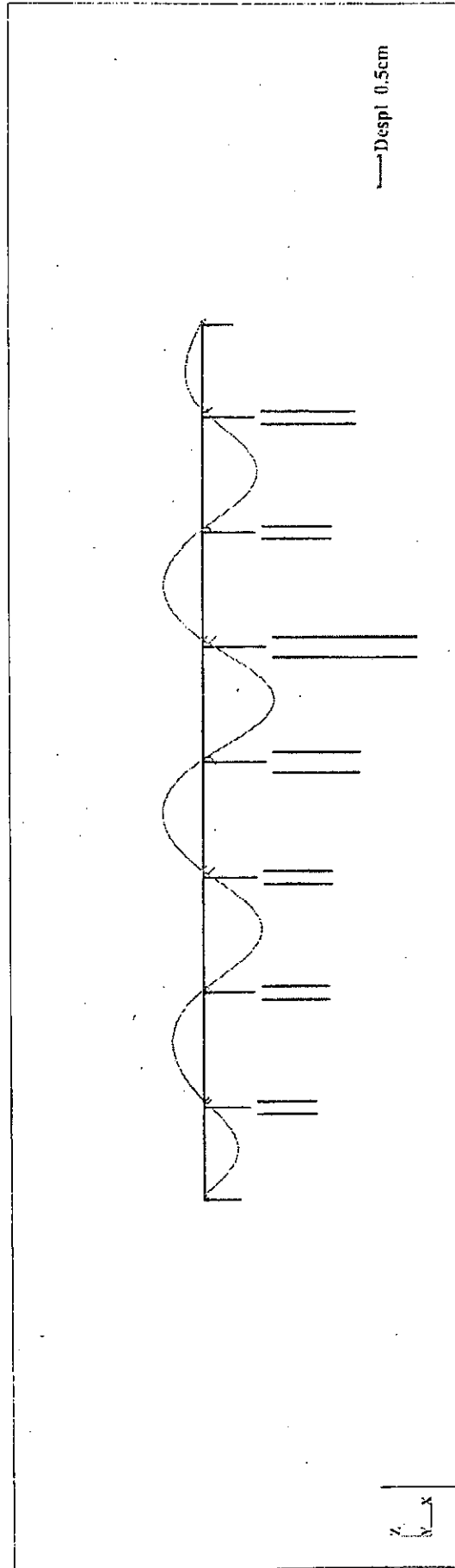


## 5.2. ESTADO LÍMITE DE DEFORMACIONES

En el presente apartado se calcula el valor de la flecha máxima, comprobándose que la relación flecha/luz se encuentra por debajo del valor  $1/2000$  para un tren tipo LM-71 definido en el EC-1.

En las hojas siguientes se muestra la deformada para la posición del tren LM-71 más desfavorable.

Diagramas - Deformación; Def. exacta; casos: 4 (LM 71 Impares)



|                       | Deformación (cm) | Def. exacta (cm) |
|-----------------------|------------------|------------------|
| Tipo (color) de línea | 1.0              | 1.0              |
| Escala : (cm) =       | 1.0              | 1.0              |
| MAX                   | 1.2460           | 1.2460           |
| Barra                 | 90               | 90               |
| Punto                 | x = 1.0000       | x = 1.0000       |
| Caso                  | 4                | 4                |
| MIN                   | 1.00             | 1.00             |
| Barra                 | 90               | 90               |
| Punto                 | x = 0.0000       | x = 0.0000       |
| Caso                  | 4                | 4                |

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Desplazamientos - Caso: 4 (LM 71 Impares)

Valores  
1

- Caso: 4 (LM 71 Impares)

| Filtrar          | Nudo               | Caso |
|------------------|--------------------|------|
| Lista completa   | 1A254 300A322      | 1A11 |
| Selección        | 80A101             | 4    |
| Número total     | 377                | 11   |
| Número seleccion | 22                 | 1    |
| Clave            | UZ                 |      |
| Dominio          | min: 0.000000 (c   |      |
| Filtro           | valor real - fuera |      |

- Caso: 4 (LM 71 Impares)

| Nudo/Caso | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)   | RZ (Rad)   |
|-----------|---------|---------|---------|-----------|------------|------------|
| 80/ 4     | 0.0729  | -0.5838 | 0.0815  | 0.0003852 | 0.0005414  | -0.0000088 |
| 81/ 4     | 0.0729  | -0.5856 | -0.0475 | 0.0003876 | 0.0005983  | -0.0000079 |
| 82/ 4     | 0.0728  | -0.5873 | -0.1882 | 0.0004125 | 0.0006407  | -0.0000070 |
| 83/ 4     | 0.0728  | -0.5888 | -0.3353 | 0.0004348 | 0.0006558  | -0.0000061 |
| 84/ 4     | 0.0728  | -0.5901 | -0.4829 | 0.0004575 | 0.0006442  | -0.0000052 |
| 85/ 4     | 0.0728  | -0.5911 | -0.6248 | 0.0004771 | 0.0006060  | -0.0000042 |
| 86/ 4     | 0.0728  | -0.5919 | -0.7555 | 0.0004938 | 0.0005446  | -0.0000032 |
| 87/ 4     | 0.0728  | -0.5925 | -0.8700 | 0.0005075 | 0.0004630  | -0.0000022 |
| 88/ 4     | 0.0728  | -0.5929 | -0.9642 | 0.0005184 | 0.0003644  | -0.0000012 |
| 89/ 4     | 0.0728  | -0.5931 | -1.0345 | 0.0005264 | 0.0002521  | -0.0000001 |
| 90/ 4     | 0.0728  | -0.5930 | -1.0783 | 0.0005326 | 0.0001290  | 0.0000010  |
| 91/ 4     | 0.0728  | -0.5926 | -1.0936 | 0.0005338 | -0.0000001 | 0.0000021  |
| 92/ 4     | 0.0728  | -0.5920 | -1.0797 | 0.0005300 | -0.0001292 | 0.0000032  |
| 93/ 4     | 0.0728  | -0.5912 | -1.0372 | 0.0005213 | -0.0002521 | 0.0000043  |
| 94/ 4     | 0.0728  | -0.5901 | -0.9682 | 0.0005109 | -0.0003644 | 0.0000054  |
| 95/ 4     | 0.0728  | -0.5888 | -0.8754 | 0.0004979 | -0.0004627 | 0.0000066  |
| 96/ 4     | 0.0728  | -0.5871 | -0.7622 | 0.0004821 | -0.0005441 | 0.0000078  |
| 97/ 4     | 0.0728  | -0.5852 | -0.6330 | 0.0004636 | -0.0006052 | 0.0000090  |
| 98/ 4     | 0.0729  | -0.5831 | -0.4925 | 0.0004424 | -0.0006430 | 0.0000102  |
| 99/ 4     | 0.0729  | -0.5806 | -0.3463 | 0.0004186 | -0.0006542 | 0.0000115  |
| 100/ 4    | 0.0729  | -0.5779 | -0.2007 | 0.0003955 | -0.0006388 | 0.0000127  |
| 101/ 4    | 0.0729  | -0.5749 | -0.0615 | 0.0003702 | -0.0005959 | 0.0000140  |

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### 5.3. ESTADO LÍMITE DE VIBRACIONES

En este apartado se comprueba que la primera frecuencia de vibración en el modo de flexión se encuentra dentro del rango de valores admitidos por el EC-1.

De acuerdo con el EC-1 (apartado 4.2.1.2, condiciones de comodidad para los usuarios), la aceleración vertical  $b_v$  se puede estimar como muy buena ( $b_v < 1 \text{ m/s}^2$ ).

Los valores límite de deformación para un nivel de comodidad muy bueno ( $b_v < 1 \text{ m/s}^2$ ) el tren LM-71 en el eje de vía se pueden obtener a partir del gráfico 4.3. En el caso de puentes continuos con 3 o más vanos, los valores  $L/\delta$  se pueden multiplicar por un coeficiente igual a 0,90. Se puede comprobar que el valor de la relación Luz/flecha límite para una velocidad de 350 km/h y una luz de 45 m es:

$$L/\delta = 2050$$

La flecha máxima obtenida para el tren LM-71 es inferior a  $\delta = 1.10 \text{ cm}$  y por tanto se comprueba que  $L/\delta = 4100$ .

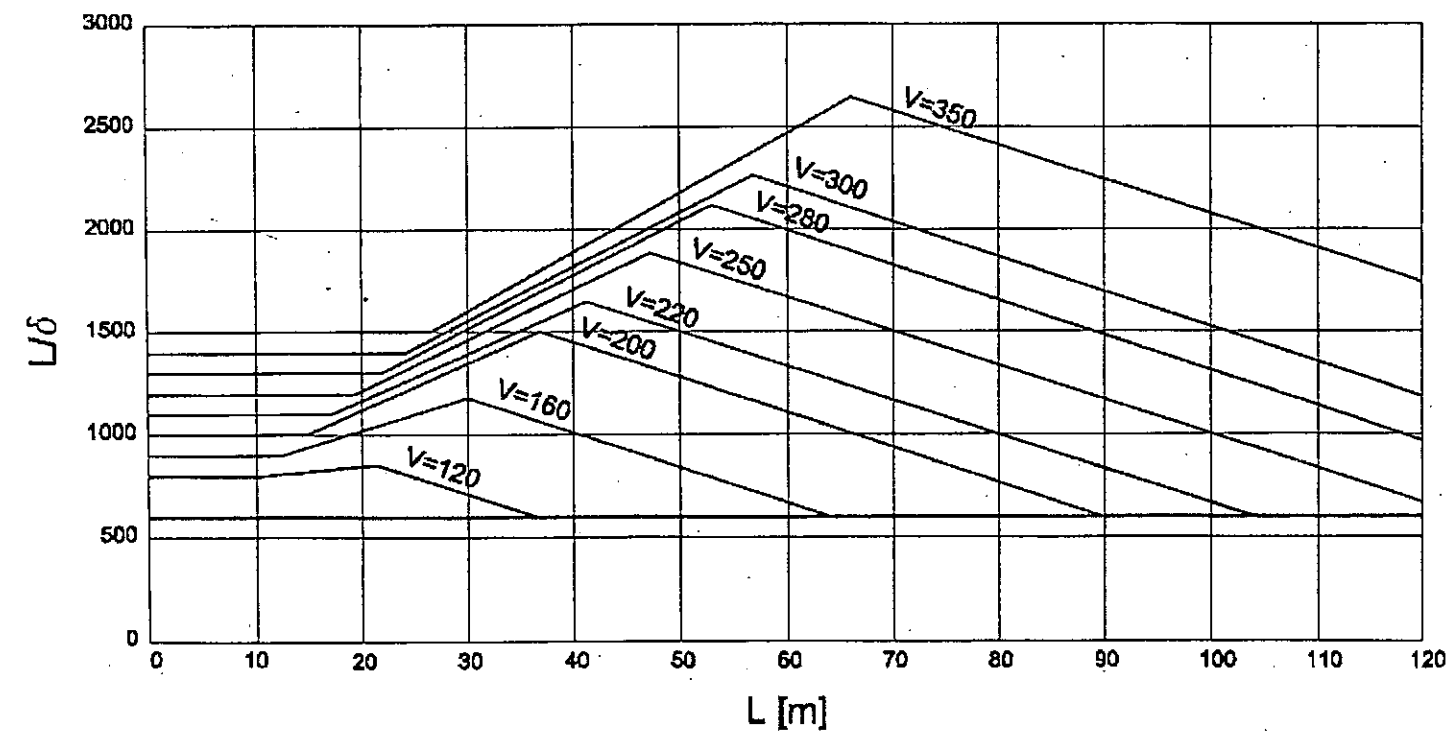


Figura 4.3: Valores límite para la deformación vertical máxima  $\delta$  por condiciones de comodidad de los viajeros, en función de la velocidad máxima de proyecto  $V$  y la luz del vano  $L$ . Estructura de  $n$  tramos sucesivos, simplemente apoyados, con  $n \geq 3$ ;  $b_v = 1,0 \text{ m/s}^2$ .

## 6 VERIFICACIÓN DEL E.L.U DE ROTURA POR TENSIONES NORMALES

### 6.1 FLEXIÓN LONGITUDINAL

En este apartado se comprueba el Estado Límite Último de rotura por flexión longitudinal de acuerdo con los criterios de la Normativa española vigente (EHE)

Los cálculos realizados han sido los siguientes:

1. Cálculo de la envolvente de esfuerzos flectores longitudinales para las distintas acciones consideradas en el proyecto del tablero. Los esfuerzos de cálculo se han combinado de acuerdo con los criterios del apartado 2 de este Anejo.

La envolvente de esfuerzos flectores positivos se muestra en las tablas y gráficos adjuntos con la notación  $M_{d,pos}$ . La envolvente de flectores negativos se denota como  $M_{d,neg}$ .

2. Cálculo del momento último respuesta para cada una de las secciones (nudos de las barras) en las que se ha discretizado el tablero. El momento último respuesta se ha calculado considerando las distintas capas de armado y la posible tensión previa de las mismas. El cálculo se realiza con un programa de cálculo automático que permite obtener el momento último respuesta y los diagramas momento curvatura considerando las curvas tensión-deformación no lineales de los materiales (acero y hormigón).

Los momentos últimos de respuesta de cada sección se han calculado para un momento positivo ( $M_{u,pos}$ ) y para un momento negativo ( $M_{u,neg}$ ). De un modo análogo se calculan los momentos de descompresión y de fisuración de la sección (momentos totales sobre la sección).

Las unidades de trabajo para los momentos son (mT).



## COMBINACION 4 G1 + PRETI

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 1     | -174.131  | -1159.460 | -178.331  | -1152.705 |
| 2     | -178.269  | -1152.631 | -179.973  | -1149.891 |
| 3     | -180.580  | -1150.500 | -182.880  | -1146.801 |
| 4     | -183.517  | -1147.447 | -186.359  | -1142.877 |
| 5     | -187.105  | -1143.647 | -190.388  | -1138.367 |
| 6     | -191.331  | -1139.301 | -194.975  | -1133.440 |
| 7     | -196.150  | -1134.628 | -200.134  | -1128.221 |
| 8     | -201.608  | -1129.684 | -205.937  | -1122.720 |
| 9     | -207.724  | -1124.518 | -212.443  | -1116.929 |
| 10    | -214.576  | -1119.075 | -223.988  | -1103.936 |
| 11    | -228.395  | -1108.355 | -252.299  | -1069.907 |
| 12    | -257.663  | -1075.276 | -297.060  | -1011.905 |
| 13    | -303.233  | -1018.070 | -359.386  | -927.748  |
| 14    | -366.138  | -934.540  | -440.349  | -815.170  |
| 15    | -447.441  | -822.236  | -540.945  | -671.834  |
| 16    | -547.942  | -678.831  | -661.809  | -495.675  |
| 17    | -668.228  | -502.105  | -802.655  | -285.878  |
| 18    | -808.555  | -291.773  | -1061.059 | 114.381   |
| 19    | -972.918  | 8.195     | -1058.760 | 118.070   |
| 20    | -1068.549 | 108.280   | -1043.197 | 75.830    |
| 21    | -1054.607 | 64.422    | -1108.251 | 133.085   |
| 22    | -1100.208 | 141.129   | -901.518  | -113.189  |
| 23    | -981.655  | -37.180   | -848.029  | -252.118  |
| 24    | -842.945  | -247.032  | -729.490  | -429.525  |
| 25    | -722.342  | -422.375  | -626.474  | -576.579  |
| 26    | -620.439  | -591.067  | -532.232  | -732.949  |
| 27    | -532.866  | -733.579  | -462.337  | -847.026  |
| 28    | -463.140  | -847.816  | -409.587  | -933.956  |
| 29    | -411.116  | -935.461  | -373.986  | -995.184  |
| 30    | -376.587  | -997.768  | -355.639  | -1031.464 |
| 31    | -359.615  | -1035.425 | -355.197  | -1042.531 |
| 32    | -360.636  | -1047.978 | -373.773  | -1026.847 |
| 33    | -380.623  | -1033.712 | -412.842  | -981.888  |
| 34    | -420.927  | -989.976  | -474.315  | -904.101  |
| 35    | -483.229  | -913.018  | -559.973  | -789.575  |
| 36    | -569.217  | -798.831  | -671.300  | -634.630  |
| 37    | -680.121  | -643.449  | -808.583  | -436.817  |
| 38    | -816.894  | -445.129  | -1082.500 | -17.900   |
| 39    | -988.533  | -99.939   | -1109.323 | 54.668    |
| 40    | -1119.129 | 44.863    | -1086.765 | 3.438     |
| 41    | -1100.844 | -10.727   | -1140.975 | 40.640    |
| 42    | -1132.118 | 49.499    | -906.478  | -239.314  |
| 43    | -991.144  | -191.835  | -838.198  | -437.851  |
| 44    | -832.585  | -432.234  | -703.707  | -639.536  |
| 45    | -695.569  | -631.398  | -588.255  | -804.013  |
| 46    | -567.119  | -676.833  | -484.029  | -810.483  |
| 47    | -484.673  | -811.099  | -419.243  | -916.342  |
| 48    | -420.036  | -917.149  | -371.607  | -995.048  |
| 49    | -373.122  | -996.573  | -341.115  | -1048.057 |
| 50    | -343.715  | -1050.642 | -327.905  | -1076.074 |
| 51    | -331.867  | -1080.058 | -332.578  | -1078.914 |
| 52    | -338.023  | -1084.351 | -356.294  | -1054.963 |
| 53    | -363.139  | -1061.834 | -400.507  | -1001.728 |
| 54    | -408.601  | -1009.803 | -467.146  | -915.632  |

## COMBINACION 4 G1 + PRETI

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 55    | -476.072  | -924.531  | -557.959  | -792.815  |
| 56    | -567.211  | -802.057  | -674.456  | -629.553  |
| 57    | -683.276  | -638.375  | -816.927  | -423.395  |
| 58    | -825.239  | -431.707  | -1096.002 | 3.817     |
| 59    | -1001.426 | -83.437   | -1127.136 | 77.468    |
| 60    | -1136.940 | 67.661    | -1109.509 | 32.550    |
| 61    | -1123.625 | 18.432    | -1162.208 | 67.817    |
| 62    | -1153.352 | 76.677    | -926.167  | -214.113  |
| 63    | -1011.762 | -158.671  | -857.197  | -407.290  |
| 64    | -851.583  | -401.675  | -721.087  | -611.580  |
| 65    | -712.949  | -603.441  | -604.023  | -778.650  |
| 66    | -582.889  | -651.467  | -498.170  | -787.737  |
| 67    | -498.802  | -788.371  | -431.767  | -896.198  |
| 68    | -432.568  | -896.991  | -382.517  | -977.499  |
| 69    | -384.029  | -979.031  | -350.431  | -1033.073 |
| 70    | -353.021  | -1035.675 | -335.591  | -1063.710 |
| 71    | -339.558  | -1067.686 | -338.650  | -1069.147 |
| 72    | -344.095  | -1074.585 | -360.729  | -1047.828 |
| 73    | -367.580  | -1054.691 | -403.328  | -997.191  |
| 74    | -411.416  | -1005.275 | -468.344  | -913.706  |
| 75    | -477.256  | -922.626  | -557.475  | -793.593  |
| 76    | -566.731  | -802.830  | -672.383  | -632.887  |
| 77    | -681.212  | -641.694  | -813.139  | -429.489  |
| 78    | -821.452  | -437.798  | -1090.647 | -4.796    |
| 79    | -996.317  | -89.976   | -1120.456 | 68.919    |
| 80    | -1130.261 | 59.112    | -1101.266 | 21.999    |
| 81    | -1115.385 | 7.884     | -1154.846 | 58.394    |
| 82    | -1145.989 | 67.253    | -919.615  | -222.499  |
| 83    | -1004.902 | -169.706  | -851.299  | -416.776  |
| 84    | -845.689  | -411.157  | -716.112  | -619.582  |
| 85    | -707.972  | -611.447  | -599.923  | -785.246  |
| 86    | -578.779  | -658.078  | -495.010  | -792.821  |
| 87    | -495.641  | -793.457  | -429.500  | -899.844  |
| 88    | -430.301  | -900.637  | -381.142  | -979.709  |
| 89    | -382.660  | -981.232  | -349.970  | -1033.814 |
| 90    | -352.560  | -1036.416 | -336.044  | -1062.982 |
| 91    | -340.020  | -1066.943 | -340.024  | -1066.937 |
| 92    | -345.466  | -1072.380 | -363.027  | -1044.133 |
| 93    | -369.874  | -1051.001 | -406.510  | -992.072  |
| 94    | -414.594  | -1000.163 | -472.409  | -907.167  |
| 95    | -481.315  | -916.097  | -562.502  | -785.508  |
| 96    | -571.745  | -794.764  | -678.242  | -623.463  |
| 97    | -687.060  | -632.287  | -819.927  | -418.569  |
| 98    | -828.243  | -426.874  | -1098.412 | 7.694     |
| 99    | -1003.729 | -80.489   | -1130.172 | 81.354    |
| 100   | -1139.977 | 71.548    | -1116.291 | 41.230    |
| 101   | -1130.408 | 27.114    | -1163.610 | 69.612    |
| 102   | -1154.752 | 78.469    | -925.150  | -215.414  |
| 103   | -1010.698 | -160.382  | -855.204  | -410.496  |
| 104   | -849.593  | -404.877  | -718.074  | -616.427  |
| 105   | -709.939  | -608.283  | -599.992  | -785.133  |
| 106   | -578.853  | -657.959  | -493.137  | -795.833  |
| 107   | -493.777  | -796.454  | -425.754  | -905.870  |
| 108   | -426.558  | -906.657  | -375.518  | -988.756  |
| 109   | -377.035  | -990.280  | -342.457  | -1045.899 |

## COMBINACION 4 G1 + PRETI

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 110   | -345.045  | -1048.504 | -326.597  | -1078.177 |
| 111   | -330.578  | -1082.131 | -328.672  | -1085.196 |
| 112   | -334.118  | -1090.633 | -349.759  | -1065.474 |
| 113   | -356.629  | -1072.307 | -391.384  | -1016.403 |
| 114   | -399.465  | -1024.497 | -455.416  | -934.501  |
| 115   | -464.328  | -943.420  | -543.653  | -815.827  |
| 116   | -552.897  | -825.082  | -657.540  | -656.763  |
| 117   | -666.354  | -665.593  | -797.329  | -454.919  |
| 118   | -805.637  | -463.236  | -1073.877 | -31.771   |
| 119   | -980.300  | -110.477  | -1103.520 | 47.241    |
| 120   | -1113.327 | 37.436    | -1083.405 | -0.862    |
| 121   | -1097.529 | -14.970   | -1141.358 | 41.130    |
| 122   | -1132.500 | 49.987    | -910.546  | -234.106  |
| 123   | -995.406  | -184.980  | -846.373  | -424.700  |
| 124   | -840.760  | -419.083  | -715.744  | -620.172  |
| 125   | -707.608  | -612.033  | -604.114  | -778.504  |
| 126   | -583.105  | -652.624  | -503.726  | -780.305  |
| 127   | -504.359  | -780.937  | -442.719  | -880.087  |
| 128   | -443.516  | -880.888  | -398.855  | -952.725  |
| 129   | -400.376  | -954.248  | -372.183  | -999.597  |
| 130   | -374.779  | -1002.195 | -362.781  | -1021.493 |
| 131   | -366.766  | -1025.449 | -371.348  | -1018.077 |
| 132   | -376.783  | -1023.545 | -398.939  | -987.908  |
| 133   | -405.784  | -994.796  | -447.066  | -928.394  |
| 134   | -455.157  | -936.493  | -517.662  | -835.954  |
| 135   | -526.588  | -844.876  | -612.465  | -706.744  |
| 136   | -621.713  | -716.011  | -732.969  | -537.055  |
| 137   | -741.793  | -545.894  | -879.422  | -324.517  |
| 138   | -887.742  | -332.834  | -1162.795 | 109.590   |
| 139   | -1065.168 | -3.140    | -1194.749 | 162.719   |
| 140   | -1204.586 | 152.883   | -1196.164 | 142.103   |
| 141   | -1203.964 | 134.320   | -1217.513 | 151.661   |
| 142   | -1203.984 | 165.192   | -1004.392 | -90.280   |
| 143   | -1092.123 | 3.036     | -925.689  | -264.675  |
| 144   | -919.123  | -258.107  | -770.700  | -496.846  |
| 145   | -764.196  | -490.334  | -635.196  | -697.831  |
| 146   | -722.463  | -382.988  | -556.641  | -649.715  |
| 147   | -597.161  | -690.227  | -470.596  | -893.807  |
| 148   | -472.524  | -895.770  | -370.514  | -1059.855 |
| 149   | -372.496  | -1061.875 | -294.589  | -1187.190 |
| 150   | -297.143  | -1189.827 | -242.556  | -1277.630 |
| 151   | -246.453  | -1281.523 | -222.885  | -1319.432 |
| 152   | -222.547  | -1319.081 | -215.156  | -1330.969 |
| 153   | -212.677  | -1328.491 | -206.874  | -1337.824 |
| 154   | -204.778  | -1335.710 | -200.541  | -1342.524 |
| 155   | -198.790  | -1340.748 | -196.156  | -1344.985 |
| 156   | -194.695  | -1343.523 | -193.671  | -1345.170 |
| 157   | -192.456  | -1343.946 | -193.040  | -1343.005 |
| 158   | -192.067  | -1342.052 | -194.446  | -1338.227 |
| 159   | -193.526  | -1337.303 | -197.683  | -1330.616 |
| 160   | -196.811  | -1329.758 | -199.223  | -1325.878 |



## COMBINACION 5 G1 + PRETI + 0.4 TEMP

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 1     | -174.131  | -1159.460 | -179.964  | -1150.078 |
| 2     | -179.903  | -1150.003 | -183.241  | -1144.635 |
| 3     | -183.847  | -1145.244 | -187.782  | -1138.916 |
| 4     | -188.419  | -1139.562 | -192.895  | -1132.363 |
| 5     | -193.641  | -1133.133 | -198.557  | -1125.226 |
| 6     | -199.501  | -1126.160 | -204.779  | -1117.670 |
| 7     | -205.954  | -1118.858 | -211.572  | -1109.822 |
| 8     | -213.046  | -1111.286 | -219.010  | -1101.692 |
| 9     | -220.797  | -1103.490 | -227.151  | -1093.270 |
| 10    | -229.285  | -1095.417 | -240.334  | -1077.643 |
| 11    | -244.741  | -1082.064 | -270.279  | -1040.984 |
| 12    | -275.643  | -1046.354 | -316.677  | -980.351  |
| 13    | -322.849  | -986.517  | -380.638  | -893.563  |
| 14    | -387.390  | -900.356  | -463.239  | -778.353  |
| 15    | -470.330  | -785.419  | -565.470  | -632.385  |
| 16    | -572.467  | -639.382  | -687.971  | -453.594  |
| 17    | -694.390  | -460.023  | -830.453  | -241.166  |
| 18    | -836.353  | -247.061  | -1090.493 | 161.726   |
| 19    | -1001.026 | 44.172    | -1088.430 | 156.047   |
| 20    | -1098.219 | 146.257   | -1074.429 | 115.806   |
| 21    | -1085.839 | 104.399   | -1139.084 | 172.550   |
| 22    | -1131.041 | 180.594   | -931.951  | -74.235   |
| 23    | -1013.524 | 14.081    | -879.480  | -201.529  |
| 24    | -874.396  | -196.443  | -760.522  | -379.610  |
| 25    | -753.374  | -372.459  | -657.088  | -527.337  |
| 26    | -651.052  | -541.826  | -562.427  | -684.380  |
| 27    | -563.061  | -685.010  | -492.113  | -799.130  |
| 28    | -492.916  | -799.920  | -438.945  | -886.733  |
| 29    | -440.474  | -888.238  | -402.925  | -948.635  |
| 30    | -405.526  | -951.219  | -384.159  | -985.588  |
| 31    | -388.136  | -989.549  | -383.299  | -997.329  |
| 32    | -388.739  | -1002.775 | -401.457  | -982.317  |
| 33    | -408.306  | -989.183  | -440.107  | -938.031  |
| 34    | -448.192  | -946.119  | -501.162  | -860.917  |
| 35    | -510.077  | -869.834  | -586.402  | -747.064  |
| 36    | -595.646  | -756.319  | -697.311  | -592.790  |
| 37    | -706.132  | -601.610  | -834.176  | -395.651  |
| 38    | -842.488  | -403.962  | -1107.675 | 22.594    |
| 39    | -1012.574 | -69.168   | -1132.964 | 84.929    |
| 40    | -1142.770 | 75.123    | -1110.007 | 33.187    |
| 41    | -1124.086 | 19.022    | -1164.331 | 70.534    |
| 42    | -1155.474 | 79.393    | -929.946  | -209.275  |
| 43    | -1015.720 | -152.305  | -862.892  | -398.129  |
| 44    | -857.280  | -392.513  | -728.520  | -599.623  |
| 45    | -720.382  | -591.486  | -613.187  | -763.909  |
| 46    | -592.051  | -636.730  | -509.080  | -770.189  |
| 47    | -509.723  | -770.805  | -444.413  | -875.857  |
| 48    | -445.205  | -876.664  | -396.895  | -954.372  |
| 49    | -398.410  | -955.897  | -366.522  | -1007.190 |
| 50    | -369.122  | -1009.776 | -353.430  | -1035.016 |
| 51    | -357.392  | -1039.001 | -358.222  | -1037.665 |
| 52    | -363.667  | -1043.103 | -382.056  | -1013.524 |
| 53    | -388.902  | -1020.395 | -426.388  | -960.098  |
| 54    | -434.482  | -968.173  | -493.146  | -873.811  |

## COMBINACION 5 G1 + PRETI + 0.4 TEMP

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 55    | -502.072  | -882.710  | -584.078  | -750.803  |
| 56    | -593.330  | -760.045  | -700.693  | -587.350  |
| 57    | -709.513  | -596.172  | -843.283  | -381.001  |
| 58    | -851.595  | -389.314  | -1122.477 | 46.402    |
| 59    | -1026.707 | -51.077   | -1152.531 | 109.973   |
| 60    | -1162.336 | 100.166   | -1135.017 | 65.200    |
| 61    | -1149.134 | 51.082    | -1187.677 | 100.417   |
| 62    | -1178.821 | 109.277   | -951.597  | -181.563  |
| 63    | -1038.391 | -115.837  | -883.785  | -364.523  |
| 64    | -878.172  | -358.908  | -747.634  | -568.879  |
| 65    | -739.496  | -560.740  | -630.528  | -736.016  |
| 66    | -609.394  | -608.833  | -524.634  | -745.170  |
| 67    | -525.267  | -745.803  | -458.190  | -853.696  |
| 68    | -458.991  | -854.490  | -408.898  | -935.064  |
| 69    | -410.410  | -936.596  | -376.771  | -990.705  |
| 70    | -379.361  | -993.306  | -361.890  | -1021.409 |
| 71    | -365.857  | -1025.384 | -364.907  | -1026.912 |
| 72    | -370.353  | -1032.349 | -386.946  | -1005.659 |
| 73    | -393.797  | -1012.522 | -429.502  | -955.089  |
| 74    | -437.590  | -963.173  | -494.477  | -871.670  |
| 75    | -503.390  | -880.590  | -583.567  | -751.624  |
| 76    | -592.822  | -760.861  | -698.434  | -590.985  |
| 77    | -707.263  | -599.791  | -839.148  | -387.653  |
| 78    | -847.461  | -395.962  | -1116.615 | 36.974    |
| 79    | -1021.115 | -58.236   | -1145.215 | 100.609   |
| 80    | -1155.019 | 90.802    | -1125.985 | 53.639    |
| 81    | -1140.103 | 39.524    | -1179.605 | 90.084    |
| 82    | -1170.747 | 98.943    | -944.413  | -190.758  |
| 83    | -1030.870 | -127.936  | -877.309  | -374.940  |
| 84    | -871.698  | -369.321  | -742.163  | -577.679  |
| 85    | -734.023  | -569.544  | -626.014  | -743.276  |
| 86    | -604.871  | -616.108  | -521.143  | -750.785  |
| 87    | -521.774  | -751.421  | -455.675  | -857.742  |
| 88    | -456.476  | -858.535  | -407.358  | -937.541  |
| 89    | -408.876  | -939.063  | -376.227  | -991.579  |
| 90    | -378.817  | -994.181  | -362.343  | -1020.680 |
| 91    | -366.319  | -1024.641 | -366.364  | -1024.569 |
| 92    | -371.806  | -1030.012 | -389.408  | -1001.698 |
| 93    | -396.256  | -1008.566 | -432.933  | -949.571  |
| 94    | -441.016  | -957.662  | -498.873  | -864.599  |
| 95    | -507.779  | -873.530  | -589.007  | -742.874  |
| 96    | -598.251  | -752.130  | -704.789  | -580.763  |
| 97    | -713.607  | -589.587  | -846.515  | -375.802  |
| 98    | -854.831  | -384.108  | -1125.042 | 50.528    |
| 99    | -1029.158 | -47.940   | -1155.641 | 113.954   |
| 100   | -1165.446 | 104.148   | -1141.799 | 73.881    |
| 101   | -1155.917 | 59.765    | -1189.006 | 102.117   |
| 102   | -1180.148 | 110.975   | -950.432  | -183.054  |
| 103   | -1037.173 | -117.797  | -881.560  | -368.102  |
| 104   | -875.950  | -362.483  | -744.311  | -574.224  |
| 105   | -736.176  | -566.080  | -626.111  | -743.121  |
| 106   | -604.972  | -615.947  | -519.137  | -754.012  |
| 107   | -519.777  | -754.633  | -451.635  | -864.240  |
| 108   | -452.440  | -865.027  | -401.280  | -947.317  |
| 109   | -402.798  | -948.840  | -368.101  | -1004.651 |

## COMBINACION 5 G1 + PRETI + 0.4 TEMP

## TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 110   | -370.688  | -1007.256 | -352.122  | -1037.120 |
| 111   | -356.103  | -1041.074 | -354.078  | -1044.330 |
| 112   | -359.524  | -1049.767 | -375.047  | -1024.798 |
| 113   | -381.916  | -1031.631 | -416.553  | -975.918  |
| 114   | -424.634  | -984.013  | -480.466  | -894.207  |
| 115   | -489.379  | -903.127  | -568.584  | -775.724  |
| 116   | -577.828  | -784.979  | -682.353  | -616.851  |
| 117   | -691.167  | -625.681  | -822.023  | -415.198  |
| 118   | -830.332  | -423.515  | -1098.453 | 7.759     |
| 119   | -1003.768 | -80.439   | -1126.875 | 77.135    |
| 120   | -1136.682 | 67.330    | -1106.647 | 28.887    |
| 121   | -1120.771 | 14.778    | -1164.999 | 71.389    |
| 122   | -1156.141 | 80.247    | -934.587  | -203.335  |
| 123   | -1020.581 | -144.486  | -871.966  | -383.534  |
| 124   | -866.353  | -377.916  | -741.755  | -578.332  |
| 125   | -733.619  | -570.193  | -630.543  | -735.992  |
| 126   | -609.535  | -610.112  | -530.574  | -737.120  |
| 127   | -531.208  | -737.751  | -469.985  | -836.228  |
| 128   | -470.783  | -837.029  | -426.540  | -908.194  |
| 129   | -428.062  | -909.716  | -400.287  | -954.392  |
| 130   | -402.882  | -956.990  | -391.303  | -975.615  |
| 131   | -395.288  | -979.571  | -400.289  | -971.526  |
| 132   | -405.724  | -976.994  | -428.297  | -940.685  |
| 133   | -435.142  | -947.573  | -476.842  | -880.498  |
| 134   | -484.934  | -888.598  | -547.857  | -787.385  |
| 135   | -556.783  | -796.308  | -643.078  | -657.503  |
| 136   | -652.326  | -666.770  | -764.000  | -487.142  |
| 137   | -772.824  | -495.980  | -910.870  | -273.932  |
| 138   | -919.191  | -282.248  | -1194.662 | 160.848   |
| 139   | -1095.600 | 35.811    | -1225.580 | 202.182   |
| 140   | -1235.417 | 192.345   | -1227.394 | 182.076   |
| 141   | -1235.194 | 174.293   | -1247.181 | 189.636   |
| 142   | -1233.653 | 203.166   | -1032.498 | -54.305   |
| 143   | -1121.556 | 50.378    | -953.486  | -219.963  |
| 144   | -946.920  | -213.395  | -796.861  | -454.766  |
| 145   | -790.357  | -448.254  | -659.723  | -658.380  |
| 146   | -746.990  | -343.537  | -579.532  | -612.894  |
| 147   | -620.052  | -653.407  | -491.851  | -859.619  |
| 148   | -493.779  | -861.582  | -390.133  | -1028.297 |
| 149   | -392.115  | -1030.318 | -312.573  | -1158.263 |
| 150   | -315.127  | -1160.900 | -258.904  | -1251.335 |
| 151   | -262.800  | -1255.228 | -237.596  | -1295.769 |
| 152   | -237.258  | -1295.418 | -228.231  | -1309.937 |
| 153   | -225.752  | -1307.458 | -218.315  | -1319.422 |
| 154   | -216.217  | -1317.308 | -210.347  | -1326.751 |
| 155   | -208.596  | -1324.976 | -204.328  | -1331.841 |
| 156   | -202.866  | -1330.379 | -200.209  | -1334.654 |
| 157   | -198.993  | -1333.431 | -197.944  | -1335.118 |
| 158   | -196.971  | -1334.165 | -197.714  | -1332.969 |
| 159   | -196.795  | -1332.045 | -199.318  | -1327.987 |
| 160   | -198.446  | -1327.128 | -199.223  | -1325.878 |

COMBINACION 6 G1 + G2 + PRETI + 0.6 TEMP

TENSIONES CON AXIL INICIAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== | =====    | =====     | =====    | =====     |
| 1     | -174.132 | -1159.459 | -218.630 | -1087.883 |
| 2     | -218.568 | -1087.810 | -255.063 | -1029.107 |
| 3     | -255.674 | -1029.710 | -287.270 | -978.888  |
| 4     | -287.910 | -979.530  | -314.523 | -936.723  |
| 5     | -315.271 | -937.490  | -336.819 | -902.831  |
| 6     | -337.766 | -903.759  | -354.180 | -877.357  |
| 7     | -355.353 | -878.549  | -366.600 | -860.458  |
| 8     | -368.076 | -861.918  | -374.146 | -852.155  |
| 9     | -375.929 | -853.960  | -376.883 | -852.425  |
| 10    | -379.018 | -854.569  | -379.140 | -854.373  |
| 11    | -383.551 | -858.787  | -392.671 | -844.117  |
| 12    | -398.034 | -849.487  | -417.141 | -818.753  |
| 13    | -423.313 | -824.921  | -453.668 | -776.094  |
| 14    | -460.419 | -782.888  | -503.308 | -713.901  |
| 15    | -510.398 | -720.969  | -567.089 | -629.781  |
| 16    | -574.089 | -636.774  | -645.616 | -521.722  |
| 17    | -652.027 | -528.164  | -738.632 | -388.861  |
| 18    | -744.534 | -394.753  | -943.685 | -74.415   |
| 19    | -860.829 | -135.276  | -890.488 | -97.314   |
| 20    | -900.272 | -107.109  | -813.457 | -218.230  |
| 21    | -824.877 | -229.626  | -955.713 | -62.159   |
| 22    | -947.675 | -54.108   | -817.980 | -220.114  |
| 23    | -894.184 | -177.877  | -824.197 | -290.452  |
| 24    | -819.113 | -285.366  | -760.687 | -379.344  |
| 25    | -753.540 | -372.192  | -704.095 | -451.725  |
| 26    | -698.066 | -466.203  | -647.672 | -547.263  |
| 27    | -648.312 | -547.884  | -606.991 | -614.349  |
| 28    | -607.792 | -615.143  | -574.845 | -668.137  |
| 29    | -576.374 | -669.642  | -551.249 | -710.055  |
| 30    | -553.851 | -712.638  | -536.298 | -740.873  |
| 31    | -540.273 | -744.834  | -530.646 | -760.319  |
| 32    | -536.086 | -765.765  | -535.404 | -766.863  |
| 33    | -542.254 | -773.727  | -552.056 | -757.961  |
| 34    | -560.139 | -766.052  | -582.513 | -730.063  |
| 35    | -591.422 | -738.990  | -628.547 | -679.274  |
| 36    | -637.788 | -688.533  | -691.651 | -601.894  |
| 37    | -700.476 | -610.708  | -772.094 | -495.510  |
| 38    | -780.395 | -503.838  | -980.576 | -181.846  |
| 39    | -891.203 | -224.518  | -941.275 | -160.428  |
| 40    | -951.072 | -170.244  | -839.775 | -312.702  |
| 41    | -853.831 | -326.897  | -972.260 | -175.310  |
| 42    | -963.408 | -166.445  | -807.871 | -365.528  |
| 43    | -887.890 | -357.920  | -799.765 | -499.669  |
| 44    | -794.155 | -494.049  | -721.471 | -610.962  |
| 45    | -713.332 | -602.826  | -653.606 | -698.895  |
| 46    | -632.474 | -571.708  | -588.370 | -642.650  |
| 47    | -589.015 | -643.263  | -553.974 | -699.626  |
| 48    | -554.766 | -700.434  | -528.118 | -743.298  |
| 49    | -529.634 | -744.823  | -510.800 | -775.118  |
| 50    | -513.399 | -777.705  | -502.156 | -795.789  |
| 51    | -506.115 | -799.778  | -502.783 | -805.138  |
| 52    | -508.227 | -810.577  | -513.843 | -801.543  |
| 53    | -520.684 | -808.422  | -536.790 | -782.516  |
| 54    | -544.882 | -790.593  | -573.551 | -744.480  |

COMBINACION 6 G1 + G2 + PRETI + 0.6 TEMP

TENSIONES CON AXIL INICIAL

=====

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -582.478 | -753.376 | -625.892 | -683.545 |
| 56    | -635.145 | -692.784 | -695.315 | -596.001 |
| 57    | -704.127 | -604.835 | -782.070 | -479.463 |
| 58    | -790.381 | -487.776 | -996.865 | -155.646 |
| 59    | -906.750 | -204.620 | -962.839 | -132.826 |
| 60    | -972.635 | -142.644 | -867.370 | -277.381 |
| 61    | -881.486 | -291.498 | -998.062 | -142.285 |
| 62    | -989.214 | -133.414 | -831.800 | -334.900 |
| 63    | -912.948 | -317.615 | -822.858 | -462.525 |
| 64    | -817.247 | -456.906 | -742.596 | -576.982 |
| 65    | -734.458 | -568.845 | -672.771 | -668.069 |
| 66    | -651.639 | -540.882 | -605.563 | -614.996 |
| 67    | -606.200 | -615.622 | -569.197 | -675.141 |
| 68    | -569.995 | -675.939 | -541.371 | -721.981 |
| 69    | -542.881 | -723.516 | -522.102 | -756.938 |
| 70    | -524.690 | -759.544 | -511.476 | -780.798 |
| 71    | -515.441 | -784.778 | -510.149 | -793.290 |
| 72    | -515.591 | -798.732 | -519.225 | -792.888 |
| 73    | -526.075 | -799.752 | -540.213 | -777.010 |
| 74    | -548.294 | -785.106 | -575.011 | -742.130 |
| 75    | -583.921 | -751.055 | -625.347 | -684.421 |
| 76    | -634.598 | -693.665 | -692.812 | -600.027 |
| 77    | -701.636 | -608.842 | -777.550 | -486.734 |
| 78    | -785.866 | -495.038 | -990.425 | -166.003 |
| 79    | -900.602 | -212.488 | -954.803 | -143.112 |
| 80    | -964.599 | -152.931 | -857.452 | -290.075 |
| 81    | -871.580 | -304.178 | -989.195 | -153.635 |
| 82    | -980.342 | -144.770 | -823.923 | -344.982 |
| 83    | -904.699 | -330.883 | -815.722 | -474.003 |
| 84    | -810.118 | -468.372 | -736.559 | -586.693 |
| 85    | -728.417 | -578.561 | -667.797 | -676.070 |
| 86    | -646.660 | -548.891 | -601.695 | -621.217 |
| 87    | -602.324 | -621.856 | -566.398 | -679.643 |
| 88    | -567.206 | -680.425 | -539.649 | -724.750 |
| 89    | -541.169 | -726.268 | -521.477 | -757.944 |
| 90    | -524.065 | -760.549 | -511.930 | -780.069 |
| 91    | -515.909 | -784.024 | -511.680 | -790.826 |
| 92    | -517.123 | -796.268 | -521.853 | -788.660 |
| 93    | -528.702 | -795.526 | -543.915 | -771.056 |
| 94    | -551.992 | -779.158 | -579.778 | -734.462 |
| 95    | -588.682 | -743.396 | -631.228 | -674.962 |
| 96    | -640.469 | -684.222 | -699.737 | -588.888 |
| 97    | -708.551 | -597.719 | -785.570 | -473.833 |
| 98    | -793.881 | -482.147 | -999.576 | -151.285 |
| 99    | -909.345 | -201.297 | -966.038 | -128.732 |
| 100   | -975.830 | -138.555 | -874.163 | -268.686 |
| 101   | -888.289 | -282.791 | -999.319 | -140.676 |
| 102   | -990.461 | -131.818 | -830.471 | -336.601 |
| 103   | -911.561 | -319.846 | -820.355 | -466.551 |
| 104   | -814.747 | -460.927 | -738.926 | -582.886 |
| 105   | -730.791 | -574.743 | -667.932 | -675.852 |
| 106   | -646.797 | -548.670 | -599.562 | -624.647 |
| 107   | -600.202 | -625.269 | -562.042 | -686.649 |
| 108   | -562.845 | -687.439 | -533.067 | -735.338 |
| 109   | -534.583 | -736.863 | -512.654 | -772.135 |

COMBINACION 6 G1 + G2 + PRETI + 0.6 TEMP

TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 110   | -515.245  | -774.735  | -500.847  | -797.895  |
| 111   | -504.830  | -801.846  | -498.360  | -812.252  |
| 112   | -503.809  | -817.684  | -506.275  | -813.717  |
| 113   | -513.145  | -820.549  | -526.124  | -799.672  |
| 114   | -534.203  | -807.770  | -559.768  | -766.650  |
| 115   | -568.679  | -775.572  | -609.004  | -710.708  |
| 116   | -618.246  | -719.968  | -675.298  | -628.198  |
| 117   | -684.113  | -637.028  | -758.898  | -516.735  |
| 118   | -767.203  | -525.058  | -970.631  | -197.842  |
| 119   | -881.697  | -236.685  | -934.810  | -168.702  |
| 120   | -944.616  | -178.508  | -836.369  | -317.061  |
| 121   | -850.495  | -331.167  | -973.260  | -174.031  |
| 122   | -964.402  | -165.173  | -813.166  | -358.751  |
| 123   | -893.439  | -348.995  | -809.852  | -483.446  |
| 124   | -804.238  | -477.829  | -736.063  | -587.488  |
| 125   | -727.929  | -579.347  | -672.685  | -668.207  |
| 126   | -651.680  | -542.320  | -611.941  | -606.241  |
| 127   | -612.573  | -606.875  | -581.952  | -656.129  |
| 128   | -582.752  | -656.926  | -560.523  | -692.682  |
| 129   | -562.043  | -694.206  | -547.671  | -717.324  |
| 130   | -550.270  | -719.916  | -543.483  | -730.833  |
| 131   | -547.467  | -734.789  | -548.649  | -732.889  |
| 132   | -554.087  | -738.351  | -564.238  | -722.023  |
| 133   | -571.082  | -728.913  | -591.750  | -695.667  |
| 134   | -599.841  | -703.768  | -633.119  | -650.240  |
| 135   | -642.047  | -659.161  | -690.098  | -581.870  |
| 136   | -699.344  | -591.142  | -764.172  | -486.865  |
| 137   | -772.997  | -495.701  | -855.594  | -362.843  |
| 138   | -863.912  | -371.164  | -1075.311 | -31.128   |
| 139   | -981.623  | -110.076  | -1042.224 | -32.508   |
| 140   | -1052.056 | -42.351   | -966.414  | -151.969  |
| 141   | -974.223  | -159.742  | -1049.212 | -63.758   |
| 142   | -1035.688 | -50.222   | -892.300  | -233.755  |
| 143   | -974.739  | -185.778  | -861.631  | -367.712  |
| 144   | -855.072  | -361.132  | -754.504  | -522.897  |
| 145   | -747.998  | -516.388  | -661.311  | -655.825  |
| 146   | -748.578  | -340.982  | -619.574  | -548.487  |
| 147   | -660.095  | -588.998  | -564.847  | -742.205  |
| 148   | -566.773  | -744.171  | -490.561  | -866.757  |
| 149   | -492.544  | -868.778  | -434.934  | -961.443  |
| 150   | -437.490  | -964.079  | -397.693  | -1028.092 |
| 151   | -401.589  | -1031.986 | -387.310  | -1054.954 |
| 152   | -386.966  | -1054.611 | -383.341  | -1060.443 |
| 153   | -380.866  | -1057.958 | -373.328  | -1070.082 |
| 154   | -371.235  | -1067.961 | -359.743  | -1086.447 |
| 155   | -357.991  | -1084.673 | -342.597  | -1109.434 |
| 156   | -341.130  | -1107.981 | -321.839  | -1139.011 |
| 157   | -320.622  | -1137.790 | -297.436  | -1175.085 |
| 158   | -296.457  | -1174.141 | -269.547  | -1217.426 |
| 159   | -268.621  | -1216.513 | -237.996  | -1265.774 |
| 160   | -237.117  | -1264.925 | -199.224  | -1325.876 |

COMBINACION 7 G1 + 1.1 PRETI + 0.4 TEMP

## TENSIONES CON AXIL INICIAL

=====

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====     |
| 1     | -191.545  | -1275.405 | -194.191  | -1271.150 |
| 2     | -193.860  | -1271.491 | -194.295  | -1270.791 |
| 3     | -194.476  | -1272.244 | -196.118  | -1269.603 |
| 4     | -196.142  | -1271.404 | -198.950  | -1266.886 |
| 5     | -198.935  | -1269.080 | -202.815  | -1262.838 |
| 6     | -202.893  | -1265.408 | -207.777  | -1257.553 |
| 7     | -208.021  | -1260.548 | -213.900  | -1251.090 |
| 8     | -214.401  | -1254.502 | -221.299  | -1243.407 |
| 9     | -222.148  | -1247.182 | -230.132  | -1234.340 |
| 10    | -231.267  | -1238.650 | -245.080  | -1216.432 |
| 11    | -248.826  | -1223.066 | -279.263  | -1174.108 |
| 12    | -284.115  | -1181.700 | -332.298  | -1104.197 |
| 13    | -338.114  | -1112.546 | -405.443  | -1004.247 |
| 14    | -411.991  | -1013.132 | -499.919  | -871.700  |
| 15    | -506.951  | -880.708  | -616.839  | -703.954  |
| 16    | -623.890  | -712.687  | -756.935  | -498.684  |
| 17    | -763.459  | -506.622  | -919.878  | -255.020  |
| 18    | -926.031  | -262.047  | -1213.116 | 199.731   |
| 19    | -1113.846 | 64.867    | -1217.977 | 198.151   |
| 20    | -1228.662 | 187.277   | -1211.342 | 165.107   |
| 21    | -1224.206 | 152.959   | -1273.923 | 216.596   |
| 22    | -1264.960 | 225.296   | -1038.047 | -65.146   |
| 23    | -1128.021 | 36.633    | -973.213  | -212.377  |
| 24    | -967.052  | -207.696  | -835.567  | -419.192  |
| 25    | -826.931  | -412.570  | -716.227  | -590.637  |
| 26    | -708.632  | -608.113  | -607.530  | -770.736  |
| 27    | -607.112  | -773.224  | -526.377  | -903.087  |
| 28    | -526.019  | -905.953  | -464.908  | -1004.249 |
| 29    | -465.256  | -1008.050 | -423.186  | -1075.719 |
| 30    | -424.651  | -1080.807 | -401.383  | -1118.235 |
| 31    | -404.363  | -1124.833 | -400.310  | -1131.354 |
| 32    | -404.840  | -1139.683 | -421.143  | -1113.459 |
| 33    | -427.359  | -1123.131 | -465.736  | -1061.401 |
| 34    | -473.409  | -1072.262 | -536.181  | -971.293  |
| 35    | -544.898  | -982.853  | -634.496  | -838.735  |
| 36    | -643.734  | -850.411  | -762.363  | -659.595  |
| 37    | -771.318  | -670.500  | -920.148  | -431.106  |
| 38    | -928.724  | -441.161  | -1229.609 | 42.815    |
| 39    | -1124.198 | -62.815   | -1266.644 | 119.511   |
| 40    | -1277.283 | 108.537   | -1252.598 | 76.940    |
| 41    | -1268.381 | 61.738    | -1303.663 | 106.897   |
| 42    | -1293.796 | 116.484   | -1037.667 | -211.354  |
| 43    | -1132.342 | -143.327  | -956.725  | -425.809  |
| 44    | -949.964  | -420.576  | -801.965  | -658.633  |
| 45    | -792.224  | -650.950  | -669.384  | -848.539  |
| 46    | -645.161  | -710.207  | -550.141  | -863.047  |
| 47    | -549.715  | -865.548  | -475.042  | -985.660  |
| 48    | -474.658  | -988.567  | -419.637  | -1077.069 |
| 49    | -419.956  | -1080.916 | -383.976  | -1138.789 |
| 50    | -385.438  | -1143.882 | -368.280  | -1171.482 |
| 51    | -371.213  | -1178.156 | -373.258  | -1174.866 |
| 52    | -377.862  | -1183.077 | -400.281  | -1147.015 |
| 53    | -406.424  | -1156.806 | -450.926  | -1085.223 |
| 54    | -458.606  | -1096.072 | -527.518  | -985.228  |

COMBINACION 7 G1 + 1.1 PRETI + 0.4 TEMP

## TENSIONES CON AXIL INICIAL

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| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| ===== | =====     | =====     | =====     | =====     |
| 55    | -536.245  | -996.772  | -631.967  | -842.803  |
| 56    | -641.212  | -854.468  | -765.987  | -653.766  |
| 57    | -774.942  | -664.671  | -929.950  | -415.339  |
| 58    | -938.548  | -425.360  | -1245.576 | 68.497    |
| 59    | -1139.423 | -43.327   | -1287.727 | 146.498   |
| 60    | -1298.390 | 135.553   | -1279.578 | 111.474   |
| 61    | -1295.397 | 96.317    | -1328.838 | 139.121   |
| 62    | -1318.971 | 148.707   | -1061.010 | -181.475  |
| 63    | -1156.795 | -103.994  | -979.254  | -389.570  |
| 64    | -972.498  | -384.328  | -822.571  | -625.488  |
| 65    | -812.829  | -617.807  | -688.066  | -818.489  |
| 66    | -663.846  | -680.151  | -566.892  | -836.103  |
| 67    | -566.458  | -838.617  | -489.880  | -961.792  |
| 68    | -489.504  | -964.686  | -432.562  | -1056.278 |
| 69    | -432.877  | -1060.132 | -395.010  | -1121.041 |
| 70    | -396.452  | -1126.166 | -377.373  | -1156.855 |
| 71    | -380.299  | -1163.540 | -380.420  | -1163.346 |
| 72    | -385.024  | -1171.557 | -405.501  | -1138.619 |
| 73    | -411.714  | -1148.296 | -454.302  | -1079.793 |
| 74    | -461.976  | -1090.651 | -528.975  | -982.884  |
| 75    | -537.687  | -994.452  | -631.437  | -843.654  |
| 76    | -640.687  | -855.313  | -763.580  | -657.639  |
| 77    | -772.545  | -668.526  | -925.517  | -422.471  |
| 78    | -934.115  | -432.490  | -1239.287 | 58.381    |
| 79    | -1133.423 | -51.008   | -1279.870 | 136.441   |
| 80    | -1290.547 | 125.515   | -1269.888 | 99.071    |
| 81    | -1285.809 | 84.045    | -1320.274 | 128.159   |
| 82    | -1310.397 | 137.733   | -1053.381 | -191.240  |
| 83    | -1148.799 | -116.856  | -972.379  | -400.629  |
| 84    | -965.520  | -395.553  | -816.675  | -634.972  |
| 85    | -807.003  | -627.178  | -683.266  | -826.209  |
| 86    | -658.971  | -687.992  | -563.132  | -842.151  |
| 87    | -562.695  | -844.669  | -487.173  | -966.146  |
| 88    | -486.789  | -969.053  | -430.895  | -1058.960 |
| 89    | -431.217  | -1062.803 | -394.415  | -1121.999 |
| 90    | -395.866  | -1127.109 | -377.862  | -1156.069 |
| 91    | -380.824  | -1162.696 | -382.026  | -1160.764 |
| 92    | -386.627  | -1168.978 | -408.199  | -1134.279 |
| 93    | -414.409  | -1143.961 | -458.048  | -1073.767 |
| 94    | -465.716  | -1084.636 | -533.763  | -975.183  |
| 95    | -542.469  | -986.760  | -637.360  | -834.127  |
| 96    | -646.598  | -845.805  | -770.488  | -646.527  |
| 97    | -779.442  | -657.433  | -933.524  | -409.592  |
| 98    | -942.126  | -419.604  | -1248.444 | 73.111    |
| 99    | -1142.164 | -39.819   | -1291.065 | 150.769   |
| 100   | -1301.742 | 139.844   | -1286.548 | 120.396   |
| 101   | -1302.374 | 105.248   | -1330.286 | 140.974   |
| 102   | -1320.417 | 150.558   | -1059.888 | -182.912  |
| 103   | -1155.617 | -105.889  | -976.995  | -393.205  |
| 104   | -970.228  | -387.980  | -819.113  | -631.050  |
| 105   | -809.374  | -623.363  | -683.428  | -825.949  |
| 106   | -659.087  | -687.807  | -560.987  | -845.600  |
| 107   | -560.562  | -848.101  | -482.852  | -973.097  |
| 108   | -482.482  | -975.981  | -424.404  | -1069.400 |
| 109   | -424.728  | -1073.240 | -385.737  | -1135.956 |

## TENSIONES CON AXIL INICIAL

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| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| ===== |           |           |           |           |
| 110   | -387.188  | -1141.068 | -366.947  | -1173.625 |
| 111   | -369.914  | -1180.245 | -368.900  | -1181.876 |
| 112   | -373.507  | -1190.082 | -392.855  | -1158.960 |
| 113   | -399.090  | -1168.602 | -440.549  | -1101.914 |
| 114   | -448.218  | -1112.782 | -514.103  | -1006.805 |
| 115   | -522.817  | -1018.370 | -615.552  | -869.206  |
| 116   | -624.791  | -880.881  | -746.534  | -685.057  |
| 117   | -755.484  | -695.969  | -907.373  | -451.655  |
| 118   | -915.969  | -461.679  | -1220.053 | 27.443    |
| 119   | -1115.054 | -74.519   | -1260.457 | 111.592   |
| 120   | -1271.135 | 100.668   | -1249.424 | 72.878    |
| 121   | -1265.258 | 57.740    | -1304.763 | 108.305   |
| 122   | -1294.893 | 117.888   | -1042.978 | -204.556  |
| 123   | -1137.900 | -134.387  | -966.752  | -409.680  |
| 124   | -959.992  | -404.441  | -816.399  | -635.412  |
| 125   | -806.640  | -627.762  | -688.160  | -818.338  |
| 126   | -663.977  | -681.596  | -573.217  | -827.585  |
| 127   | -572.784  | -830.096  | -502.464  | -943.206  |
| 128   | -502.092  | -946.097  | -451.401  | -1027.634 |
| 129   | -451.733  | -1031.465 | -420.137  | -1082.289 |
| 130   | -421.602  | -1087.382 | -408.828  | -1107.930 |
| 131   | -411.810  | -1114.534 | -418.309  | -1104.080 |
| 132   | -422.913  | -1112.306 | -449.800  | -1069.057 |
| 133   | -456.022  | -1078.738 | -505.037  | -999.897  |
| 134   | -512.729  | -1010.750 | -586.204  | -892.566  |
| 135   | -594.946  | -904.112  | -695.266  | -742.746  |
| 136   | -704.525  | -754.411  | -833.923  | -546.274  |
| 137   | -842.897  | -557.174  | -1002.489 | -300.470  |
| 138   | -1011.108 | -310.476  | -1323.072 | 191.320   |
| 139   | -1213.391 | 49.928    | -1366.155 | 245.461   |
| 140   | -1376.870 | 234.506   | -1379.175 | 237.456   |
| 141   | -1388.015 | 229.227   | -1394.178 | 237.115   |
| 142   | -1379.208 | 251.886   | -1151.512 | -39.559   |
| 143   | -1249.976 | 81.578    | -1058.953 | -225.684  |
| 144   | -1051.300 | -219.150  | -880.851  | -493.320  |
| 145   | -873.162  | -487.017  | -725.082  | -725.204  |
| 146   | -820.274  | -380.167  | -632.481  | -682.234  |
| 147   | -676.250  | -728.088  | -532.214  | -959.772  |
| 148   | -533.426  | -963.392  | -416.989  | -1150.682 |
| 149   | -418.172  | -1154.509 | -328.849  | -1298.185 |
| 150   | -330.592  | -1302.803 | -267.538  | -1404.225 |
| 151   | -270.714  | -1410.294 | -242.413  | -1455.815 |
| 152   | -240.914  | -1457.242 | -231.058  | -1473.096 |
| 153   | -227.213  | -1472.168 | -219.768  | -1484.142 |
| 154   | -216.383  | -1483.551 | -211.345  | -1491.656 |
| 155   | -208.414  | -1491.319 | -205.838  | -1495.463 |
| 156   | -203.329  | -1495.305 | -203.242  | -1495.445 |
| 157   | -201.141  | -1495.328 | -203.556  | -1491.443 |
| 158   | -201.895  | -1491.343 | -207.034  | -1483.077 |
| 159   | -205.643  | -1482.673 | -213.507  | -1470.023 |
| 160   | -212.411  | -1469.297 | -219.145  | -1458.466 |



COMBINACION 8 G1 + G2 + 1.1 PRETI + 0.60 TEMP

TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 1     | -191.545  | -1275.405 | -230.999  | -1211.943 |
| 2     | -230.931  | -1211.863 | -262.929  | -1160.394 |
| 3     | -263.601  | -1161.057 | -291.554  | -1116.094 |
| 4     | -292.258  | -1116.800 | -316.082  | -1078.479 |
| 5     | -316.905  | -1079.324 | -336.504  | -1047.799 |
| 6     | -337.545  | -1048.820 | -352.843  | -1024.214 |
| 7     | -354.133  | -1025.525 | -365.095  | -1007.893 |
| 8     | -366.718  | -1009.500 | -373.335  | -998.856  |
| 9     | -375.297  | -1000.841 | -377.635  | -997.080  |
| 10    | -379.984  | -999.438  | -382.758  | -994.977  |
| 11    | -387.609  | -999.832  | -401.625  | -977.287  |
| 12    | -407.525  | -983.194  | -433.875  | -940.810  |
| 13    | -440.663  | -947.594  | -480.733  | -883.141  |
| 14    | -488.160  | -890.614  | -543.369  | -801.810  |
| 15    | -551.168  | -809.584  | -622.903  | -694.199  |
| 16    | -630.603  | -701.891  | -720.010  | -558.078  |
| 17    | -727.063  | -565.164  | -834.397  | -392.517  |
| 18    | -840.889  | -398.999  | -1073.378 | -25.038   |
| 19    | -980.645  | -105.626  | -1027.418 | -45.758   |
| 20    | -1038.182 | -56.532   | -958.228  | -158.870  |
| 21    | -970.789  | -171.406  | -1094.654 | -12.863   |
| 22    | -1085.812 | -4.008    | -925.258  | -209.512  |
| 23    | -1010.284 | -152.748  | -916.755  | -303.189  |
| 24    | -911.164  | -297.594  | -832.739  | -423.740  |
| 25    | -824.877  | -415.873  | -758.998  | -521.840  |
| 26    | -752.366  | -537.767  | -687.830  | -641.574  |
| 27    | -688.533  | -642.257  | -636.083  | -726.624  |
| 28    | -636.964  | -727.497  | -595.832  | -793.658  |
| 29    | -597.513  | -795.314  | -567.089  | -844.251  |
| 30    | -569.951  | -847.092  | -549.962  | -879.244  |
| 31    | -554.335  | -883.603  | -545.170  | -898.344  |
| 32    | -551.154  | -904.335  | -553.936  | -899.861  |
| 33    | -561.470  | -907.413  | -577.888  | -881.004  |
| 34    | -586.780  | -889.904  | -619.131  | -837.868  |
| 35    | -628.931  | -847.686  | -679.613  | -766.164  |
| 36    | -689.778  | -776.349  | -760.977  | -661.826  |
| 37    | -770.683  | -671.522  | -863.523  | -522.189  |
| 38    | -872.655  | -531.349  | -1109.014 | -151.164  |
| 39    | -1009.335 | -209.837  | -1081.941 | -116.903  |
| 40    | -1092.719 | -127.699  | -989.989  | -259.190  |
| 41    | -1005.457 | -274.797  | -1115.493 | -133.955  |
| 42    | -1105.754 | -124.204  | -916.591  | -366.327  |
| 43    | -1005.929 | -346.663  | -892.253  | -529.513  |
| 44    | -886.081  | -523.331  | -791.781  | -675.014  |
| 45    | -782.827  | -666.065  | -705.447  | -790.531  |
| 46    | -682.201  | -650.627  | -624.391  | -743.616  |
| 47    | -625.099  | -744.291  | -579.361  | -817.862  |
| 48    | -580.232  | -818.750  | -545.832  | -874.083  |
| 49    | -547.499  | -875.761  | -523.801  | -913.880  |
| 50    | -526.661  | -916.725  | -513.418  | -938.025  |
| 51    | -517.774  | -942.412  | -515.340  | -946.326  |
| 52    | -521.329  | -952.309  | -530.846  | -937.001  |
| 53    | -538.372  | -944.566  | -561.533  | -907.311  |
| 54    | -570.435  | -916.195  | -609.524  | -853.321  |

COMBINACION 8 G1 + G2 + 1.1 PRETI + 0.60 TEMP

TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1     | TS_2      | TI_2     |
|-------|-----------|----------|-----------|----------|
| 55    | -619.343  | -863.108 | -676.755  | -770.760 |
| 56    | -686.934  | -780.925 | -764.882  | -655.544 |
| 57    | -774.577  | -665.259 | -874.188  | -505.034 |
| 58    | -883.331  | -514.177 | -1126.434 | -123.144 |
| 59    | -1025.961 | -188.555 | -1105.007 | -87.379  |
| 60    | -1115.784 | -98.177  | -1019.509 | -221.405 |
| 61    | -1035.037 | -236.935 | -1143.085 | -98.637  |
| 62    | -1133.352 | -88.880  | -942.183  | -333.570 |
| 63    | -1032.729 | -303.556 | -916.952  | -489.784 |
| 64    | -910.779  | -483.604 | -814.377  | -638.668 |
| 65    | -805.425  | -629.716 | -725.949  | -757.554 |
| 66    | -702.704  | -617.649 | -642.783  | -714.031 |
| 67    | -643.483  | -714.721 | -595.650  | -791.660 |
| 68    | -596.529  | -792.537 | -560.019  | -851.263 |
| 69    | -561.680  | -852.952 | -535.906  | -894.409 |
| 70    | -538.753  | -897.274 | -523.405  | -921.961 |
| 71    | -527.767  | -926.338 | -523.238  | -933.623 |
| 72    | -529.225  | -939.608 | -536.621  | -927.712 |
| 73    | -544.157  | -935.261 | -565.216  | -901.387 |
| 74    | -574.106  | -910.291 | -611.107  | -850.773 |
| 75    | -620.908  | -860.591 | -676.188  | -771.672 |
| 76    | -686.365  | -781.840 | -762.227  | -659.814 |
| 77    | -771.934  | -669.510 | -869.364  | -512.793 |
| 78    | -878.512  | -521.928 | -1119.562 | -134.197 |
| 79    | -1019.402 | -196.952 | -1096.425 | -98.363  |
| 80    | -1107.202 | -109.162 | -1008.913 | -234.969 |
| 81    | -1024.452 | -250.484 | -1133.609 | -110.766 |
| 82    | -1123.871 | -101.015 | -933.756  | -344.356 |
| 83    | -1023.904 | -317.750 | -909.320  | -502.060 |
| 84    | -903.155  | -495.867 | -807.917  | -649.058 |
| 85    | -798.961  | -640.113 | -720.617  | -766.130 |
| 86    | -697.366  | -626.235 | -638.634  | -720.705 |
| 87    | -639.326  | -721.408 | -592.639  | -796.504 |
| 88    | -593.526  | -797.366 | -558.153  | -854.265 |
| 89    | -559.825  | -855.935 | -535.207  | -895.533 |
| 90    | -538.055  | -898.398 | -523.858  | -921.232 |
| 91    | -528.236  | -925.584 | -524.845  | -931.038 |
| 92    | -530.831  | -937.025 | -539.398  | -923.245 |
| 93    | -546.932  | -930.797 | -569.133  | -895.086 |
| 94    | -578.018  | -903.997 | -616.156  | -842.652 |
| 95    | -625.951  | -852.478 | -682.431  | -761.631 |
| 96    | -692.596  | -771.817 | -769.573  | -647.999 |
| 97    | -779.268  | -657.713 | -877.880  | -499.095 |
| 98    | -887.022  | -508.239 | -1129.288 | -118.553 |
| 99    | -1028.694 | -185.058 | -1108.270 | -83.203  |
| 100   | -1119.042 | -94.007  | -1026.299 | -212.715 |
| 101   | -1041.837 | -228.232 | -1144.278 | -97.110  |
| 102   | -1134.534 | -87.367  | -940.726  | -335.435 |
| 103   | -1031.208 | -306.002 | -914.257  | -494.118 |
| 104   | -908.088  | -487.932 | -810.443  | -644.996 |
| 105   | -801.494  | -636.038 | -720.775  | -765.876 |
| 106   | -697.526  | -625.977 | -636.379  | -724.332 |
| 107   | -637.083  | -725.016 | -588.028  | -803.921 |
| 108   | -588.911  | -804.790 | -551.180  | -865.480 |
| 109   | -552.848  | -867.158 | -525.859  | -910.570 |

COMBINACION 8 G1 + G2 + 1.1 PRETI + 0.60 TEMP

TENSIONES CON AXIL INICIAL

| Barra | TS_1      | TI_1      | TS_2      | TI_2      |
|-------|-----------|-----------|-----------|-----------|
| 110   | -528.708  | -913.431  | -512.108  | -940.132  |
| 111   | -516.488  | -944.480  | -510.715  | -953.765  |
| 112   | -516.709  | -959.741  | -522.872  | -949.827  |
| 113   | -530.430  | -957.341  | -550.263  | -925.438  |
| 114   | -559.151  | -934.346  | -594.934  | -876.788  |
| 115   | -604.737  | -886.602  | -658.865  | -799.536  |
| 116   | -669.031  | -809.721  | -743.662  | -689.677  |
| 117   | -753.358  | -699.390  | -849.599  | -544.585  |
| 118   | -858.735  | -553.740  | -1098.593 | -167.927  |
| 119   | -999.374  | -222.586  | -1075.251 | -125.466  |
| 120   | -1086.038 | -136.251  | -986.589  | -263.542  |
| 121   | -1002.127 | -279.060  | -1116.743 | -132.354  |
| 122   | -1106.999 | -122.611  | -922.386  | -358.910  |
| 123   | -1012.001 | -336.896  | -903.131  | -512.015  |
| 124   | -896.955  | -505.837  | -807.424  | -649.849  |
| 125   | -798.476  | -640.893  | -725.832  | -757.742  |
| 126   | -702.726  | -619.268  | -649.523  | -704.845  |
| 127   | -650.218  | -705.542  | -609.155  | -771.593  |
| 128   | -610.035  | -772.470  | -580.304  | -820.293  |
| 129   | -581.976  | -821.969  | -562.994  | -852.502  |
| 130   | -565.852  | -855.355  | -557.322  | -869.076  |
| 131   | -561.704  | -873.428  | -564.046  | -869.662  |
| 132   | -570.027  | -875.671  | -584.340  | -852.650  |
| 133   | -591.869  | -860.226  | -619.858  | -815.206  |
| 134   | -628.758  | -824.117  | -672.725  | -753.395  |
| 135   | -682.545  | -763.209  | -744.867  | -662.963  |
| 136   | -755.037  | -673.162  | -837.918  | -539.847  |
| 137   | -847.626  | -549.567  | -952.159  | -381.426  |
| 138   | -961.309  | -390.579  | -1209.633 | 8.853     |
| 139   | -1105.369 | -88.337   | -1189.190 | 18.952    |
| 140   | -1200.006 | 8.125     | -1125.135 | -87.706   |
| 141   | -1133.723 | -96.259   | -1200.056 | -11.355   |
| 142   | -1185.179 | 3.534     | -1012.680 | -217.260  |
| 143   | -1104.832 | -151.887  | -966.351  | -374.635  |
| 144   | -959.136  | -367.398  | -836.011  | -565.445  |
| 145   | -828.855  | -558.284  | -722.805  | -728.867  |
| 146   | -818.799  | -382.539  | -667.768  | -625.474  |
| 147   | -712.341  | -670.036  | -599.789  | -851.077  |
| 148   | -601.907  | -853.240  | -511.645  | -998.427  |
| 149   | -513.826  | -1000.649 | -445.371  | -1110.759 |
| 150   | -448.183  | -1113.658 | -400.670  | -1190.082 |
| 151   | -404.954  | -1194.366 | -386.858  | -1223.474 |
| 152   | -386.482  | -1223.095 | -381.455  | -1231.181 |
| 153   | -378.732  | -1228.448 | -370.748  | -1241.290 |
| 154   | -368.446  | -1238.958 | -357.461  | -1256.627 |
| 155   | -355.535  | -1254.674 | -341.607  | -1277.076 |
| 156   | -339.995  | -1275.477 | -323.128  | -1302.606 |
| 157   | -321.790  | -1301.263 | -301.986  | -1333.117 |
| 158   | -300.910  | -1332.078 | -278.359  | -1368.351 |
| 159   | -277.341  | -1367.345 | -252.048  | -1408.029 |
| 160   | -251.083  | -1407.094 | -219.146  | -1458.464 |



## COMBINACION 9 G1 + G2 + PRETD

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -146.165 | -973.239 | -185.408 | -910.117 |
| 2     | -197.317 | -922.018 | -235.632 | -860.388 |
| 3     | -236.556 | -861.304 | -268.434 | -810.029 |
| 4     | -269.642 | -811.240 | -295.139 | -770.227 |
| 5     | -296.532 | -771.641 | -315.755 | -740.720 |
| 6     | -317.280 | -742.228 | -330.338 | -721.224 |
| 7     | -331.915 | -722.816 | -338.923 | -711.543 |
| 8     | -340.547 | -713.151 | -341.590 | -711.473 |
| 9     | -343.223 | -713.120 | -338.407 | -720.866 |
| 10    | -340.064 | -722.528 | -332.636 | -734.477 |
| 11    | -336.342 | -738.182 | -334.215 | -741.604 |
| 12    | -339.309 | -746.695 | -343.454 | -740.028 |
| 13    | -349.835 | -746.400 | -361.695 | -727.324 |
| 14    | -369.132 | -734.804 | -390.355 | -700.668 |
| 15    | -398.512 | -708.816 | -430.865 | -656.776 |
| 16    | -439.086 | -664.985 | -483.965 | -592.797 |
| 17    | -491.314 | -600.174 | -548.869 | -507.597 |
| 18    | -556.497 | -515.217 | -712.206 | -264.758 |
| 19    | -643.025 | -269.557 | -647.542 | -263.775 |
| 20    | -655.142 | -271.386 | -557.266 | -396.664 |
| 21    | -570.277 | -409.653 | -707.664 | -233.801 |
| 22    | -695.094 | -221.219 | -605.530 | -335.858 |
| 23    | -669.972 | -346.867 | -629.218 | -412.420 |
| 24    | -626.528 | -409.726 | -592.610 | -464.283 |
| 25    | -586.834 | -458.506 | -556.964 | -506.552 |
| 26    | -545.849 | -515.951 | -515.462 | -564.828 |
| 27    | -515.018 | -564.371 | -490.474 | -603.849 |
| 28    | -490.071 | -603.437 | -470.523 | -634.881 |
| 29    | -470.753 | -635.083 | -455.343 | -659.870 |
| 30    | -456.659 | -661.161 | -444.840 | -680.172 |
| 31    | -447.610 | -682.923 | -439.439 | -696.067 |
| 32    | -443.837 | -700.474 | -440.032 | -706.594 |
| 33    | -446.117 | -712.683 | -448.057 | -709.561 |
| 34    | -455.752 | -717.262 | -465.526 | -701.540 |
| 35    | -474.493 | -710.521 | -494.585 | -678.203 |
| 36    | -504.263 | -687.893 | -537.129 | -635.027 |
| 37    | -546.475 | -644.358 | -593.016 | -569.498 |
| 38    | -603.334 | -579.840 | -761.947 | -324.709 |
| 39    | -687.140 | -322.184 | -710.090 | -292.809 |
| 40    | -716.480 | -299.219 | -599.422 | -449.049 |
| 41    | -615.439 | -465.204 | -738.905 | -307.171 |
| 42    | -725.354 | -293.607 | -612.510 | -438.044 |
| 43    | -680.753 | -471.717 | -623.337 | -564.072 |
| 44    | -619.384 | -560.111 | -572.801 | -635.040 |
| 45    | -564.941 | -627.181 | -523.511 | -693.821 |
| 46    | -507.148 | -571.400 | -480.250 | -614.665 |
| 47    | -480.526 | -614.916 | -459.998 | -647.936 |
| 48    | -459.530 | -647.481 | -443.763 | -672.842 |
| 49    | -444.055 | -673.138 | -432.186 | -692.230 |
| 50    | -433.661 | -693.701 | -425.205 | -707.304 |
| 51    | -428.187 | -710.318 | -423.233 | -718.287 |
| 52    | -427.905 | -722.960 | -427.266 | -723.987 |
| 53    | -433.628 | -730.395 | -438.745 | -722.165 |
| 54    | -446.739 | -730.149 | -459.757 | -709.209 |

## COMBINACION 9 G1 + G2 + PRETD

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -469.018 | -718.436 | -492.481 | -680.695 |
| 56    | -502.394 | -690.591 | -538.798 | -632.036 |
| 57    | -548.271 | -641.535 | -598.475 | -560.781 |
| 58    | -608.819 | -571.131 | -771.026 | -310.220 |
| 59    | -695.639 | -311.028 | -721.852 | -277.476 |
| 60    | -728.025 | -283.670 | -614.257 | -429.289 |
| 61    | -630.159 | -445.193 | -752.684 | -288.364 |
| 62    | -739.201 | -274.857 | -625.592 | -420.273 |
| 63    | -694.775 | -448.775 | -636.236 | -542.936 |
| 64    | -632.558 | -539.253 | -584.702 | -616.230 |
| 65    | -577.039 | -608.563 | -534.298 | -677.312 |
| 66    | -518.051 | -555.011 | -489.862 | -600.353 |
| 67    | -490.187 | -600.673 | -468.434 | -635.663 |
| 68    | -467.984 | -635.203 | -451.045 | -662.450 |
| 69    | -451.307 | -662.725 | -438.352 | -683.563 |
| 70    | -439.772 | -684.992 | -430.263 | -700.287 |
| 71    | -433.183 | -703.224 | -427.221 | -712.814 |
| 72    | -431.810 | -717.417 | -430.159 | -720.073 |
| 73    | -436.446 | -726.386 | -440.548 | -719.788 |
| 74    | -448.451 | -727.709 | -460.446 | -708.414 |
| 75    | -469.618 | -717.594 | -491.989 | -681.610 |
| 76    | -501.845 | -691.456 | -537.132 | -634.696 |
| 77    | -546.586 | -644.152 | -595.603 | -565.309 |
| 78    | -605.964 | -575.666 | -767.088 | -316.497 |
| 79    | -691.950 | -315.864 | -717.150 | -283.608 |
| 80    | -723.399 | -289.879 | -608.613 | -436.802 |
| 81    | -624.581 | -452.746 | -747.741 | -295.104 |
| 82    | -734.223 | -281.575 | -621.158 | -426.295 |
| 83    | -690.019 | -456.552 | -632.209 | -549.540 |
| 84    | -628.450 | -545.758 | -581.348 | -621.522 |
| 85    | -573.630 | -613.803 | -531.639 | -681.346 |
| 86    | -515.364 | -559.028 | -487.935 | -603.148 |
| 87    | -488.253 | -603.480 | -467.210 | -637.327 |
| 88    | -466.783 | -636.874 | -450.525 | -663.025 |
| 89    | -450.821 | -663.318 | -438.544 | -683.066 |
| 90    | -439.996 | -684.534 | -431.140 | -698.778 |
| 91    | -434.118 | -701.725 | -428.795 | -710.287 |
| 92    | -433.429 | -714.920 | -432.446 | -716.502 |
| 93    | -438.779 | -722.833 | -443.559 | -715.144 |
| 94    | -451.491 | -723.091 | -464.194 | -702.658 |
| 95    | -473.375 | -711.864 | -496.511 | -674.649 |
| 96    | -506.356 | -684.512 | -542.388 | -626.554 |
| 97    | -551.810 | -635.995 | -601.593 | -555.920 |
| 98    | -611.890 | -566.228 | -773.748 | -305.879 |
| 99    | -698.214 | -307.693 | -725.481 | -272.791 |
| 100   | -731.649 | -278.991 | -621.936 | -419.420 |
| 101   | -637.863 | -435.325 | -755.032 | -285.353 |
| 102   | -741.555 | -271.876 | -625.538 | -420.373 |
| 103   | -694.719 | -448.892 | -635.241 | -544.563 |
| 104   | -631.542 | -540.850 | -582.737 | -619.352 |
| 105   | -575.034 | -611.638 | -531.376 | -681.862 |
| 106   | -515.074 | -559.516 | -486.002 | -606.278 |
| 107   | -486.273 | -606.536 | -463.644 | -642.933 |
| 108   | -463.143 | -642.411 | -445.340 | -671.047 |
| 109   | -445.551 | -671.260 | -431.728 | -693.494 |

## COMBINACION 9 G1 + G2 + PRETD

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 110   | -433.102 | -694.871  | -422.668 | -711.654  |
| 111   | -425.567 | -714.514  | -418.652 | -725.636  |
| 112   | -423.216 | -730.198  | -420.587 | -734.426  |
| 113   | -426.870 | -740.699  | -429.956 | -735.737  |
| 114   | -437.856 | -743.664  | -448.794 | -726.070  |
| 115   | -457.992 | -735.275  | -479.306 | -700.991  |
| 116   | -489.211 | -710.912  | -523.396 | -655.924  |
| 117   | -532.943 | -665.486  | -580.908 | -588.334  |
| 118   | -591.412 | -598.857  | -751.635 | -341.136  |
| 119   | -677.410 | -334.793  | -701.862 | -303.495  |
| 120   | -708.261 | -309.895  | -592.643 | -457.882  |
| 121   | -608.670 | -473.890  | -735.737 | -311.248  |
| 122   | -722.113 | -297.624  | -612.923 | -437.385  |
| 123   | -681.205 | -470.878  | -627.596 | -557.107  |
| 124   | -623.746 | -553.255  | -580.852 | -622.250  |
| 125   | -573.159 | -614.554  | -535.329 | -675.405  |
| 126   | -519.237 | -554.430  | -495.704 | -592.282  |
| 127   | -496.173 | -592.752  | -478.989 | -620.393  |
| 128   | -478.741 | -620.144  | -466.318 | -640.127  |
| 129   | -466.813 | -640.633  | -458.355 | -654.238  |
| 130   | -460.017 | -655.903  | -455.059 | -663.878  |
| 131   | -458.222 | -667.030  | -456.922 | -669.121  |
| 132   | -461.717 | -673.936  | -464.910 | -668.799  |
| 133   | -471.357 | -675.279  | -480.506 | -660.563  |
| 134   | -488.504 | -668.570  | -505.780 | -640.781  |
| 135   | -514.946 | -649.944  | -542.829 | -605.094  |
| 136   | -552.519 | -614.812  | -593.404 | -549.049  |
| 137   | -602.517 | -558.173  | -657.057 | -470.445  |
| 138   | -666.820 | -480.206  | -833.019 | -212.873  |
| 139   | -753.938 | -236.327  | -783.336 | -198.699  |
| 140   | -788.970 | -204.348  | -691.733 | -328.810  |
| 141   | -701.100 | -338.141  | -779.251 | -238.111  |
| 142   | -762.006 | -220.855  | -647.372 | -367.583  |
| 143   | -715.540 | -380.352  | -631.603 | -515.364  |
| 144   | -628.266 | -512.006  | -565.531 | -612.916  |
| 145   | -559.966 | -607.345  | -506.186 | -693.850  |
| 146   | -604.504 | -390.062  | -504.979 | -550.149  |
| 147   | -541.644 | -586.804  | -473.218 | -696.868  |
| 148   | -472.160 | -695.836  | -420.213 | -779.393  |
| 149   | -418.989 | -778.203  | -381.981 | -837.730  |
| 150   | -381.713 | -837.521  | -357.858 | -875.892  |
| 151   | -359.614 | -877.635  | -354.702 | -885.537  |
| 152   | -353.978 | -884.803  | -355.825 | -881.832  |
| 153   | -353.776 | -879.765  | -350.674 | -884.754  |
| 154   | -348.778 | -882.834  | -340.645 | -895.917  |
| 155   | -338.893 | -894.135  | -325.685 | -915.380  |
| 156   | -324.065 | -913.762  | -305.701 | -943.302  |
| 157   | -304.246 | -941.841  | -280.586 | -979.898  |
| 158   | -279.379 | -978.716  | -250.465 | -1025.226 |
| 159   | -249.458 | -1024.232 | -215.214 | -1079.314 |
| 160   | -214.557 | -1078.681 | -171.331 | -1148.209 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -146.170 | -973.232 | -225.045 | -846.361 |
| 2     | -271.806 | -802.201 | -376.462 | -633.862 |
| 3     | -377.387 | -634.776 | -467.484 | -489.855 |
| 4     | -468.691 | -491.067 | -544.290 | -369.467 |
| 5     | -545.685 | -370.877 | -606.918 | -272.383 |
| 6     | -608.444 | -273.888 | -655.267 | -198.573 |
| 7     | -656.846 | -200.162 | -689.517 | -147.611 |
| 8     | -691.142 | -149.217 | -709.747 | -119.289 |
| 9     | -711.380 | -120.938 | -715.962 | -113.566 |
| 10    | -717.618 | -115.231 | -711.494 | -125.082 |
| 11    | -715.203 | -128.782 | -706.182 | -143.292 |
| 12    | -711.275 | -148.385 | -700.388 | -165.897 |
| 13    | -706.767 | -172.272 | -695.581 | -190.266 |
| 14    | -703.020 | -197.743 | -693.020 | -213.828 |
| 15    | -701.174 | -221.982 | -694.302 | -233.034 |
| 16    | -702.523 | -241.245 | -699.906 | -245.454 |
| 17    | -707.289 | -252.776 | -712.107 | -245.027 |
| 18    | -730.703 | -235.007 | -851.476 | -40.742  |
| 19    | -784.561 | -88.394  | -777.718 | -97.154  |
| 20    | -792.305 | -95.823  | -692.931 | -223.018 |
| 21    | -711.074 | -229.437 | -833.377 | -72.892  |
| 22    | -825.550 | -54.240  | -724.878 | -183.096 |
| 23    | -806.929 | -126.570 | -772.398 | -182.114 |
| 24    | -779.973 | -162.909 | -776.235 | -168.921 |
| 25    | -784.366 | -140.774 | -800.916 | -114.155 |
| 26    | -805.474 | -98.343  | -835.502 | -50.043  |
| 27    | -835.060 | -49.580  | -858.755 | -11.467  |
| 28    | -858.350 | -11.059  | -874.749 | 15.319   |
| 29    | -874.978 | 15.116   | -883.002 | 28.023   |
| 30    | -884.318 | 26.731   | -883.529 | 25.462   |
| 31    | -886.298 | 22.709   | -876.742 | 7.339    |
| 32    | -881.140 | 2.931    | -863.490 | -25.459  |
| 33    | -869.577 | -31.544  | -845.091 | -70.929  |
| 34    | -852.790 | -78.623  | -823.708 | -125.403 |
| 35    | -832.674 | -134.384 | -801.462 | -184.590 |
| 36    | -811.143 | -194.275 | -780.272 | -243.930 |
| 37    | -794.070 | -246.101 | -781.100 | -266.963 |
| 38    | -802.102 | -260.119 | -919.296 | -71.612  |
| 39    | -850.808 | -112.695 | -861.323 | -99.236  |
| 40    | -878.943 | -91.271  | -763.985 | -238.414 |
| 41    | -788.184 | -244.095 | -894.540 | -107.963 |
| 42    | -885.963 | -88.032  | -759.968 | -249.302 |
| 43    | -848.116 | -202.513 | -792.195 | -292.462 |
| 44    | -799.926 | -269.709 | -779.878 | -301.955 |
| 45    | -781.979 | -278.073 | -785.381 | -272.601 |
| 46    | -786.975 | -121.295 | -818.645 | -70.355  |
| 47    | -818.919 | -70.609  | -844.796 | -28.986  |
| 48    | -844.325 | -28.535  | -862.656 | 0.950    |
| 49    | -862.950 | 0.657    | -872.650 | 16.260   |
| 50    | -874.120 | 14.779   | -874.808 | 15.887   |
| 51    | -877.793 | 12.876   | -869.545 | -0.391   |
| 52    | -874.217 | -5.063   | -857.827 | -31.426  |
| 53    | -864.185 | -37.842  | -840.942 | -75.228  |
| 54    | -848.931 | -83.221  | -821.123 | -127.950 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -830.384 | -137.175 | -800.583 | -185.110 |
| 56    | -810.498 | -195.004 | -781.184 | -242.156 |
| 57    | -797.333 | -240.916 | -793.576 | -246.960 |
| 58    | -813.726 | -241.536 | -940.315 | -37.917  |
| 59    | -870.930 | -86.661  | -889.703 | -62.632  |
| 60    | -907.226 | -54.297  | -800.590 | -190.789 |
| 61    | -824.698 | -196.189 | -928.745 | -63.011  |
| 62    | -920.260 | -43.107  | -792.138 | -207.099 |
| 63    | -882.218 | -147.271 | -823.743 | -241.330 |
| 64    | -831.909 | -218.595 | -807.702 | -257.532 |
| 65    | -810.158 | -233.589 | -810.915 | -232.371 |
| 66    | -812.753 | -80.981  | -841.604 | -34.573  |
| 67    | -841.937 | -34.882  | -865.038 | 2.277    |
| 68    | -864.588 | 2.736    | -880.180 | 27.817   |
| 69    | -880.442 | 27.543   | -887.502 | 38.898   |
| 70    | -888.919 | 37.464   | -887.026 | 34.419   |
| 71    | -889.950 | 31.489   | -879.183 | 14.171   |
| 72    | -883.774 | 9.571    | -864.865 | -20.846  |
| 73    | -871.151 | -27.160  | -845.378 | -68.615  |
| 74    | -853.275 | -76.546  | -822.951 | -125.322 |
| 75    | -832.126 | -134.498 | -799.773 | -186.538 |
| 76    | -809.628 | -196.384 | -777.693 | -247.753 |
| 77    | -794.519 | -245.350 | -789.994 | -252.629 |
| 78    | -810.187 | -247.171 | -936.137 | -44.580  |
| 79    | -867.035 | -91.760  | -885.191 | -68.521  |
| 80    | -902.801 | -60.250  | -795.543 | -197.537 |
| 81    | -819.718 | -202.976 | -924.626 | -68.697  |
| 82    | -916.107 | -48.769  | -788.750 | -211.783 |
| 83    | -878.563 | -153.278 | -821.048 | -245.792 |
| 84    | -829.128 | -222.966 | -805.828 | -260.445 |
| 85    | -808.219 | -236.465 | -809.974 | -233.642 |
| 86    | -811.442 | -82.784  | -840.752 | -35.639  |
| 87    | -841.073 | -35.966  | -864.618 | 1.907    |
| 88    | -864.200 | 2.374    | -880.215 | 28.134   |
| 89    | -880.512 | 27.844   | -887.967 | 39.836   |
| 90    | -889.422 | 38.371   | -887.877 | 35.885   |
| 91    | -890.849 | 32.931   | -880.380 | 16.091   |
| 92    | -885.018 | 11.463   | -866.476 | -18.362  |
| 93    | -872.808 | -24.694  | -847.457 | -65.472  |
| 94    | -855.386 | -73.422  | -825.507 | -121.484 |
| 95    | -834.689 | -130.688 | -802.795 | -181.989 |
| 96    | -812.641 | -191.851 | -781.225 | -242.383 |
| 97    | -798.219 | -239.644 | -794.695 | -245.312 |
| 98    | -814.833 | -239.793 | -941.761 | -35.628  |
| 99    | -872.320 | -84.842  | -892.775 | -58.660  |
| 100   | -910.302 | -50.321  | -808.348 | -180.819 |
| 101   | -832.480 | -186.222 | -931.777 | -59.124  |
| 102   | -923.299 | -39.248  | -793.374 | -205.548 |
| 103   | -883.516 | -145.211 | -824.735 | -239.761 |
| 104   | -832.871 | -217.010 | -808.271 | -256.580 |
| 105   | -810.682 | -232.598 | -811.153 | -231.839 |
| 106   | -811.404 | -82.866  | -837.638 | -40.669  |
| 107   | -837.908 | -40.928  | -858.380 | -7.999   |
| 108   | -857.876 | -7.479   | -870.861 | 13.406   |
| 109   | -871.067 | 13.186   | -875.500 | 20.316   |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== |          |          |          |           |
| 110   | -876.875 | 18.941   | -872.310 | 11.598    |
| 111   | -875.212 | 8.743    | -861.732 | -12.940   |
| 112   | -866.298 | -17.496  | -844.626 | -52.357   |
| 113   | -850.906 | -58.635  | -822.342 | -104.580  |
| 114   | -830.243 | -112.506 | -797.067 | -165.871  |
| 115   | -806.267 | -175.072 | -771.006 | -231.790  |
| 116   | -780.907 | -241.717 | -746.096 | -297.710  |
| 117   | -763.456 | -294.703 | -756.825 | -305.370  |
| 118   | -777.307 | -299.844 | -901.395 | -100.248  |
| 119   | -834.221 | -134.079 | -850.628 | -113.079  |
| 120   | -868.474 | -104.827 | -759.388 | -244.454  |
| 121   | -783.644 | -249.930 | -897.379 | -104.351  |
| 122   | -888.776 | -84.301  | -770.211 | -236.060  |
| 123   | -859.044 | -184.822 | -810.841 | -262.357  |
| 124   | -818.959 | -239.253 | -804.889 | -261.885  |
| 125   | -807.361 | -237.840 | -819.127 | -218.913  |
| 126   | -814.378 | -79.692  | -844.155 | -31.796   |
| 127   | -844.621 | -32.271  | -868.537 | 6.198     |
| 128   | -868.294 | 6.454    | -884.683 | 32.817    |
| 129   | -885.177 | 32.309   | -893.006 | 44.901    |
| 130   | -894.673 | 43.244   | -893.582 | 41.489    |
| 131   | -896.740 | 38.329   | -886.862 | 22.441    |
| 132   | -891.658 | 17.627   | -873.835 | -11.041   |
| 133   | -880.274 | -17.533  | -855.799 | -56.901   |
| 134   | -863.793 | -64.916  | -834.989 | -111.247  |
| 135   | -844.155 | -120.409 | -813.517 | -169.690  |
| 136   | -823.207 | -179.409 | -793.146 | -227.764  |
| 137   | -812.619 | -220.223 | -811.362 | -222.244  |
| 138   | -833.043 | -212.834 | -968.621 | 5.244     |
| 139   | -893.248 | -58.015  | -913.343 | -32.294   |
| 140   | -931.432 | -22.001  | -839.538 | -139.623  |
| 141   | -857.387 | -138.099 | -927.724 | -48.070   |
| 142   | -913.885 | -26.455  | -794.059 | -179.828  |
| 143   | -878.358 | -118.458 | -799.312 | -245.603  |
| 144   | -805.432 | -227.035 | -759.793 | -300.445  |
| 145   | -765.235 | -277.169 | -755.084 | -293.498  |
| 146   | -854.140 | 11.479   | -794.724 | -84.093   |
| 147   | -831.392 | -120.743 | -795.106 | -179.109  |
| 148   | -794.050 | -178.074 | -766.140 | -222.967  |
| 149   | -764.914 | -221.779 | -743.910 | -255.564  |
| 150   | -743.643 | -255.354 | -727.660 | -281.064  |
| 151   | -729.414 | -282.810 | -724.185 | -291.221  |
| 152   | -723.459 | -290.489 | -716.856 | -301.110  |
| 153   | -714.807 | -299.043 | -695.127 | -330.699  |
| 154   | -693.231 | -328.779 | -660.357 | -381.658  |
| 155   | -658.601 | -379.882 | -612.585 | -453.899  |
| 156   | -610.962 | -452.287 | -551.509 | -547.917  |
| 157   | -550.050 | -546.462 | -477.167 | -663.696  |
| 158   | -475.960 | -662.515 | -389.656 | -801.335  |
| 159   | -388.649 | -800.343 | -288.895 | -960.797  |
| 160   | -288.236 | -960.166 | -171.333 | -1148.207 |

COMBINACION 11 G1 + G2 + PRETD + TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -146.165 | -973.239 | -189.492 | -903.548 |
| 2     | -201.401 | -915.448 | -243.801 | -847.249 |
| 3     | -244.725 | -848.164 | -280.688 | -790.317 |
| 4     | -281.897 | -791.528 | -311.479 | -743.944 |
| 5     | -312.872 | -745.357 | -336.179 | -707.868 |
| 6     | -337.705 | -709.374 | -354.848 | -681.800 |
| 7     | -356.425 | -683.392 | -367.518 | -665.547 |
| 8     | -369.141 | -667.156 | -374.273 | -658.902 |
| 9     | -375.906 | -660.549 | -375.178 | -661.720 |
| 10    | -376.836 | -663.382 | -373.500 | -668.746 |
| 11    | -377.206 | -672.452 | -379.167 | -669.298 |
| 12    | -384.260 | -674.391 | -392.495 | -661.145 |
| 13    | -398.876 | -667.518 | -414.825 | -641.863 |
| 14    | -422.262 | -649.344 | -447.578 | -608.624 |
| 15    | -455.734 | -616.773 | -492.177 | -558.155 |
| 16    | -500.398 | -566.363 | -549.369 | -487.594 |
| 17    | -556.718 | -494.971 | -618.363 | -395.815 |
| 18    | -625.991 | -403.436 | -785.791 | -146.396 |
| 19    | -713.295 | -179.613 | -721.716 | -168.834 |
| 20    | -729.317 | -176.445 | -635.347 | -296.723 |
| 21    | -648.358 | -309.712 | -784.747 | -135.138 |
| 22    | -772.177 | -122.556 | -681.613 | -238.474 |
| 23    | -749.645 | -218.713 | -707.844 | -285.949 |
| 24    | -705.154 | -283.255 | -670.190 | -339.495 |
| 25    | -664.415 | -333.718 | -633.498 | -383.448 |
| 26    | -622.383 | -392.846 | -590.950 | -443.406 |
| 27    | -590.505 | -442.949 | -564.915 | -484.110 |
| 28    | -564.512 | -483.698 | -543.918 | -516.825 |
| 29    | -544.148 | -517.026 | -527.691 | -543.497 |
| 30    | -529.008 | -544.788 | -516.142 | -565.482 |
| 31    | -518.912 | -568.233 | -509.695 | -583.059 |
| 32    | -514.093 | -587.467 | -509.242 | -595.269 |
| 33    | -515.326 | -601.359 | -516.221 | -599.919 |
| 34    | -523.915 | -607.620 | -532.644 | -593.580 |
| 35    | -541.611 | -602.561 | -560.658 | -571.924 |
| 36    | -570.336 | -581.614 | -602.158 | -530.428 |
| 37    | -611.503 | -539.760 | -656.999 | -466.581 |
| 38    | -667.317 | -476.923 | -824.885 | -223.473 |
| 39    | -747.242 | -245.255 | -769.194 | -217.158 |
| 40    | -775.584 | -223.568 | -657.528 | -374.676 |
| 41    | -673.544 | -390.830 | -797.294 | -232.435 |
| 42    | -783.743 | -218.871 | -671.181 | -362.946 |
| 43    | -742.193 | -372.891 | -685.074 | -464.768 |
| 44    | -681.121 | -460.807 | -634.834 | -535.259 |
| 45    | -626.974 | -527.400 | -585.841 | -593.562 |
| 46    | -569.478 | -471.141 | -542.876 | -513.930 |
| 47    | -543.153 | -514.181 | -522.921 | -546.723 |
| 48    | -522.453 | -546.269 | -506.983 | -571.152 |
| 49    | -507.275 | -571.449 | -495.702 | -590.063 |
| 50    | -497.178 | -591.535 | -489.018 | -604.660 |
| 51    | -492.000 | -607.674 | -487.342 | -615.166 |
| 52    | -492.014 | -619.839 | -491.672 | -620.389 |
| 53    | -498.035 | -626.797 | -503.448 | -618.090 |
| 54    | -511.442 | -626.074 | -524.757 | -604.657 |

COMBINACION 11 G1 + G2 + PRETD + TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -534.017 | -613.883 | -557.777 | -575.665 |
| 56    | -567.691 | -585.561 | -604.391 | -526.529 |
| 57    | -613.863 | -536.028 | -664.365 | -454.797 |
| 58    | -674.708 | -465.147 | -837.212 | -203.759 |
| 59    | -758.843 | -230.128 | -785.340 | -196.213 |
| 60    | -791.513 | -202.407 | -678.028 | -347.664 |
| 61    | -693.930 | -363.568 | -816.357 | -206.865 |
| 62    | -802.873 | -193.358 | -689.166 | -338.900 |
| 63    | -761.349 | -341.691 | -702.706 | -436.018 |
| 64    | -699.028 | -432.335 | -651.069 | -509.477 |
| 65    | -643.406 | -501.810 | -600.562 | -570.725 |
| 66    | -584.315 | -448.425 | -556.022 | -493.933 |
| 67    | -556.348 | -494.253 | -534.492 | -529.409 |
| 68    | -534.042 | -528.949 | -516.999 | -556.363 |
| 69    | -517.260 | -556.638 | -504.202 | -577.642 |
| 70    | -505.622 | -579.071 | -496.010 | -594.533 |
| 71    | -498.930 | -597.469 | -492.864 | -607.225 |
| 72    | -497.454 | -611.828 | -495.699 | -614.651 |
| 73    | -501.986 | -620.964 | -505.985 | -614.532 |
| 74    | -513.888 | -622.453 | -525.779 | -603.326 |
| 75    | -534.951 | -612.505 | -557.219 | -576.687 |
| 76    | -567.075 | -586.533 | -602.258 | -529.940 |
| 77    | -611.713 | -539.396 | -660.626 | -460.719 |
| 78    | -670.987 | -471.076 | -832.008 | -212.073 |
| 79    | -753.945 | -236.512 | -779.046 | -204.383 |
| 80    | -785.295 | -210.654 | -670.410 | -357.704 |
| 81    | -686.378 | -373.647 | -809.637 | -215.879 |
| 82    | -796.120 | -202.350 | -683.153 | -346.943 |
| 83    | -754.939 | -352.128 | -697.232 | -444.950 |
| 84    | -693.473 | -441.168 | -646.475 | -516.765 |
| 85    | -638.756 | -509.046 | -596.869 | -576.423 |
| 86    | -580.594 | -454.105 | -553.268 | -498.059 |
| 87    | -553.586 | -498.390 | -532.647 | -532.071 |
| 88    | -532.220 | -531.618 | -516.065 | -557.603 |
| 89    | -516.361 | -557.895 | -504.187 | -577.477 |
| 90    | -505.640 | -578.946 | -496.887 | -593.024 |
| 91    | -499.865 | -595.970 | -494.645 | -604.367 |
| 92    | -499.279 | -609.000 | -498.399 | -610.416 |
| 93    | -504.732 | -616.747 | -509.615 | -608.892 |
| 94    | -517.547 | -616.839 | -530.354 | -596.240 |
| 95    | -539.535 | -605.445 | -562.774 | -568.065 |
| 96    | -572.619 | -577.927 | -608.755 | -519.803 |
| 97    | -618.177 | -529.244 | -668.063 | -449.002 |
| 98    | -678.360 | -459.311 | -840.321 | -198.795 |
| 99    | -761.788 | -226.320 | -789.154 | -191.291 |
| 100   | -795.322 | -197.491 | -685.708 | -337.794 |
| 101   | -701.635 | -353.699 | -818.521 | -204.089 |
| 102   | -805.043 | -190.612 | -688.744 | -339.472 |
| 103   | -760.906 | -342.430 | -701.131 | -438.578 |
| 104   | -697.432 | -434.865 | -648.331 | -513.844 |
| 105   | -640.628 | -506.131 | -596.673 | -576.832 |
| 106   | -580.371 | -454.486 | -551.002 | -501.726 |
| 107   | -551.272 | -501.983 | -528.347 | -538.858 |
| 108   | -527.846 | -538.336 | -509.746 | -567.449 |
| 109   | -509.957 | -567.662 | -495.838 | -590.374 |

## COMBINACION 11 G1 + G2 + PRETD + TEMP

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 110   | -497.211 | -591.751  | -486.481 | -609.010  |
| 111   | -489.380 | -611.871  | -482.168 | -623.470  |
| 112   | -486.731 | -628.032  | -483.806 | -632.738  |
| 113   | -490.090 | -639.011  | -492.878 | -634.525  |
| 114   | -500.779 | -642.453  | -511.420 | -625.336  |
| 115   | -520.618 | -634.541  | -541.635 | -600.735  |
| 116   | -551.540 | -610.656  | -585.429 | -556.145  |
| 117   | -594.975 | -565.706  | -642.644 | -489.031  |
| 118   | -653.148 | -499.554  | -813.074 | -242.312  |
| 119   | -736.081 | -259.696  | -760.249 | -228.761  |
| 120   | -766.649 | -235.160  | -650.747 | -383.511  |
| 121   | -666.775 | -399.518  | -794.840 | -235.598  |
| 122   | -781.216 | -221.975  | -673.024 | -360.456  |
| 123   | -744.142 | -369.643  | -691.579 | -454.191  |
| 124   | -687.728 | -450.338  | -645.880 | -517.652  |
| 125   | -638.188 | -509.956  | -601.403 | -569.124  |
| 126   | -585.311 | -448.148  | -562.825 | -484.318  |
| 127   | -563.293 | -484.788  | -547.155 | -510.747  |
| 128   | -546.908 | -510.498  | -535.531 | -528.797  |
| 129   | -536.026 | -529.303  | -528.615 | -541.225  |
| 130   | -530.276 | -542.890  | -526.364 | -549.183  |
| 131   | -529.527 | -552.335  | -529.274 | -552.743  |
| 132   | -534.068 | -557.559  | -538.307 | -550.740  |
| 133   | -544.753 | -557.221  | -554.948 | -540.823  |
| 134   | -562.946 | -548.831  | -581.267 | -519.360  |
| 135   | -590.433 | -528.522  | -619.361 | -481.992  |
| 136   | -629.052 | -491.710  | -670.982 | -424.265  |
| 137   | -680.094 | -433.390  | -735.679 | -343.980  |
| 138   | -745.442 | -353.742  | -912.686 | -84.728   |
| 139   | -830.016 | -138.950  | -860.413 | -100.043  |
| 140   | -866.047 | -105.693  | -769.807 | -228.877  |
| 141   | -779.175 | -238.208  | -853.422 | -143.174  |
| 142   | -836.177 | -125.919  | -717.639 | -277.644  |
| 143   | -789.121 | -261.997  | -701.096 | -403.584  |
| 144   | -697.760 | -400.226  | -630.934 | -507.716  |
| 145   | -625.369 | -502.144  | -567.503 | -595.222  |
| 146   | -665.821 | -291.434  | -562.207 | -458.098  |
| 147   | -598.872 | -494.754  | -526.355 | -611.397  |
| 148   | -525.297 | -610.365  | -469.261 | -700.499  |
| 149   | -468.036 | -699.309  | -426.940 | -765.412  |
| 150   | -426.672 | -765.205  | -398.727 | -810.154  |
| 151   | -400.482 | -811.899  | -391.480 | -826.379  |
| 152   | -390.756 | -825.645  | -388.514 | -829.251  |
| 153   | -386.465 | -827.184  | -379.276 | -838.748  |
| 154   | -377.378 | -836.831  | -365.160 | -856.484  |
| 155   | -363.406 | -854.705  | -346.115 | -882.519  |
| 156   | -344.495 | -880.902  | -322.046 | -917.011  |
| 157   | -320.589 | -915.553  | -292.845 | -960.179  |
| 158   | -291.638 | -958.998  | -258.636 | -1012.082 |
| 159   | -257.630 | -1011.087 | -219.301 | -1072.740 |
| 160   | -218.644 | -1072.107 | -171.331 | -1148.210 |



## COMBINACION 12 G1 + G2 + PRETD + SCMAX-IPF + 0.6 TEMP

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -146.171 | -973.230 | -232.300 | -834.691 |
| 2     | -288.584 | -775.214 | -407.888 | -583.313 |
| 3     | -408.813 | -584.227 | -511.436 | -419.158 |
| 4     | -512.643 | -420.372 | -598.644 | -282.038 |
| 5     | -600.039 | -283.447 | -669.562 | -171.620 |
| 6     | -671.088 | -173.125 | -724.046 | -87.942  |
| 7     | -725.626 | -89.529  | -762.313 | -30.518  |
| 8     | -763.939 | -32.122  | -784.442 | 0.858    |
| 9     | -786.074 | -0.791   | -790.421 | 6.201    |
| 10    | -792.076 | 4.535    | -783.596 | -9.104   |
| 11    | -787.307 | -12.802  | -773.792 | -34.541  |
| 12    | -778.886 | -39.633  | -761.377 | -67.795  |
| 13    | -767.757 | -74.171  | -747.852 | -106.186 |
| 14    | -755.293 | -113.662 | -734.437 | -147.208 |
| 15    | -742.590 | -155.364 | -722.773 | -187.240 |
| 16    | -730.993 | -195.451 | -713.268 | -223.962 |
| 17    | -720.660 | -231.269 | -708.980 | -250.056 |
| 18    | -730.481 | -235.363 | -839.441 | -60.100  |
| 19    | -775.331 | -100.209 | -762.882 | -116.143 |
| 20    | -779.320 | -112.443 | -676.952 | -243.470 |
| 21    | -696.455 | -248.149 | -815.426 | -95.869  |
| 22    | -808.855 | -75.608  | -705.906 | -207.381 |
| 23    | -790.235 | -153.424 | -758.010 | -205.257 |
| 24    | -768.304 | -181.678 | -773.024 | -174.086 |
| 25    | -784.839 | -140.014 | -814.146 | -92.873  |
| 26    | -822.856 | -70.384  | -869.383 | 4.456    |
| 27    | -868.943 | 4.921    | -905.949 | 64.445   |
| 28    | -905.544 | 64.853   | -932.037 | 107.468  |
| 29    | -932.266 | 107.264  | -947.113 | 131.146  |
| 30    | -948.428 | 129.853  | -951.217 | 134.339  |
| 31    | -953.986 | 131.586  | -944.759 | 116.744  |
| 32    | -949.157 | 112.337  | -928.577 | 79.234   |
| 33    | -934.665 | 73.150   | -903.960 | 23.761   |
| 34    | -911.659 | 16.069   | -873.106 | -45.945  |
| 35    | -882.073 | -54.926  | -838.132 | -125.605 |
| 36    | -847.814 | -135.288 | -800.964 | -210.647 |
| 37    | -815.941 | -210.921 | -788.155 | -255.614 |
| 38    | -811.972 | -244.244 | -919.023 | -72.052  |
| 39    | -854.098 | -108.483 | -861.939 | -98.447  |
| 40    | -882.535 | -86.674  | -768.752 | -232.312 |
| 41    | -795.119 | -235.218 | -896.766 | -105.113 |
| 42    | -889.507 | -83.495  | -759.853 | -249.449 |
| 43    | -851.425 | -197.191 | -795.716 | -286.799 |
| 44    | -806.541 | -259.068 | -793.210 | -280.510 |
| 45    | -797.950 | -252.384 | -812.795 | -228.505 |
| 46    | -819.146 | -69.547  | -865.934 | 5.710    |
| 47    | -866.208 | 5.455    | -904.018 | 66.273   |
| 48    | -903.547 | 66.723   | -930.589 | 110.221  |
| 49    | -930.884 | 109.930  | -946.020 | 134.277  |
| 50    | -947.489 | 132.794  | -950.363 | 137.417  |
| 51    | -953.348 | 134.407  | -944.032 | 119.421  |
| 52    | -948.704 | 114.749  | -927.987 | 81.426   |
| 53    | -934.343 | 75.008   | -903.477 | 25.359   |
| 54    | -911.464 | 17.364   | -872.772 | -44.872  |

## COMBINACION 12 G1 + G2 + PRETD + SCMAX-IPF + 0.6 TEMP

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -882.034 | -54.096  | -838.094 | -124.773 |
| 56    | -848.009 | -134.667 | -801.300 | -209.799 |
| 57    | -819.218 | -205.715 | -801.205 | -234.688 |
| 58    | -823.954 | -225.085 | -941.026 | -36.773  |
| 59    | -875.219 | -81.171  | -891.782 | -59.971  |
| 60    | -912.312 | -47.787  | -807.325 | -182.167 |
| 61    | -833.607 | -184.786 | -932.840 | -57.771  |
| 62    | -925.678 | -36.172  | -793.791 | -204.983 |
| 63    | -887.404 | -138.930 | -829.029 | -232.827 |
| 64    | -840.332 | -205.046 | -822.368 | -233.943 |
| 65    | -827.503 | -205.689 | -839.617 | -186.203 |
| 66    | -846.245 | -27.107  | -890.076 | 43.395   |
| 67    | -890.411 | 43.089   | -925.301 | 99.210   |
| 68    | -924.851 | 99.670   | -949.007 | 138.526  |
| 69    | -949.270 | 138.252  | -961.619 | 158.116  |
| 70    | -963.036 | 156.682  | -963.190 | 156.930  |
| 71    | -966.115 | 154.001  | -954.145 | 134.748  |
| 72    | -958.737 | 130.149  | -935.367 | 92.559   |
| 73    | -941.654 | 86.245   | -908.123 | 32.309   |
| 74    | -916.018 | 24.377   | -874.681 | -42.115  |
| 75    | -883.856 | -51.290  | -837.244 | -126.265 |
| 76    | -847.100 | -136.111 | -797.636 | -215.674 |
| 77    | -816.415 | -210.130 | -798.013 | -239.731 |
| 78    | -820.810 | -230.084 | -937.627 | -42.184  |
| 79    | -872.074 | -85.310  | -888.378 | -64.442  |
| 80    | -908.998 | -52.318  | -803.748 | -187.035 |
| 81    | -830.097 | -189.691 | -930.119 | -61.666  |
| 82    | -922.925 | -40.043  | -791.730 | -207.968 |
| 83    | -885.139 | -142.701 | -827.648 | -235.175 |
| 84    | -838.864 | -207.305 | -821.710 | -234.898 |
| 85    | -826.779 | -206.611 | -839.819 | -185.635 |
| 86    | -845.987 | -27.218  | -890.059 | 43.673   |
| 87    | -890.382 | 43.347   | -925.507 | 99.847   |
| 88    | -925.091 | 100.318  | -949.464 | 139.523  |
| 89    | -949.762 | 139.232  | -962.296 | 159.393  |
| 90    | -963.751 | 157.929  | -964.034 | 158.385  |
| 91    | -967.005 | 155.428  | -955.106 | 136.289  |
| 92    | -959.744 | 131.662  | -936.526 | 94.314   |
| 93    | -942.858 | 87.982   | -909.542 | 34.393   |
| 94    | -917.471 | 26.442   | -876.370 | -39.669  |
| 95    | -885.553 | -48.873  | -839.182 | -123.460 |
| 96    | -849.029 | -133.321 | -799.887 | -212.365 |
| 97    | -818.887 | -206.400 | -801.410 | -234.511 |
| 98    | -824.154 | -224.800 | -941.877 | -35.443  |
| 99    | -876.049 | -80.068  | -894.583 | -56.346  |
| 100   | -915.119 | -44.155  | -815.103 | -172.173 |
| 101   | -841.408 | -174.794 | -936.175 | -53.496  |
| 102   | -929.020 | -31.925  | -795.614 | -202.682 |
| 103   | -889.316 | -135.881 | -830.932 | -229.793 |
| 104   | -842.204 | -201.999 | -824.121 | -231.084 |
| 105   | -829.212 | -202.792 | -841.336 | -183.290 |
| 106   | -845.972 | -27.264  | -886.854 | 38.496   |
| 107   | -887.124 | 38.237   | -919.049 | 89.588   |
| 108   | -918.545 | 90.107   | -939.760 | 124.231  |
| 109   | -939.965 | 124.009  | -949.352 | 139.107  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -950.727 | 137.732  | -947.874 | 133.144   |
| 111   | -950.777 | 130.290  | -935.757 | 106.130   |
| 112   | -940.324 | 101.575  | -913.847 | 58.986    |
| 113   | -920.126 | 52.707   | -883.462 | -6.268    |
| 114   | -891.364 | -14.193  | -846.827 | -85.831   |
| 115   | -856.028 | -95.032  | -806.147 | -175.265  |
| 116   | -816.046 | -185.195 | -763.367 | -269.930  |
| 117   | -782.797 | -263.594 | -762.137 | -296.826  |
| 118   | -785.261 | -287.050 | -900.088 | -102.349  |
| 119   | -836.628 | -130.998 | -851.041 | -112.550  |
| 120   | -871.920 | -100.417 | -764.701 | -237.654  |
| 121   | -791.136 | -240.339 | -900.691 | -100.112  |
| 122   | -893.418 | -78.360  | -771.720 | -234.129  |
| 123   | -864.103 | -176.685 | -816.651 | -253.011  |
| 124   | -827.939 | -224.809 | -820.719 | -236.422  |
| 125   | -825.883 | -208.046 | -849.843 | -169.507  |
| 126   | -848.115 | -25.427  | -891.120 | 43.747    |
| 127   | -891.585 | 43.271   | -925.533 | 97.877    |
| 128   | -925.291 | 98.135   | -948.497 | 135.462   |
| 129   | -948.990 | 134.953  | -960.359 | 153.240   |
| 130   | -962.028 | 151.585  | -961.228 | 150.299   |
| 131   | -964.385 | 147.137  | -951.543 | 126.480   |
| 132   | -956.339 | 121.668  | -932.298 | 82.998    |
| 133   | -938.736 | 76.503   | -904.748 | 21.833    |
| 134   | -912.740 | 13.816   | -871.164 | -53.060   |
| 135   | -880.330 | -62.221  | -833.666 | -137.280  |
| 136   | -843.356 | -147.000 | -794.017 | -226.361  |
| 137   | -816.235 | -214.406 | -799.733 | -240.949  |
| 138   | -824.572 | -226.460 | -951.438 | -22.395   |
| 139   | -879.439 | -75.690  | -896.355 | -54.038   |
| 140   | -917.743 | -39.523  | -826.550 | -156.248  |
| 141   | -846.645 | -151.848 | -917.519 | -61.132   |
| 142   | -904.582 | -38.363  | -785.989 | -190.158  |
| 143   | -872.347 | -128.127 | -797.327 | -248.796  |
| 144   | -805.951 | -226.199 | -767.573 | -287.931  |
| 145   | -775.931 | -259.965 | -779.904 | -253.573  |
| 146   | -879.157 | 51.719   | -832.907 | -22.675   |
| 147   | -869.576 | -59.323  | -844.374 | -99.862   |
| 148   | -843.318 | -98.825  | -824.373 | -129.299  |
| 149   | -823.147 | -128.111 | -809.005 | -150.858  |
| 150   | -808.740 | -150.646 | -797.495 | -168.733  |
| 151   | -799.250 | -170.478 | -796.620 | -174.708  |
| 152   | -795.894 | -173.977 | -789.765 | -183.836  |
| 153   | -787.716 | -181.770 | -766.384 | -216.082  |
| 154   | -764.489 | -214.160 | -727.828 | -273.130  |
| 155   | -726.072 | -271.355 | -674.160 | -354.855  |
| 156   | -672.536 | -353.244 | -605.025 | -461.837  |
| 157   | -603.566 | -460.381 | -520.498 | -593.998  |
| 158   | -519.291 | -592.816 | -420.671 | -751.448  |
| 159   | -419.663 | -750.457 | -305.470 | -934.137  |
| 160   | -304.810 | -933.508 | -171.333 | -1148.206 |



## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -146.169 | -973.234 | -212.889 | -865.913 |
| 2     | -249.201 | -838.562 | -333.486 | -702.988 |
| 3     | -334.411 | -703.903 | -406.365 | -588.165 |
| 4     | -407.573 | -589.377 | -467.256 | -493.377 |
| 5     | -468.650 | -494.787 | -516.189 | -418.320 |
| 6     | -517.715 | -419.827 | -553.101 | -362.908 |
| 7     | -554.680 | -364.497 | -578.137 | -326.766 |
| 8     | -579.763 | -328.371 | -591.377 | -309.689 |
| 9     | -593.009 | -311.337 | -592.840 | -311.609 |
| 10    | -594.496 | -313.273 | -585.839 | -327.198 |
| 11    | -589.548 | -330.899 | -580.243 | -345.865 |
| 12    | -585.337 | -350.957 | -576.398 | -365.336 |
| 13    | -582.778 | -371.710 | -575.740 | -383.030 |
| 14    | -583.179 | -390.508 | -579.570 | -396.314 |
| 15    | -587.724 | -404.466 | -589.442 | -401.703 |
| 16    | -597.663 | -409.913 | -605.900 | -396.663 |
| 17    | -613.274 | -404.001 | -630.429 | -376.406 |
| 18    | -645.933 | -371.359 | -774.090 | -165.218 |
| 19    | -708.254 | -186.065 | -702.590 | -193.315 |
| 20    | -715.208 | -194.505 | -614.232 | -323.750 |
| 21    | -630.928 | -332.021 | -758.002 | -169.371 |
| 22    | -748.837 | -152.430 | -651.815 | -276.616 |
| 23    | -727.042 | -255.070 | -691.379 | -312.434 |
| 24    | -696.060 | -297.884 | -684.854 | -315.908 |
| 25    | -689.065 | -294.067 | -693.572 | -286.818 |
| 26    | -693.712 | -278.113 | -707.677 | -255.650 |
| 27    | -707.234 | -255.189 | -718.219 | -237.520 |
| 28    | -717.815 | -237.111 | -724.885 | -225.738 |
| 29    | -725.114 | -225.941 | -727.247 | -222.510 |
| 30    | -728.563 | -223.801 | -725.293 | -229.061 |
| 31    | -728.063 | -231.813 | -719.438 | -245.687 |
| 32    | -723.836 | -250.094 | -710.542 | -271.478 |
| 33    | -716.628 | -277.564 | -699.951 | -304.389 |
| 34    | -707.648 | -312.085 | -689.791 | -340.809 |
| 35    | -698.757 | -349.790 | -682.190 | -376.440 |
| 36    | -691.870 | -386.126 | -679.060 | -406.730 |
| 37    | -691.603 | -410.919 | -695.409 | -404.796 |
| 38    | -713.435 | -402.741 | -842.560 | -195.043 |
| 39    | -773.749 | -211.327 | -788.380 | -192.600 |
| 40    | -802.835 | -188.687 | -687.896 | -335.806 |
| 41    | -709.788 | -344.439 | -820.795 | -202.354 |
| 42    | -810.816 | -184.218 | -688.356 | -340.964 |
| 43    | -769.475 | -329.008 | -712.952 | -419.926 |
| 44    | -717.388 | -402.471 | -689.953 | -446.601 |
| 45    | -689.245 | -427.236 | -680.357 | -441.532 |
| 46    | -676.889 | -298.370 | -692.320 | -273.549 |
| 47    | -692.595 | -273.802 | -705.583 | -252.911 |
| 48    | -705.113 | -252.459 | -713.940 | -238.261 |
| 49    | -714.233 | -238.555 | -717.871 | -232.703 |
| 50    | -719.343 | -234.181 | -717.384 | -237.331 |
| 51    | -720.368 | -240.343 | -712.892 | -252.368 |
| 52    | -717.564 | -257.040 | -705.370 | -276.654 |
| 53    | -711.729 | -283.068 | -696.143 | -308.138 |
| 54    | -704.133 | -316.129 | -687.409 | -343.030 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -696.670 | -352.256 | -681.370 | -376.866 |
| 56    | -691.284 | -386.761 | -679.893 | -405.083 |
| 57    | -694.160 | -406.870 | -704.955 | -389.507 |
| 58    | -722.341 | -388.529 | -858.568 | -169.407 |
| 59    | -789.024 | -191.498 | -809.857 | -164.832 |
| 60    | -824.181 | -160.593 | -715.496 | -299.706 |
| 61    | -737.291 | -308.068 | -846.568 | -168.195 |
| 62    | -836.674 | -150.095 | -712.664 | -308.824 |
| 63    | -795.319 | -287.050 | -736.847 | -381.102 |
| 64    | -741.674 | -363.739 | -711.050 | -412.998 |
| 65    | -710.652 | -393.644 | -699.702 | -411.257 |
| 66    | -696.442 | -268.067 | -709.692 | -246.754 |
| 67    | -710.023 | -247.067 | -720.878 | -229.605 |
| 68    | -720.428 | -229.145 | -727.165 | -218.310 |
| 69    | -727.427 | -218.584 | -729.068 | -215.943 |
| 70    | -730.486 | -217.376 | -726.584 | -223.653 |
| 71    | -729.507 | -226.584 | -720.145 | -241.643 |
| 72    | -724.735 | -246.244 | -710.653 | -268.896 |
| 73    | -716.940 | -275.209 | -699.458 | -303.330 |
| 74    | -707.357 | -311.257 | -688.743 | -341.197 |
| 75    | -697.917 | -350.374 | -680.683 | -378.094 |
| 76    | -690.539 | -387.940 | -677.158 | -409.464 |
| 77    | -691.906 | -410.405 | -702.022 | -394.133 |
| 78    | -719.443 | -393.134 | -855.115 | -174.904 |
| 79    | -785.815 | -195.719 | -806.117 | -169.733 |
| 80    | -820.525 | -165.561 | -711.305 | -305.359 |
| 81    | -733.167 | -313.760 | -843.139 | -172.999 |
| 82    | -833.210 | -154.874 | -709.801 | -312.835 |
| 83    | -792.211 | -292.176 | -734.527 | -384.960 |
| 84    | -739.270 | -367.504 | -709.399 | -415.550 |
| 85    | -708.940 | -396.155 | -698.812 | -412.447 |
| 86    | -695.278 | -269.635 | -708.964 | -247.620 |
| 87    | -709.285 | -247.949 | -720.552 | -229.825 |
| 88    | -720.131 | -229.362 | -727.256 | -217.900 |
| 89    | -727.553 | -218.191 | -729.563 | -214.958 |
| 90    | -731.017 | -216.424 | -727.442 | -222.175 |
| 91    | -730.416 | -225.128 | -721.341 | -239.725 |
| 92    | -725.977 | -244.355 | -712.240 | -266.451 |
| 93    | -718.573 | -272.783 | -701.477 | -300.281 |
| 94    | -709.408 | -308.230 | -691.206 | -337.508 |
| 95    | -700.388 | -346.712 | -683.592 | -373.727 |
| 96    | -693.438 | -383.589 | -680.534 | -404.346 |
| 97    | -695.393 | -405.041 | -706.337 | -387.438 |
| 98    | -723.700 | -386.381 | -860.175 | -166.860 |
| 99    | -790.558 | -189.495 | -812.992 | -160.780 |
| 100   | -827.317 | -156.539 | -723.234 | -289.762 |
| 101   | -745.053 | -298.126 | -849.505 | -164.431 |
| 102   | -839.617 | -146.359 | -713.729 | -307.491 |
| 103   | -796.437 | -285.278 | -737.581 | -379.948 |
| 104   | -742.381 | -362.564 | -711.304 | -412.552 |
| 105   | -710.863 | -393.156 | -699.550 | -411.353 |
| 106   | -695.135 | -269.886 | -706.356 | -251.837 |
| 107   | -706.627 | -252.095 | -715.447 | -237.907 |
| 108   | -714.944 | -237.387 | -719.665 | -229.794 |
| 109   | -719.873 | -230.012 | -719.484 | -230.638 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -720.858 | -232.013 | -714.876 | -241.635  |
| 111   | -717.777 | -244.491 | -706.298 | -262.955  |
| 112   | -710.864 | -267.513 | -694.622 | -293.638  |
| 113   | -700.903 | -299.915 | -681.230 | -331.560  |
| 114   | -689.131 | -339.486 | -668.271 | -373.039  |
| 115   | -677.471 | -382.242 | -657.951 | -413.640  |
| 116   | -667.852 | -423.566 | -652.196 | -448.749  |
| 117   | -667.354 | -449.285 | -675.762 | -435.760  |
| 118   | -693.431 | -434.759 | -827.616 | -218.922  |
| 119   | -759.875 | -229.239 | -778.807 | -205.007  |
| 120   | -793.427 | -200.885 | -682.756 | -342.541  |
| 121   | -704.692 | -350.985 | -821.638 | -201.298  |
| 122   | -811.618 | -183.060 | -695.148 | -332.138  |
| 123   | -776.739 | -317.211 | -726.438 | -398.120  |
| 124   | -731.181 | -380.444 | -708.637 | -416.706  |
| 125   | -708.244 | -397.270 | -706.020 | -400.846  |
| 126   | -698.039 | -266.826 | -712.667 | -243.296  |
| 127   | -713.134 | -243.769 | -725.263 | -224.259  |
| 128   | -725.019 | -224.005 | -733.002 | -211.164  |
| 129   | -733.496 | -211.671 | -736.358 | -207.067  |
| 130   | -738.024 | -208.727 | -735.381 | -212.978  |
| 131   | -738.541 | -216.135 | -730.532 | -229.017  |
| 132   | -735.328 | -233.831 | -722.792 | -253.994  |
| 133   | -729.234 | -260.483 | -713.508 | -285.778  |
| 134   | -721.503 | -293.791 | -704.870 | -320.544  |
| 135   | -714.036 | -329.706 | -698.990 | -353.909  |
| 136   | -708.680 | -363.628 | -697.624 | -381.411  |
| 137   | -714.176 | -378.568 | -727.616 | -356.950  |
| 138   | -745.938 | -352.944 | -889.403 | -122.179  |
| 139   | -814.831 | -158.386 | -837.143 | -129.828  |
| 140   | -851.720 | -124.030 | -757.914 | -244.100  |
| 141   | -773.371 | -245.636 | -847.909 | -150.231  |
| 142   | -833.109 | -129.845 | -716.746 | -278.787  |
| 143   | -794.800 | -252.861 | -716.469 | -378.858  |
| 144   | -719.922 | -364.578 | -671.557 | -442.374  |
| 145   | -673.896 | -424.089 | -653.880 | -456.284  |
| 146   | -752.729 | -151.642 | -684.502 | -261.386  |
| 147   | -721.169 | -298.037 | -678.263 | -367.052  |
| 148   | -677.206 | -366.017 | -644.899 | -417.984  |
| 149   | -643.674 | -416.795 | -620.478 | -454.106  |
| 150   | -620.211 | -453.895 | -604.267 | -479.542  |
| 151   | -606.023 | -481.286 | -603.078 | -486.022  |
| 152   | -602.353 | -485.290 | -600.266 | -488.647  |
| 153   | -598.216 | -486.581 | -585.281 | -507.388  |
| 154   | -583.385 | -505.467 | -559.493 | -543.898  |
| 155   | -557.738 | -542.120 | -522.919 | -598.128  |
| 156   | -521.297 | -596.514 | -475.309 | -670.487  |
| 157   | -473.851 | -669.029 | -416.663 | -761.017  |
| 158   | -415.456 | -759.835 | -347.089 | -869.805  |
| 159   | -346.082 | -868.812 | -266.491 | -996.835  |
| 160   | -265.832 | -996.204 | -171.332 | -1148.207 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 1     | -146.160 | -973.248  | -183.636 | -912.968  |
| 2     | -182.348 | -946.096  | -205.694 | -908.543  |
| 3     | -206.619 | -909.458  | -223.520 | -882.272  |
| 4     | -224.730 | -883.481  | -235.264 | -866.537  |
| 5     | -236.656 | -867.952  | -240.915 | -861.102  |
| 6     | -242.439 | -862.610  | -240.523 | -865.692  |
| 7     | -242.099 | -867.286  | -234.133 | -880.099  |
| 8     | -235.756 | -881.707  | -221.842 | -904.089  |
| 9     | -223.475 | -905.735  | -200.216 | -943.147  |
| 10    | -201.875 | -944.807  | -175.018 | -988.007  |
| 11    | -178.722 | -991.716  | -156.311 | -1027.763 |
| 12    | -161.406 | -1032.854 | -144.441 | -1060.141 |
| 13    | -150.823 | -1066.512 | -140.760 | -1082.698 |
| 14    | -148.196 | -1090.181 | -146.690 | -1092.605 |
| 15    | -154.848 | -1100.750 | -163.662 | -1086.573 |
| 16    | -171.884 | -1094.782 | -192.351 | -1061.859 |
| 17    | -199.653 | -1069.313 | -231.013 | -1018.870 |
| 18    | -224.770 | -1048.803 | -325.660 | -886.521  |
| 19    | -263.087 | -755.866  | -192.282 | -846.493  |
| 20    | -191.045 | -865.417  | 2.919    | -1113.685 |
| 21    | -3.603   | -1134.979 | -298.909 | -756.996  |
| 22    | -280.341 | -752.090  | -316.931 | -705.257  |
| 23    | -352.608 | -857.349  | -401.116 | -779.324  |
| 24    | -385.441 | -797.515  | -414.816 | -750.266  |
| 25    | -391.450 | -772.783  | -392.217 | -771.549  |
| 26    | -361.280 | -812.832  | -328.605 | -865.390  |
| 27    | -328.158 | -864.935  | -301.324 | -908.098  |
| 28    | -300.923 | -907.683  | -279.084 | -942.812  |
| 29    | -279.315 | -943.011  | -261.612 | -971.487  |
| 30    | -262.931 | -972.774  | -248.818 | -995.474  |
| 31    | -251.591 | -998.221  | -241.124 | -1015.058 |
| 32    | -245.522 | -1019.465 | -239.432 | -1029.260 |
| 33    | -245.515 | -1035.353 | -240.688 | -1043.116 |
| 34    | -248.380 | -1050.821 | -243.998 | -1057.870 |
| 35    | -252.965 | -1066.850 | -257.626 | -1059.353 |
| 36    | -267.302 | -1069.047 | -283.461 | -1043.054 |
| 37    | -287.176 | -1061.443 | -295.695 | -1047.740 |
| 38    | -292.512 | -1079.799 | -385.497 | -930.232  |
| 39    | -310.691 | -804.028  | -238.299 | -896.687  |
| 40    | -230.480 | -921.285  | 13.207   | -1233.196 |
| 41    | 7.573    | -1262.641 | -277.369 | -897.923  |
| 42    | -257.527 | -892.411  | -265.533 | -882.164  |
| 43    | -301.032 | -1082.503 | -337.466 | -1023.897 |
| 44    | -318.737 | -1043.704 | -332.907 | -1020.911 |
| 45    | -312.446 | -1033.320 | -306.532 | -1042.833 |
| 46    | -267.455 | -956.947  | -243.434 | -995.584  |
| 47    | -243.714 | -995.830  | -226.061 | -1024.225 |
| 48    | -225.596 | -1023.765 | -212.691 | -1044.522 |
| 49    | -212.981 | -1044.822 | -203.991 | -1059.283 |
| 50    | -205.471 | -1060.747 | -199.906 | -1069.698 |
| 51    | -202.888 | -1072.713 | -200.837 | -1076.013 |
| 52    | -205.509 | -1080.685 | -207.790 | -1077.016 |
| 53    | -214.154 | -1083.421 | -219.206 | -1075.295 |
| 54    | -227.205 | -1083.272 | -230.752 | -1077.566 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 55    | -240.012 | -1086.793 | -252.742 | -1066.317 |
| 56    | -262.655 | -1076.214 | -287.063 | -1036.953 |
| 57    | -288.090 | -1060.037 | -295.542 | -1048.052 |
| 58    | -293.481 | -1078.354 | -386.493 | -928.744  |
| 59    | -311.189 | -803.112  | -238.533 | -896.110  |
| 60    | -230.346 | -920.684  | 13.621   | -1232.953 |
| 61    | 8.099    | -1262.143 | -276.858 | -897.407  |
| 62    | -257.055 | -891.989  | -264.687 | -882.221  |
| 63    | -300.351 | -1083.209 | -336.647 | -1024.826 |
| 64    | -317.987 | -1045.243 | -331.882 | -1022.892 |
| 65    | -311.419 | -1035.814 | -305.214 | -1045.794 |
| 66    | -266.092 | -960.287  | -242.053 | -998.954  |
| 67    | -242.373 | -999.284  | -224.774 | -1027.593 |
| 68    | -224.323 | -1027.134 | -211.543 | -1047.691 |
| 69    | -211.804 | -1047.967 | -202.997 | -1062.133 |
| 70    | -204.419 | -1063.559 | -199.065 | -1072.170 |
| 71    | -201.980 | -1075.115 | -200.170 | -1078.026 |
| 72    | -204.758 | -1082.631 | -207.268 | -1078.594 |
| 73    | -213.556 | -1084.906 | -218.905 | -1076.302 |
| 74    | -226.813 | -1084.215 | -230.546 | -1078.209 |
| 75    | -239.717 | -1087.391 | -252.551 | -1066.748 |
| 76    | -262.407 | -1076.594 | -286.880 | -1037.229 |
| 77    | -287.006 | -1061.689 | -292.147 | -1053.420 |
| 78    | -290.072 | -1083.781 | -380.815 | -937.820  |
| 79    | -305.807 | -810.114  | -231.029 | -905.828  |
| 80    | -222.904 | -930.498  | 23.192   | -1245.492 |
| 81    | 17.601   | -1274.720 | -268.005 | -909.152  |
| 82    | -248.165 | -903.714  | -256.379 | -893.201  |
| 83    | -291.532 | -1097.522 | -328.563 | -1037.956 |
| 84    | -309.833 | -1058.256 | -324.524 | -1034.625 |
| 85    | -304.018 | -1047.475 | -298.618 | -1056.161 |
| 86    | -259.903 | -969.939  | -237.322 | -1006.261 |
| 87    | -237.639 | -1006.594 | -221.438 | -1032.654 |
| 88    | -221.005 | -1032.210 | -209.586 | -1050.577 |
| 89    | -209.881 | -1050.871 | -202.460 | -1062.807 |
| 90    | -203.911 | -1064.279 | -199.925 | -1070.689 |
| 91    | -202.907 | -1073.629 | -202.481 | -1074.314 |
| 92    | -207.111 | -1078.954 | -211.001 | -1072.697 |
| 93    | -217.334 | -1079.030 | -224.065 | -1068.203 |
| 94    | -231.997 | -1076.149 | -237.138 | -1067.880 |
| 95    | -246.318 | -1077.087 | -260.605 | -1054.105 |
| 96    | -270.450 | -1063.969 | -296.363 | -1022.287 |
| 97    | -296.207 | -1047.134 | -302.135 | -1037.599 |
| 98    | -299.984 | -1067.931 | -391.482 | -920.756  |
| 99    | -315.887 | -797.059  | -243.245 | -890.039  |
| 100   | -235.040 | -914.635  | 5.940    | -1223.083 |
| 101   | 0.389    | -1252.269 | -278.118 | -895.789  |
| 102   | -258.317 | -890.405  | -262.428 | -885.143  |
| 103   | -297.983 | -1087.045 | -332.195 | -1032.015 |
| 104   | -313.525 | -1052.382 | -325.385 | -1033.305 |
| 105   | -304.889 | -1046.168 | -296.681 | -1059.371 |
| 106   | -259.443 | -970.700  | -236.408 | -1007.752 |
| 107   | -236.681 | -1008.006 | -220.092 | -1034.690 |
| 108   | -219.592 | -1034.163 | -207.847 | -1053.057 |
| 109   | -208.061 | -1053.265 | -200.302 | -1065.744 |

## COMBINACION 14 G1 + G2 + PRETD + SCMIN-IPF

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 110   | -201.673 | -1067.126 | -197.291 | -1074.174 |
| 111   | -200.187 | -1077.040 | -199.329 | -1078.419 |
| 112   | -203.890 | -1082.984 | -207.350 | -1077.419 |
| 113   | -213.636 | -1083.689 | -220.195 | -1073.137 |
| 114   | -228.095 | -1081.067 | -232.751 | -1073.576 |
| 115   | -241.949 | -1082.782 | -255.706 | -1060.654 |
| 116   | -265.614 | -1070.570 | -290.975 | -1029.776 |
| 117   | -290.637 | -1055.237 | -295.810 | -1046.915 |
| 118   | -293.693 | -1077.740 | -384.601 | -931.514  |
| 119   | -309.454 | -805.764  | -234.921 | -901.164  |
| 120   | -226.843 | -926.096  | 19.101   | -1240.897 |
| 121   | 13.478   | -1270.222 | -271.118 | -905.946  |
| 122   | -251.143 | -900.452  | -257.947 | -891.742  |
| 123   | -292.876 | -1095.507 | -329.233 | -1037.027 |
| 124   | -310.244 | -1057.525 | -324.397 | -1034.759 |
| 125   | -303.850 | -1047.741 | -296.706 | -1059.232 |
| 126   | -266.253 | -961.355  | -253.406 | -982.020  |
| 127   | -253.876 | -982.487  | -247.354 | -992.979  |
| 128   | -247.106 | -992.730  | -245.353 | -995.551  |
| 129   | -245.851 | -996.052  | -248.061 | -992.498  |
| 130   | -249.719 | -994.168  | -255.440 | -984.967  |
| 131   | -258.606 | -988.114  | -268.003 | -972.999  |
| 132   | -272.796 | -977.816  | -286.684 | -955.478  |
| 133   | -293.135 | -961.950  | -312.984 | -930.023  |
| 134   | -320.985 | -938.026  | -342.217 | -903.874  |
| 135   | -351.381 | -913.040  | -377.170 | -871.559  |
| 136   | -386.860 | -881.277  | -424.375 | -820.933  |
| 137   | -420.386 | -851.132  | -437.281 | -823.956  |
| 138   | -431.966 | -857.969  | -526.564 | -705.808  |
| 139   | -448.872 | -626.803  | -383.904 | -709.961  |
| 140   | -373.782 | -735.777  | -150.714 | -1021.296 |
| 141   | -149.362 | -1044.349 | -335.106 | -806.603  |
| 142   | -313.554 | -794.860  | -286.335 | -829.699  |
| 143   | -325.819 | -1007.221 | -312.493 | -1028.655 |
| 144   | -297.198 | -1044.532 | -281.850 | -1069.219 |
| 145   | -262.363 | -1086.042 | -228.162 | -1141.055 |
| 146   | -325.547 | -838.767  | -244.622 | -968.934  |
| 147   | -281.285 | -1005.594 | -231.441 | -1085.768 |
| 148   | -230.382 | -1084.738 | -197.008 | -1138.420 |
| 149   | -195.785 | -1137.227 | -177.365 | -1166.856 |
| 150   | -177.096 | -1166.649 | -171.817 | -1175.140 |
| 151   | -173.573 | -1176.884 | -187.256 | -1154.875 |
| 152   | -186.533 | -1154.139 | -206.976 | -1121.256 |
| 153   | -204.927 | -1119.190 | -220.407 | -1094.289 |
| 154   | -218.511 | -1092.371 | -228.980 | -1075.530 |
| 155   | -227.228 | -1073.748 | -232.629 | -1065.062 |
| 156   | -231.011 | -1063.442 | -231.260 | -1063.040 |
| 157   | -229.807 | -1061.576 | -224.755 | -1069.702 |
| 158   | -223.549 | -1068.520 | -213.248 | -1085.090 |
| 159   | -212.242 | -1084.095 | -196.603 | -1109.250 |
| 160   | -195.946 | -1108.616 | -171.329 | -1148.213 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -146.162 | -973.245 | -182.605 | -914.625 |
| 2     | -188.819 | -935.687 | -218.636 | -887.726 |
| 3     | -219.560 | -888.642 | -242.936 | -851.041 |
| 4     | -244.145 | -852.252 | -261.148 | -824.903 |
| 5     | -262.540 | -826.317 | -273.268 | -809.061 |
| 6     | -274.793 | -810.569 | -279.349 | -803.240 |
| 7     | -280.926 | -804.832 | -279.433 | -807.233 |
| 8     | -281.057 | -808.841 | -273.608 | -820.822 |
| 9     | -275.242 | -822.469 | -259.843 | -847.238 |
| 10    | -261.500 | -848.899 | -242.898 | -878.822 |
| 11    | -246.603 | -882.529 | -232.788 | -904.750 |
| 12    | -237.882 | -909.841 | -229.844 | -922.771 |
| 13    | -236.226 | -929.142 | -235.414 | -930.447 |
| 14    | -242.851 | -937.928 | -250.918 | -924.952 |
| 15    | -259.077 | -933.098 | -277.788 | -903.000 |
| 16    | -286.010 | -911.209 | -316.725 | -861.804 |
| 17    | -324.047 | -869.225 | -366.399 | -801.101 |
| 18    | -366.152 | -821.389 | -490.382 | -621.564 |
| 19    | -425.059 | -548.546 | -386.449 | -597.966 |
| 20    | -389.032 | -611.999 | -236.214 | -807.602 |
| 21    | -245.541 | -825.305 | -473.530 | -533.486 |
| 22    | -457.555 | -525.262 | -440.073 | -547.639 |
| 23    | -488.109 | -639.396 | -498.153 | -623.239 |
| 24    | -488.092 | -632.402 | -490.229 | -628.964 |
| 25    | -474.468 | -639.249 | -462.114 | -659.119 |
| 26    | -439.746 | -686.619 | -408.184 | -737.386 |
| 27    | -407.739 | -736.930 | -382.019 | -778.300 |
| 28    | -381.617 | -777.887 | -360.892 | -811.223 |
| 29    | -361.123 | -811.423 | -344.535 | -838.105 |
| 30    | -345.853 | -839.393 | -332.856 | -860.299 |
| 31    | -335.628 | -863.048 | -326.277 | -878.088 |
| 32    | -330.675 | -882.495 | -325.698 | -890.502 |
| 33    | -331.781 | -896.593 | -329.860 | -899.683 |
| 34    | -337.553 | -907.386 | -339.032 | -905.007 |
| 35    | -347.999 | -913.987 | -359.032 | -896.241 |
| 36    | -368.708 | -905.933 | -391.750 | -868.871 |
| 37    | -397.899 | -883.344 | -422.515 | -843.748 |
| 38    | -425.125 | -866.491 | -546.056 | -671.971 |
| 39    | -471.347 | -598.392 | -439.727 | -638.866 |
| 40    | -438.050 | -655.601 | -248.621 | -898.064 |
| 41    | -258.743 | -921.763 | -474.828 | -645.181 |
| 42    | -457.706 | -636.188 | -413.643 | -692.588 |
| 43    | -463.208 | -821.641 | -459.216 | -828.062 |
| 44    | -446.875 | -837.594 | -434.926 | -856.813 |
| 45    | -419.912 | -860.460 | -398.790 | -894.436 |
| 46    | -369.532 | -792.756 | -344.412 | -833.162 |
| 47    | -344.690 | -833.410 | -325.939 | -863.571 |
| 48    | -325.472 | -863.113 | -311.475 | -885.628 |
| 49    | -311.766 | -885.927 | -301.675 | -902.157 |
| 50    | -303.154 | -903.624 | -296.484 | -914.353 |
| 51    | -299.466 | -917.368 | -296.304 | -922.453 |
| 52    | -300.976 | -927.126 | -302.139 | -925.254 |
| 53    | -308.503 | -931.660 | -313.631 | -923.412 |
| 54    | -321.628 | -931.392 | -329.014 | -919.511 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -338.274 | -928.738 | -355.347 | -901.275 |
| 56    | -365.260 | -911.172 | -394.517 | -864.113 |
| 57    | -399.195 | -881.324 | -424.748 | -840.223 |
| 58    | -428.049 | -861.900 | -550.552 | -664.853 |
| 59    | -475.310 | -593.042 | -444.953 | -631.898 |
| 60    | -442.974 | -648.526 | -254.810 | -889.370 |
| 61    | -264.820 | -912.816 | -480.506 | -636.744 |
| 62    | -463.435 | -627.829 | -418.812 | -684.945 |
| 63    | -468.877 | -812.134 | -464.321 | -819.462 |
| 64    | -452.138 | -829.460 | -439.483 | -849.815 |
| 65    | -424.553 | -853.837 | -402.699 | -888.989 |
| 66    | -373.466 | -787.576 | -347.778 | -828.895 |
| 67    | -348.101 | -829.220 | -328.851 | -860.184 |
| 68    | -328.401 | -859.725 | -313.967 | -882.940 |
| 69    | -314.229 | -883.216 | -303.774 | -900.033 |
| 70    | -305.195 | -901.460 | -298.190 | -912.727 |
| 71    | -301.107 | -915.668 | -297.647 | -921.233 |
| 72    | -302.236 | -925.837 | -303.092 | -924.460 |
| 73    | -309.380 | -930.773 | -314.241 | -922.954 |
| 74    | -322.147 | -930.870 | -329.196 | -919.531 |
| 75    | -338.367 | -928.712 | -355.027 | -901.915 |
| 76    | -364.883 | -911.760 | -393.693 | -865.419 |
| 77    | -397.852 | -883.393 | -421.578 | -845.228 |
| 78    | -424.880 | -866.941 | -545.626 | -672.720 |
| 79    | -470.660 | -599.108 | -438.660 | -640.067 |
| 80    | -436.748 | -656.783 | -246.936 | -899.738 |
| 81    | -257.012 | -923.223 | -473.341 | -646.328 |
| 82    | -456.235 | -637.392 | -412.176 | -693.785 |
| 83    | -461.812 | -823.625 | -457.989 | -829.774 |
| 84    | -445.731 | -839.663 | -433.854 | -858.767 |
| 85    | -418.876 | -862.725 | -397.803 | -896.621 |
| 86    | -368.789 | -794.794 | -344.257 | -834.254 |
| 87    | -344.576 | -834.586 | -326.427 | -863.779 |
| 88    | -325.996 | -863.331 | -312.630 | -884.829 |
| 89    | -312.926 | -885.122 | -303.551 | -900.202 |
| 90    | -305.002 | -901.672 | -299.057 | -911.235 |
| 91    | -302.037 | -914.178 | -299.640 | -918.034 |
| 92    | -304.272 | -922.671 | -306.200 | -919.569 |
| 93    | -312.533 | -925.901 | -318.472 | -916.348 |
| 94    | -326.404 | -924.294 | -334.559 | -911.178 |
| 95    | -343.739 | -920.384 | -361.555 | -891.727 |
| 96    | -371.400 | -901.591 | -401.350 | -853.416 |
| 97    | -405.334 | -871.603 | -429.839 | -832.186 |
| 98    | -433.070 | -853.862 | -554.562 | -658.441 |
| 99    | -479.091 | -588.163 | -449.197 | -626.426 |
| 100   | -447.206 | -643.070 | -262.491 | -879.500 |
| 101   | -272.527 | -902.945 | -482.236 | -634.524 |
| 102   | -465.168 | -625.642 | -417.505 | -686.649 |
| 103   | -467.506 | -814.365 | -461.362 | -824.249 |
| 104   | -449.164 | -834.206 | -434.944 | -857.078 |
| 105   | -419.979 | -861.046 | -396.591 | -898.665 |
| 106   | -368.403 | -795.436 | -342.904 | -836.453 |
| 107   | -343.176 | -836.708 | -324.121 | -867.357 |
| 108   | -323.621 | -866.833 | -309.402 | -889.704 |
| 109   | -309.615 | -889.914 | -299.380 | -906.377 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== |          |           |          |           |
| 110   | -300.752 | -907.756  | -293.900 | -918.779  |
| 111   | -296.796 | -921.642  | -293.466 | -926.999  |
| 112   | -298.028 | -931.562  | -299.001 | -929.997  |
| 113   | -305.286 | -936.269  | -310.404 | -928.035  |
| 114   | -318.304 | -935.964  | -325.422 | -924.515  |
| 115   | -334.620 | -933.720  | -351.348 | -906.813  |
| 116   | -361.255 | -916.731  | -390.094 | -870.342  |
| 117   | -394.029 | -888.930  | -417.321 | -851.464  |
| 118   | -420.660 | -873.512  | -541.112 | -679.764  |
| 119   | -466.461 | -604.801  | -434.277 | -645.995  |
| 120   | -432.458 | -662.915  | -242.373 | -906.218  |
| 121   | -252.493 | -929.786  | -469.933 | -651.470  |
| 122   | -452.703 | -642.461  | -409.504 | -697.755  |
| 123   | -458.761 | -828.680  | -456.373 | -832.521  |
| 124   | -443.928 | -842.492  | -433.567 | -859.158  |
| 125   | -418.577 | -863.201  | -398.270 | -895.865  |
| 126   | -374.070 | -787.932  | -356.750 | -815.791  |
| 127   | -357.219 | -816.260  | -346.235 | -833.929  |
| 128   | -345.987 | -833.680  | -339.768 | -843.684  |
| 129   | -340.264 | -844.187  | -338.009 | -847.815  |
| 130   | -339.669 | -849.483  | -340.920 | -847.471  |
| 131   | -344.085 | -850.621  | -349.005 | -842.707  |
| 132   | -353.798 | -847.523  | -363.210 | -832.385  |
| 133   | -369.659 | -838.861  | -385.029 | -814.138  |
| 134   | -393.029 | -822.143  | -412.480 | -790.856  |
| 135   | -421.645 | -800.020  | -448.072 | -757.512  |
| 136   | -457.762 | -767.230  | -496.427 | -705.038  |
| 137   | -498.101 | -726.127  | -530.919 | -673.338  |
| 138   | -532.122 | -696.867  | -657.281 | -495.548  |
| 139   | -579.068 | -460.156  | -554.481 | -491.627  |
| 140   | -551.170 | -508.725  | -382.046 | -725.199  |
| 141   | -385.328 | -742.320  | -524.975 | -563.576  |
| 142   | -505.286 | -549.449  | -440.390 | -632.514  |
| 143   | -492.178 | -739.631  | -448.445 | -809.975  |
| 144   | -438.320 | -817.537  | -402.604 | -874.986  |
| 145   | -389.135 | -882.128  | -346.588 | -950.566  |
| 146   | -444.376 | -647.629  | -355.528 | -790.541  |
| 147   | -392.192 | -827.199  | -334.433 | -920.106  |
| 148   | -333.374 | -919.075  | -292.088 | -985.483  |
| 149   | -290.865 | -984.291  | -264.526 | -1026.656 |
| 150   | -264.259 | -1026.448 | -251.066 | -1047.667 |
| 151   | -252.822 | -1049.411 | -258.584 | -1040.143 |
| 152   | -257.861 | -1039.408 | -270.382 | -1019.267 |
| 153   | -268.333 | -1017.201 | -275.898 | -1005.032 |
| 154   | -274.001 | -1003.113 | -276.547 | -999.019  |
| 155   | -274.795 | -997.237  | -272.268 | -1001.301 |
| 156   | -270.650 | -999.682  | -262.970 | -1012.034 |
| 157   | -261.516 | -1010.572 | -248.538 | -1031.448 |
| 158   | -247.331 | -1030.266 | -229.101 | -1059.589 |
| 159   | -228.095 | -1058.594 | -204.531 | -1096.498 |
| 160   | -203.874 | -1095.864 | -171.329 | -1148.212 |



COMBINACION 16 G1 + G2 + PRETD + SCMAX-EC1 + 0.6 TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -146.169 | -973.232 | -251.763 | -803.384 |
| 2     | -272.644 | -800.854 | -377.231 | -632.625 |
| 3     | -378.169 | -633.518 | -467.778 | -489.382 |
| 4     | -468.996 | -490.578 | -543.488 | -370.757 |
| 5     | -544.882 | -372.168 | -604.241 | -276.689 |
| 6     | -605.775 | -278.182 | -650.679 | -205.953 |
| 7     | -652.257 | -207.544 | -681.948 | -159.785 |
| 8     | -683.582 | -161.377 | -698.992 | -136.589 |
| 9     | -700.621 | -138.243 | -701.661 | -136.570 |
| 10    | -703.321 | -138.227 | -693.587 | -153.885 |
| 11    | -697.295 | -157.587 | -684.063 | -178.870 |
| 12    | -689.155 | -183.966 | -674.264 | -207.917 |
| 13    | -680.645 | -214.290 | -665.571 | -238.537 |
| 14    | -673.003 | -246.026 | -659.076 | -268.428 |
| 15    | -667.225 | -276.589 | -657.698 | -291.913 |
| 16    | -665.919 | -300.123 | -669.524 | -294.323 |
| 17    | -676.906 | -301.647 | -687.787 | -284.146 |
| 18    | -705.495 | -275.553 | -828.707 | -77.366  |
| 19    | -762.127 | -117.109 | -757.266 | -123.331 |
| 20    | -768.320 | -126.522 | -672.097 | -249.684 |
| 21    | -687.646 | -259.424 | -808.594 | -104.615 |
| 22    | -798.703 | -88.603  | -704.801 | -208.795 |
| 23    | -784.936 | -161.946 | -759.026 | -203.624 |
| 24    | -765.771 | -185.753 | -774.514 | -171.689 |
| 25    | -775.588 | -154.895 | -796.708 | -120.923 |
| 26    | -793.343 | -117.855 | -814.108 | -84.455  |
| 27    | -813.678 | -83.974  | -827.408 | -61.889  |
| 28    | -827.004 | -61.479  | -832.584 | -52.503  |
| 29    | -832.817 | -52.700  | -829.035 | -58.784  |
| 30    | -830.352 | -60.073  | -826.398 | -66.434  |
| 31    | -829.167 | -69.187  | -824.681 | -76.402  |
| 32    | -829.075 | -80.816  | -816.100 | -101.686 |
| 33    | -822.186 | -107.772 | -801.592 | -140.899 |
| 34    | -809.287 | -148.597 | -783.368 | -190.290 |
| 35    | -792.321 | -199.293 | -763.735 | -245.273 |
| 36    | -773.398 | -254.987 | -746.464 | -298.311 |
| 37    | -759.901 | -301.061 | -756.922 | -305.852 |
| 38    | -777.029 | -300.451 | -895.337 | -110.152 |
| 39    | -826.844 | -143.368 | -830.928 | -138.140 |
| 40    | -847.641 | -131.337 | -730.803 | -280.887 |
| 41    | -754.340 | -287.414 | -860.810 | -151.136 |
| 42    | -851.832 | -131.719 | -733.470 | -283.218 |
| 43    | -819.322 | -248.829 | -775.204 | -319.793 |
| 44    | -781.990 | -298.559 | -767.621 | -321.671 |
| 45    | -764.665 | -305.923 | -773.342 | -291.966 |
| 46    | -765.859 | -155.261 | -789.098 | -117.881 |
| 47    | -789.380 | -118.122 | -806.125 | -91.188  |
| 48    | -805.659 | -90.729  | -813.985 | -77.338  |
| 49    | -814.281 | -77.627  | -816.909 | -73.399  |
| 50    | -818.380 | -74.879  | -816.656 | -77.652  |
| 51    | -819.639 | -80.665  | -812.299 | -92.471  |
| 52    | -816.970 | -97.145  | -806.379 | -114.181 |
| 53    | -812.732 | -120.604 | -794.610 | -149.754 |
| 54    | -802.597 | -157.750 | -779.081 | -195.575 |

COMBINACION 16 G1 + G2 + PRETD + SCMAX-EC1 + 0.6 TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -788.337 | -204.808 | -762.229 | -246.804 |
| 56    | -772.142 | -256.700 | -747.247 | -296.743 |
| 57    | -762.856 | -296.373 | -768.136 | -287.879 |
| 58    | -787.493 | -283.732 | -913.194 | -81.541  |
| 59    | -843.929 | -121.221 | -855.027 | -107.015 |
| 60    | -871.633 | -99.855  | -761.843 | -240.384 |
| 61    | -785.287 | -246.633 | -891.003 | -111.320 |
| 62    | -882.113 | -91.933  | -760.870 | -247.121 |
| 63    | -848.422 | -201.633 | -802.133 | -276.088 |
| 64    | -809.342 | -254.894 | -788.049 | -289.145 |
| 65    | -789.204 | -267.292 | -792.026 | -262.754 |
| 66    | -784.714 | -126.081 | -805.842 | -92.096  |
| 67    | -806.184 | -92.390  | -820.868 | -68.771  |
| 68    | -820.418 | -68.311  | -826.826 | -58.003  |
| 69    | -827.091 | -58.273  | -830.246 | -53.198  |
| 70    | -831.665 | -54.629  | -827.618 | -61.138  |
| 71    | -830.541 | -64.071  | -819.382 | -82.020  |
| 72    | -823.970 | -86.624  | -811.380 | -106.875 |
| 73    | -817.664 | -113.195 | -797.737 | -145.248 |
| 74    | -805.626 | -153.190 | -780.321 | -193.893 |
| 75    | -789.495 | -203.070 | -761.545 | -248.027 |
| 76    | -771.390 | -257.891 | -744.064 | -301.844 |
| 77    | -760.296 | -300.399 | -764.903 | -292.988 |
| 78    | -784.301 | -288.810 | -909.407 | -87.576  |
| 79    | -840.406 | -125.845 | -850.968 | -112.325 |
| 80    | -867.660 | -105.230 | -757.333 | -246.444 |
| 81    | -780.845 | -252.733 | -887.413 | -116.329 |
| 82    | -878.490 | -96.918  | -757.871 | -251.307 |
| 83    | -845.172 | -206.987 | -799.757 | -280.037 |
| 84    | -806.880 | -258.751 | -786.002 | -292.334 |
| 85    | -787.578 | -269.666 | -790.104 | -265.603 |
| 86    | -782.610 | -129.160 | -804.370 | -94.159  |
| 87    | -804.685 | -94.497  | -819.975 | -69.903  |
| 88    | -819.561 | -69.428  | -826.974 | -57.505  |
| 89    | -827.269 | -57.797  | -830.777 | -52.155  |
| 90    | -832.231 | -53.621  | -828.487 | -59.643  |
| 91    | -831.462 | -62.594  | -820.557 | -80.134  |
| 92    | -825.195 | -84.762  | -813.336 | -103.838 |
| 93    | -819.674 | -110.161 | -800.324 | -141.286 |
| 94    | -808.247 | -149.247 | -783.548 | -188.975 |
| 95    | -792.722 | -198.191 | -765.400 | -242.139 |
| 96    | -775.240 | -252.011 | -747.954 | -295.901 |
| 97    | -763.724 | -295.131 | -769.244 | -286.251 |
| 98    | -788.585 | -282.013 | -914.572 | -79.362  |
| 99    | -845.251 | -119.489 | -857.972 | -103.207 |
| 100   | -874.581 | -96.043  | -769.538 | -230.495 |
| 101   | -793.006 | -236.747 | -894.056 | -107.407 |
| 102   | -885.173 | -88.049  | -762.075 | -245.610 |
| 103   | -849.686 | -199.627 | -803.100 | -274.561 |
| 104   | -810.280 | -253.348 | -788.200 | -288.864 |
| 105   | -789.794 | -266.196 | -790.558 | -264.966 |
| 106   | -782.441 | -129.454 | -801.823 | -98.278  |
| 107   | -802.099 | -98.527  | -815.022 | -77.741  |
| 108   | -814.523 | -77.214  | -819.094 | -69.862  |
| 109   | -819.302 | -70.080  | -819.257 | -70.152  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -820.633 | -71.525  | -814.113 | -82.012   |
| 111   | -817.016 | -84.865  | -805.918 | -102.716  |
| 112   | -810.480 | -107.281 | -796.187 | -130.270  |
| 113   | -802.470 | -136.545 | -780.613 | -171.702  |
| 114   | -788.504 | -179.643 | -761.206 | -223.553  |
| 115   | -770.397 | -232.769 | -740.411 | -281.003  |
| 116   | -750.306 | -290.939 | -720.322 | -339.168  |
| 117   | -733.732 | -342.515 | -734.282 | -341.631  |
| 118   | -753.957 | -337.403 | -877.246 | -139.091  |
| 119   | -810.044 | -165.024 | -817.810 | -155.084  |
| 120   | -834.732 | -148.017 | -723.970 | -289.788  |
| 121   | -747.560 | -296.115 | -862.274 | -149.285  |
| 122   | -853.265 | -129.754 | -740.781 | -273.730  |
| 123   | -827.164 | -236.101 | -790.347 | -295.323  |
| 124   | -797.497 | -273.774 | -785.112 | -293.696  |
| 125   | -786.763 | -270.972 | -796.007 | -256.102  |
| 126   | -786.071 | -125.225 | -810.176 | -86.452   |
| 127   | -810.643 | -86.925  | -828.186 | -58.706   |
| 128   | -827.951 | -58.438  | -837.220 | -43.528   |
| 129   | -837.715 | -44.035  | -837.549 | -44.301   |
| 130   | -839.216 | -45.959  | -834.875 | -52.941   |
| 131   | -838.037 | -56.094  | -837.085 | -57.627   |
| 132   | -841.879 | -62.443  | -832.353 | -77.764   |
| 133   | -838.793 | -84.256  | -821.907 | -111.417  |
| 134   | -829.897 | -119.437 | -807.865 | -154.875  |
| 135   | -817.026 | -164.046 | -792.588 | -203.355  |
| 136   | -802.262 | -213.100 | -777.982 | -252.155  |
| 137   | -792.215 | -253.042 | -785.271 | -264.211  |
| 138   | -805.988 | -256.352 | -938.837 | -42.663   |
| 139   | -864.012 | -95.436  | -881.221 | -73.410   |
| 140   | -893.008 | -71.183  | -805.913 | -182.662  |
| 141   | -819.471 | -186.630 | -891.703 | -94.175   |
| 142   | -876.139 | -74.768  | -758.148 | -225.794  |
| 143   | -840.008 | -180.144 | -771.694 | -290.028  |
| 144   | -777.049 | -272.689 | -740.985 | -330.698  |
| 145   | -745.537 | -308.853 | -732.581 | -329.693  |
| 146   | -831.577 | -24.813  | -767.162 | -128.426  |
| 147   | -803.830 | -165.076 | -763.349 | -230.190  |
| 148   | -762.292 | -229.157 | -731.412 | -278.827  |
| 149   | -730.185 | -277.641 | -707.823 | -313.611  |
| 150   | -707.556 | -313.401 | -691.113 | -339.850  |
| 151   | -692.871 | -341.590 | -687.985 | -349.448  |
| 152   | -687.260 | -348.717 | -681.941 | -357.272  |
| 153   | -679.891 | -355.206 | -662.889 | -382.554  |
| 154   | -660.993 | -380.635 | -630.693 | -429.373  |
| 155   | -628.936 | -427.598 | -588.657 | -492.388  |
| 156   | -587.027 | -490.787 | -533.867 | -576.295  |
| 157   | -532.420 | -574.822 | -465.117 | -683.078  |
| 158   | -463.898 | -681.916 | -382.355 | -813.079  |
| 159   | -381.336 | -812.105 | -285.757 | -965.845  |
| 160   | -285.083 | -965.238 | -171.335 | -1148.202 |



## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -146.169 | -973.234 | -240.616 | -821.315 |
| 2     | -259.054 | -822.713 | -351.936 | -673.312 |
| 3     | -352.872 | -674.209 | -432.558 | -546.033 |
| 4     | -433.774 | -547.233 | -500.165 | -440.442 |
| 5     | -501.559 | -441.854 | -554.661 | -356.438 |
| 6     | -556.194 | -357.933 | -596.574 | -292.982 |
| 7     | -598.151 | -294.573 | -625.225 | -251.025 |
| 8     | -626.856 | -252.620 | -641.388 | -229.247 |
| 9     | -643.017 | -230.899 | -644.954 | -227.783 |
| 10    | -646.614 | -229.441 | -639.486 | -240.906 |
| 11    | -643.193 | -244.610 | -634.399 | -258.756 |
| 12    | -639.490 | -263.851 | -630.698 | -277.994 |
| 13    | -637.078 | -284.367 | -629.755 | -296.147 |
| 14    | -637.188 | -303.634 | -632.731 | -310.804 |
| 15    | -640.882 | -318.962 | -642.243 | -316.773 |
| 16    | -650.464 | -324.982 | -664.911 | -301.743 |
| 17    | -672.286 | -309.079 | -695.152 | -272.299 |
| 18    | -710.714 | -267.159 | -842.888 | -54.555  |
| 19    | -773.998 | -101.915 | -773.225 | -102.904 |
| 20    | -783.505 | -107.086 | -689.047 | -227.989 |
| 21    | -704.027 | -238.457 | -827.911 | -79.889  |
| 22    | -817.428 | -64.635  | -723.995 | -184.227 |
| 23    | -802.691 | -133.388 | -773.211 | -180.807 |
| 24    | -777.946 | -166.169 | -777.427 | -167.003 |
| 25    | -776.965 | -152.679 | -786.965 | -136.594 |
| 26    | -781.864 | -136.319 | -791.281 | -121.172 |
| 27    | -790.848 | -120.696 | -795.922 | -112.534 |
| 28    | -795.518 | -112.124 | -795.186 | -112.658 |
| 29    | -795.419 | -112.856 | -788.540 | -123.921 |
| 30    | -789.857 | -125.210 | -783.673 | -135.156 |
| 31    | -786.443 | -137.909 | -780.680 | -147.178 |
| 32    | -785.074 | -151.592 | -773.509 | -170.195 |
| 33    | -779.594 | -176.282 | -763.197 | -202.657 |
| 34    | -770.892 | -210.356 | -751.917 | -240.878 |
| 35    | -760.873 | -249.877 | -741.944 | -280.324 |
| 36    | -751.610 | -290.034 | -736.672 | -314.061 |
| 37    | -749.238 | -318.213 | -756.113 | -307.154 |
| 38    | -774.148 | -305.085 | -900.347 | -102.092 |
| 39    | -829.004 | -140.603 | -836.514 | -130.990 |
| 40    | -851.029 | -127.001 | -733.625 | -277.274 |
| 41    | -755.561 | -285.852 | -865.775 | -144.781 |
| 42    | -855.823 | -126.611 | -738.862 | -276.316 |
| 43    | -822.434 | -243.824 | -775.786 | -318.857 |
| 44    | -780.285 | -301.301 | -759.407 | -334.884 |
| 45    | -755.351 | -320.905 | -753.818 | -323.370 |
| 46    | -744.345 | -189.866 | -757.176 | -169.228 |
| 47    | -757.457 | -169.471 | -766.481 | -154.955 |
| 48    | -766.015 | -154.497 | -769.372 | -149.098 |
| 49    | -769.667 | -149.388 | -769.361 | -149.881 |
| 50    | -770.833 | -151.359 | -767.843 | -156.168 |
| 51    | -770.826 | -159.181 | -764.159 | -169.905 |
| 52    | -768.830 | -174.579 | -760.541 | -187.912 |
| 53    | -766.896 | -194.332 | -753.848 | -215.319 |
| 54    | -761.837 | -223.312 | -746.170 | -248.512 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -755.427 | -257.744 | -739.891 | -282.735 |
| 56    | -749.804 | -292.631 | -737.942 | -311.711 |
| 57    | -752.244 | -313.443 | -767.120 | -289.513 |
| 58    | -784.558 | -288.453 | -918.049 | -73.732  |
| 59    | -845.897 | -118.701 | -860.299 | -100.267 |
| 60    | -874.683 | -95.951  | -764.204 | -237.362 |
| 61    | -786.042 | -245.667 | -895.276 | -105.851 |
| 62    | -885.408 | -87.716  | -765.801 | -240.809 |
| 63    | -851.033 | -197.434 | -802.227 | -275.939 |
| 64    | -807.117 | -258.473 | -780.247 | -301.693 |
| 65    | -779.519 | -282.872 | -772.842 | -293.612 |
| 66    | -763.527 | -160.160 | -774.217 | -142.966 |
| 67    | -774.556 | -143.265 | -781.491 | -132.109 |
| 68    | -781.042 | -131.648 | -782.435 | -129.407 |
| 69    | -782.700 | -129.677 | -782.403 | -130.154 |
| 70    | -783.822 | -131.584 | -778.568 | -140.035 |
| 71    | -781.490 | -142.968 | -771.372 | -159.244 |
| 72    | -775.961 | -163.848 | -765.675 | -180.393 |
| 73    | -771.959 | -186.711 | -757.069 | -210.661 |
| 74    | -764.962 | -218.599 | -747.464 | -246.744 |
| 75    | -756.637 | -255.922 | -739.214 | -283.947 |
| 76    | -749.060 | -293.808 | -734.836 | -316.689 |
| 77    | -749.624 | -317.565 | -763.507 | -295.235 |
| 78    | -780.980 | -294.152 | -913.561 | -80.893  |
| 79    | -841.700 | -124.188 | -855.263 | -106.828 |
| 80    | -869.730 | -102.579 | -758.411 | -245.065 |
| 81    | -780.316 | -253.410 | -890.461 | -112.428 |
| 82    | -880.560 | -94.269  | -761.663 | -246.453 |
| 83    | -846.589 | -204.708 | -798.735 | -281.681 |
| 84    | -803.541 | -264.123 | -777.262 | -306.393 |
| 85    | -776.858 | -286.909 | -770.202 | -297.616 |
| 86    | -760.740 | -164.338 | -772.201 | -145.904 |
| 87    | -772.516 | -146.242 | -780.192 | -133.894 |
| 88    | -779.776 | -133.423 | -782.222 | -129.487 |
| 89    | -782.518 | -129.780 | -782.752 | -129.403 |
| 90    | -784.206 | -130.869 | -779.439 | -138.537 |
| 91    | -782.415 | -141.487 | -772.741 | -157.047 |
| 92    | -777.378 | -161.675 | -767.924 | -176.883 |
| 93    | -774.261 | -183.208 | -760.082 | -206.015 |
| 94    | -768.007 | -213.973 | -751.248 | -240.929 |
| 95    | -760.424 | -250.143 | -743.769 | -276.932 |
| 96    | -753.610 | -286.803 | -739.678 | -309.212 |
| 97    | -754.089 | -310.629 | -768.962 | -286.705 |
| 98    | -786.378 | -285.564 | -919.918 | -70.763  |
| 99    | -847.682 | -116.378 | -863.486 | -96.149  |
| 100   | -877.872 | -91.831  | -771.896 | -227.476 |
| 101   | -793.758 | -235.785 | -898.082 | -102.253 |
| 102   | -888.221 | -84.147  | -766.543 | -239.891 |
| 103   | -851.811 | -196.208 | -802.469 | -275.575 |
| 104   | -807.332 | -258.090 | -779.533 | -302.804 |
| 105   | -779.147 | -283.321 | -770.531 | -297.180 |
| 106   | -760.580 | -164.618 | -769.613 | -150.088 |
| 107   | -769.888 | -150.339 | -775.158 | -141.862 |
| 108   | -774.659 | -141.336 | -774.328 | -141.868 |
| 109   | -774.536 | -142.085 | -771.424 | -147.090 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -772.800 | -148.464 | -765.301 | -160.527  |
| 111   | -768.203 | -163.381 | -757.861 | -180.017  |
| 112   | -762.423 | -184.581 | -750.498 | -203.762  |
| 113   | -756.780 | -210.037 | -740.062 | -236.928  |
| 114   | -747.956 | -244.867 | -728.570 | -276.048  |
| 115   | -737.763 | -285.262 | -718.417 | -316.379  |
| 116   | -728.314 | -326.313 | -711.661 | -353.100  |
| 117   | -724.205 | -357.840 | -734.541 | -341.214  |
| 118   | -752.263 | -340.127 | -883.121 | -129.641  |
| 119   | -812.954 | -161.301 | -824.043 | -147.106  |
| 120   | -838.724 | -142.907 | -726.803 | -286.162  |
| 121   | -748.783 | -294.550 | -866.646 | -143.689  |
| 122   | -856.653 | -125.417 | -745.460 | -267.741  |
| 123   | -829.494 | -232.354 | -789.798 | -296.206  |
| 124   | -794.605 | -278.426 | -776.403 | -307.704  |
| 125   | -776.064 | -288.180 | -776.059 | -288.189  |
| 126   | -764.743 | -159.531 | -779.400 | -135.956  |
| 127   | -779.867 | -136.428 | -790.659 | -119.069  |
| 128   | -790.421 | -118.804 | -795.662 | -110.374  |
| 129   | -796.156 | -110.882 | -794.758 | -113.131  |
| 130   | -796.423 | -114.791 | -792.499 | -121.103  |
| 131   | -795.662 | -124.256 | -795.296 | -124.845  |
| 132   | -800.089 | -129.661 | -793.879 | -139.651  |
| 133   | -800.319 | -146.141 | -789.527 | -163.501  |
| 134   | -797.519 | -171.518 | -784.350 | -192.700  |
| 135   | -793.512 | -201.869 | -780.655 | -222.550  |
| 136   | -790.332 | -232.290 | -780.317 | -248.399  |
| 137   | -793.403 | -251.132 | -799.792 | -240.854  |
| 138   | -818.177 | -236.747 | -958.540 | -10.971   |
| 139   | -880.906 | -73.813  | -901.236 | -47.791   |
| 140   | -911.644 | -47.329  | -823.029 | -160.754  |
| 141   | -835.647 | -165.925 | -907.072 | -74.504   |
| 142   | -891.131 | -55.580  | -771.786 | -208.337  |
| 143   | -852.487 | -160.071 | -778.806 | -278.588  |
| 144   | -782.310 | -264.226 | -738.522 | -334.659  |
| 145   | -740.920 | -316.279 | -717.225 | -354.394  |
| 146   | -816.076 | -49.747  | -742.127 | -168.694  |
| 147   | -778.795 | -205.345 | -730.286 | -283.372  |
| 148   | -729.229 | -282.339 | -691.772 | -342.589  |
| 149   | -690.545 | -341.403 | -662.964 | -385.767  |
| 150   | -662.696 | -385.559 | -642.554 | -417.957  |
| 151   | -644.311 | -419.699 | -637.277 | -431.013  |
| 152   | -636.552 | -430.281 | -630.597 | -439.858  |
| 153   | -628.548 | -437.792 | -612.331 | -463.877  |
| 154   | -610.434 | -461.959 | -582.649 | -506.652  |
| 155   | -580.892 | -504.878 | -544.182 | -563.925  |
| 156   | -542.554 | -562.321 | -494.583 | -639.484  |
| 157   | -493.133 | -638.014 | -432.862 | -734.960  |
| 158   | -431.646 | -733.794 | -359.003 | -850.640  |
| 159   | -357.987 | -849.662 | -273.125 | -986.163  |
| 160   | -272.455 | -985.551 | -171.334 | -1148.204 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -146.168 | -973.235 | -224.568 | -847.128 |
| 2     | -239.637 | -853.945 | -315.092 | -732.575 |
| 3     | -316.025 | -733.477 | -380.170 | -630.299 |
| 4     | -381.384 | -631.501 | -434.162 | -546.608 |
| 5     | -435.556 | -548.020 | -476.997 | -481.362 |
| 6     | -478.527 | -482.861 | -509.081 | -433.714 |
| 7     | -510.659 | -435.305 | -529.918 | -404.326 |
| 8     | -531.548 | -405.924 | -540.107 | -392.157 |
| 9     | -541.738 | -393.808 | -539.584 | -397.271 |
| 10    | -541.243 | -398.931 | -531.833 | -414.067 |
| 11    | -535.541 | -417.770 | -526.406 | -432.463 |
| 12    | -531.498 | -437.557 | -524.130 | -449.409 |
| 13    | -530.511 | -455.782 | -526.371 | -462.441 |
| 14    | -533.805 | -469.926 | -534.353 | -469.046 |
| 15    | -542.505 | -477.201 | -550.397 | -464.507 |
| 16    | -558.618 | -472.717 | -579.654 | -438.880 |
| 17    | -587.021 | -446.228 | -617.713 | -396.860 |
| 18    | -630.942 | -395.473 | -767.649 | -175.577 |
| 19    | -700.332 | -196.206 | -699.221 | -197.628 |
| 20    | -708.608 | -202.952 | -611.319 | -327.478 |
| 21    | -625.643 | -338.786 | -753.902 | -174.618 |
| 22    | -742.746 | -160.226 | -651.152 | -277.464 |
| 23    | -723.863 | -260.183 | -691.988 | -311.454 |
| 24    | -694.540 | -300.329 | -685.748 | -314.469 |
| 25    | -683.514 | -302.996 | -683.109 | -303.647 |
| 26    | -676.004 | -306.596 | -674.511 | -308.997 |
| 27    | -674.075 | -308.525 | -671.094 | -313.320 |
| 28    | -670.691 | -312.910 | -665.213 | -321.721 |
| 29    | -665.445 | -321.919 | -656.400 | -336.467 |
| 30    | -657.718 | -337.757 | -650.402 | -349.525 |
| 31    | -653.171 | -352.277 | -647.391 | -361.574 |
| 32    | -651.786 | -365.986 | -643.055 | -380.030 |
| 33    | -649.141 | -386.118 | -638.530 | -403.184 |
| 34    | -646.225 | -410.884 | -635.948 | -427.416 |
| 35    | -644.906 | -436.410 | -637.551 | -448.241 |
| 36    | -647.220 | -457.945 | -646.360 | -459.328 |
| 37    | -657.979 | -465.003 | -676.670 | -434.940 |
| 38    | -692.469 | -436.465 | -828.348 | -217.902 |
| 39    | -757.396 | -232.258 | -769.774 | -216.415 |
| 40    | -781.899 | -215.485 | -665.126 | -364.951 |
| 41    | -685.321 | -375.757 | -799.221 | -229.968 |
| 42    | -788.210 | -213.153 | -672.526 | -361.225 |
| 43    | -750.213 | -359.991 | -700.645 | -439.722 |
| 44    | -702.658 | -426.165 | -674.599 | -471.297 |
| 45    | -669.274 | -459.360 | -656.686 | -479.609 |
| 46    | -644.917 | -349.797 | -646.219 | -347.703 |
| 47    | -646.499 | -347.948 | -646.847 | -347.388 |
| 48    | -646.380 | -346.930 | -643.977 | -350.796 |
| 49    | -644.272 | -351.088 | -640.404 | -357.309 |
| 50    | -641.877 | -358.785 | -637.160 | -366.373 |
| 51    | -640.143 | -369.386 | -633.853 | -379.504 |
| 52    | -638.524 | -384.177 | -632.406 | -394.019 |
| 53    | -638.762 | -400.436 | -630.823 | -413.206 |
| 54    | -638.813 | -421.197 | -631.194 | -433.452 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -640.452 | -442.683 | -635.850 | -450.085 |
| 56    | -645.763 | -459.981 | -647.462 | -457.249 |
| 57    | -660.343 | -461.266 | -685.114 | -421.422 |
| 58    | -700.464 | -423.718 | -841.869 | -196.268 |
| 59    | -770.250 | -215.528 | -787.804 | -193.059 |
| 60    | -799.773 | -191.834 | -688.207 | -334.636 |
| 61    | -708.299 | -345.176 | -821.466 | -200.325 |
| 62    | -810.535 | -183.552 | -692.911 | -334.106 |
| 63    | -771.929 | -324.672 | -720.710 | -407.059 |
| 64    | -723.080 | -393.647 | -690.458 | -446.120 |
| 65    | -687.673 | -430.606 | -671.148 | -457.188 |
| 66    | -659.523 | -327.452 | -659.151 | -328.049 |
| 67    | -659.487 | -328.354 | -658.218 | -330.394 |
| 68    | -657.769 | -329.934 | -653.856 | -336.227 |
| 69    | -654.120 | -336.499 | -650.244 | -342.732 |
| 70    | -651.664 | -344.162 | -645.241 | -354.493 |
| 71    | -648.162 | -357.428 | -639.287 | -371.704 |
| 72    | -643.875 | -376.308 | -636.261 | -388.556 |
| 73    | -642.546 | -394.873 | -633.226 | -409.864 |
| 74    | -641.121 | -417.797 | -632.127 | -432.264 |
| 75    | -641.300 | -441.442 | -635.264 | -451.151 |
| 76    | -645.113 | -461.008 | -645.015 | -461.166 |
| 77    | -658.234 | -464.566 | -682.156 | -426.087 |
| 78    | -697.538 | -428.369 | -838.184 | -202.139 |
| 79    | -766.814 | -220.040 | -783.671 | -198.463 |
| 80    | -795.722 | -197.308 | -683.456 | -341.005 |
| 81    | -703.615 | -351.585 | -817.515 | -205.796 |
| 82    | -806.550 | -189.000 | -689.485 | -338.838 |
| 83    | -768.231 | -330.747 | -717.793 | -411.878 |
| 84    | -720.080 | -398.371 | -687.975 | -450.012 |
| 85    | -685.420 | -433.988 | -668.982 | -460.428 |
| 86    | -657.251 | -330.801 | -657.551 | -330.319 |
| 87    | -657.866 | -330.656 | -657.232 | -331.675 |
| 88    | -656.813 | -331.209 | -653.762 | -336.117 |
| 89    | -654.058 | -336.409 | -650.652 | -341.888 |
| 90    | -652.105 | -343.354 | -646.114 | -352.992 |
| 91    | -649.090 | -355.941 | -640.611 | -369.579 |
| 92    | -645.247 | -374.209 | -638.326 | -385.342 |
| 93    | -644.662 | -391.668 | -635.946 | -405.688 |
| 94    | -643.873 | -413.643 | -635.512 | -427.091 |
| 95    | -644.689 | -436.304 | -639.323 | -444.935 |
| 96    | -649.165 | -454.803 | -649.373 | -454.468 |
| 97    | -662.295 | -458.280 | -687.037 | -418.482 |
| 98    | -702.359 | -420.709 | -843.792 | -193.212 |
| 99    | -772.079 | -213.147 | -791.025 | -188.897 |
| 100   | -802.994 | -187.672 | -695.895 | -324.755 |
| 101   | -716.011 | -335.298 | -824.233 | -196.777 |
| 102   | -813.308 | -180.033 | -693.606 | -333.248 |
| 103   | -772.658 | -323.526 | -720.882 | -406.809 |
| 104   | -723.226 | -393.374 | -689.751 | -447.220 |
| 105   | -687.213 | -431.198 | -669.084 | -460.359 |
| 106   | -657.016 | -331.201 | -655.338 | -333.901 |
| 107   | -655.611 | -334.153 | -653.031 | -338.304 |
| 108   | -652.531 | -337.779 | -647.265 | -346.249 |
| 109   | -647.474 | -346.465 | -641.427 | -356.192 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 110   | -642.802 | -357.567  | -634.620 | -370.728  |
| 111   | -637.521 | -373.584  | -628.395 | -388.263  |
| 112   | -632.958 | -392.826  | -624.026 | -407.192  |
| 113   | -630.309 | -413.466  | -619.520 | -430.820  |
| 114   | -627.415 | -438.756  | -616.899 | -455.673  |
| 115   | -626.093 | -464.884  | -618.509 | -477.083  |
| 116   | -628.408 | -487.013  | -626.370 | -490.292  |
| 117   | -637.915 | -496.638  | -659.049 | -462.643  |
| 118   | -674.648 | -464.971  | -813.911 | -240.967  |
| 119   | -743.925 | -249.655  | -758.869 | -230.527  |
| 120   | -771.114 | -229.445  | -658.317 | -373.822  |
| 121   | -678.546 | -384.451  | -798.587 | -230.802  |
| 122   | -787.527 | -213.897  | -676.585 | -355.899  |
| 123   | -754.576 | -352.860  | -710.655 | -423.507  |
| 124   | -712.916 | -409.824  | -687.273 | -451.071  |
| 125   | -684.771 | -435.026  | -673.719 | -452.803  |
| 126   | -660.812 | -326.705  | -664.101 | -321.415  |
| 127   | -664.568 | -321.887  | -666.855 | -318.209  |
| 128   | -666.614 | -317.948  | -666.236 | -318.558  |
| 129   | -666.731 | -319.064  | -662.672 | -325.592  |
| 130   | -664.337 | -327.253  | -659.569 | -334.921  |
| 131   | -662.732 | -338.074  | -661.857 | -339.482  |
| 132   | -666.651 | -344.297  | -662.825 | -350.451  |
| 133   | -669.268 | -356.938  | -663.803 | -365.728  |
| 134   | -671.797 | -373.743  | -666.891 | -381.633  |
| 135   | -676.054 | -390.801  | -674.343 | -393.554  |
| 136   | -684.023 | -403.288  | -688.002 | -396.887  |
| 137   | -699.764 | -401.750  | -718.939 | -370.907  |
| 138   | -734.788 | -370.879  | -881.842 | -134.340  |
| 139   | -805.575 | -170.234  | -828.062 | -141.451  |
| 140   | -836.880 | -143.026  | -745.532 | -259.948  |
| 141   | -757.067 | -266.505  | -832.420 | -170.056  |
| 142   | -816.044 | -151.688  | -700.041 | -300.168  |
| 143   | -775.397 | -284.070  | -701.089 | -403.597  |
| 144   | -702.580 | -392.472  | -655.604 | -468.034  |
| 145   | -655.660 | -453.421  | -625.486 | -501.956  |
| 146   | -724.181 | -197.561  | -645.055 | -324.836  |
| 147   | -681.722 | -361.489  | -629.648 | -445.249  |
| 148   | -628.591 | -444.216  | -589.123 | -507.701  |
| 149   | -587.897 | -506.512  | -559.768 | -551.758  |
| 150   | -559.501 | -551.548  | -540.438 | -582.212  |
| 151   | -542.195 | -583.953  | -537.897 | -590.866  |
| 152   | -537.172 | -590.134  | -535.571 | -592.708  |
| 153   | -533.522 | -590.642  | -523.184 | -607.271  |
| 154   | -521.288 | -605.352  | -501.212 | -637.644  |
| 155   | -499.457 | -635.867  | -471.617 | -680.648  |
| 156   | -469.991 | -679.040  | -432.614 | -739.162  |
| 157   | -431.163 | -737.693  | -383.434 | -814.465  |
| 158   | -382.221 | -813.295  | -324.100 | -906.783  |
| 159   | -323.086 | -905.802  | -254.663 | -1015.860 |
| 160   | -253.996 | -1015.242 | -171.334 | -1148.205 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | Tl_2      |
|-------|----------|-----------|----------|-----------|
| 1     | -146.160 | -973.247  | -181.073 | -917.090  |
| 2     | -184.010 | -943.422  | -209.019 | -903.195  |
| 3     | -209.944 | -904.109  | -228.508 | -874.249  |
| 4     | -229.718 | -875.458  | -241.913 | -855.842  |
| 5     | -243.305 | -857.256  | -249.226 | -847.732  |
| 6     | -250.752 | -849.239  | -250.498 | -849.647  |
| 7     | -252.074 | -851.240  | -245.770 | -861.380  |
| 8     | -247.396 | -862.986  | -235.142 | -882.696  |
| 9     | -236.773 | -884.346  | -218.673 | -913.460  |
| 10    | -220.332 | -915.119  | -199.617 | -948.438  |
| 11    | -203.322 | -952.146  | -187.914 | -976.930  |
| 12    | -193.009 | -982.019  | -183.867 | -996.724  |
| 13    | -190.249 | -1003.096 | -188.820 | -1005.394 |
| 14    | -196.258 | -1012.873 | -204.197 | -1000.104 |
| 15    | -212.355 | -1008.250 | -231.431 | -977.566  |
| 16    | -239.652 | -985.776  | -271.244 | -934.959  |
| 17    | -278.576 | -942.364  | -322.470 | -871.760  |
| 18    | -324.669 | -888.115  | -425.741 | -725.539  |
| 19    | -365.234 | -625.120  | -298.584 | -710.430  |
| 20    | -302.716 | -722.481  | -123.502 | -951.870  |
| 21    | -134.005 | -968.068  | -384.633 | -647.272  |
| 22    | -369.738 | -637.665  | -381.016 | -623.230  |
| 23    | -428.978 | -734.507  | -455.181 | -692.360  |
| 24    | -447.429 | -697.807  | -444.928 | -701.830  |
| 25    | -432.304 | -707.069  | -421.111 | -725.073  |
| 26    | -402.263 | -746.911  | -377.698 | -786.424  |
| 27    | -377.253 | -785.967  | -358.351 | -816.369  |
| 28    | -357.950 | -815.955  | -336.122 | -851.066  |
| 29    | -336.353 | -851.266  | -318.662 | -879.722  |
| 30    | -319.980 | -881.010  | -304.237 | -906.334  |
| 31    | -307.009 | -909.082  | -291.861 | -933.447  |
| 32    | -296.259 | -937.854  | -285.486 | -955.183  |
| 33    | -291.569 | -961.275  | -286.529 | -969.382  |
| 34    | -294.220 | -977.086  | -296.998 | -972.619  |
| 35    | -305.965 | -981.599  | -316.351 | -964.894  |
| 36    | -326.028 | -974.585  | -347.169 | -940.580  |
| 37    | -354.312 | -953.454  | -380.792 | -910.860  |
| 38    | -385.379 | -930.421  | -488.490 | -764.566  |
| 39    | -419.376 | -664.914  | -353.314 | -749.472  |
| 40    | -354.131 | -763.015  | -133.138 | -1045.880 |
| 41    | -145.096 | -1067.228 | -383.236 | -762.417  |
| 42    | -367.246 | -751.974  | -359.033 | -762.486  |
| 43    | -408.946 | -908.922  | -414.776 | -899.543  |
| 44    | -405.073 | -904.833  | -389.857 | -929.307  |
| 45    | -377.092 | -929.337  | -357.186 | -961.355  |
| 46    | -331.960 | -853.190  | -313.839 | -882.338  |
| 47    | -314.116 | -882.587  | -296.772 | -910.485  |
| 48    | -296.306 | -910.027  | -281.840 | -933.297  |
| 49    | -282.130 | -933.596  | -271.571 | -950.580  |
| 50    | -273.050 | -952.046  | -265.821 | -963.673  |
| 51    | -268.803 | -966.688  | -260.208 | -980.513  |
| 52    | -264.880 | -985.187  | -260.611 | -992.053  |
| 53    | -266.975 | -998.458  | -268.466 | -996.059  |
| 54    | -276.463 | -1004.040 | -285.854 | -988.935  |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | Tl_2      |
|-------|----------|-----------|----------|-----------|
| 55    | -295.113 | -998.162  | -313.100 | -969.230  |
| 56    | -323.013 | -979.126  | -349.596 | -936.368  |
| 57    | -355.765 | -951.181  | -384.654 | -904.713  |
| 58    | -387.530 | -927.075  | -493.994 | -755.826  |
| 59    | -424.342 | -658.280  | -360.052 | -740.569  |
| 60    | -360.591 | -753.974  | -141.444 | -1034.475 |
| 61    | -153.291 | -1055.570 | -390.790 | -751.577  |
| 62    | -374.869 | -741.191  | -366.362 | -752.079  |
| 63    | -416.896 | -895.746  | -421.941 | -887.630  |
| 64    | -412.430 | -893.331  | -396.355 | -919.186  |
| 65    | -383.709 | -919.535  | -362.918 | -952.977  |
| 66    | -337.744 | -845.035  | -317.267 | -877.973  |
| 67    | -317.589 | -878.298  | -298.079 | -909.680  |
| 68    | -297.629 | -909.220  | -282.938 | -932.852  |
| 69    | -283.199 | -933.127  | -272.484 | -950.362  |
| 70    | -273.906 | -951.787  | -266.640 | -963.475  |
| 71    | -269.558 | -966.415  | -260.856 | -980.412  |
| 72    | -265.445 | -985.016  | -261.057 | -992.074  |
| 73    | -267.345 | -998.386  | -268.715 | -996.183  |
| 74    | -276.621 | -1004.098 | -285.877 | -989.210  |
| 75    | -295.048 | -998.391  | -312.749 | -969.919  |
| 76    | -322.605 | -979.765  | -348.533 | -938.059  |
| 77    | -354.339 | -953.383  | -381.615 | -909.511  |
| 78    | -384.284 | -932.239  | -489.368 | -763.211  |
| 79    | -419.977 | -663.981  | -354.253 | -748.105  |
| 80    | -354.860 | -761.597  | -134.251 | -1043.971 |
| 81    | -146.192 | -1065.069 | -384.317 | -760.277  |
| 82    | -368.348 | -749.885  | -360.438 | -760.009  |
| 83    | -410.574 | -906.042  | -416.344 | -896.761  |
| 84    | -406.761 | -902.346  | -391.463 | -926.953  |
| 85    | -378.763 | -927.247  | -358.742 | -959.452  |
| 86    | -333.711 | -851.218  | -313.330 | -884.000  |
| 87    | -313.648 | -884.333  | -295.347 | -913.771  |
| 88    | -294.915 | -913.325  | -281.397 | -935.068  |
| 89    | -281.692 | -935.362  | -272.167 | -950.684  |
| 90    | -273.617 | -952.156  | -267.524 | -961.956  |
| 91    | -270.504 | -964.899  | -262.987 | -976.990  |
| 92    | -267.619 | -981.626  | -264.413 | -986.784  |
| 93    | -270.746 | -993.116  | -273.292 | -989.020  |
| 94    | -281.224 | -996.967  | -291.692 | -980.129  |
| 95    | -300.871 | -989.337  | -318.663 | -960.719  |
| 96    | -328.507 | -970.583  | -355.451 | -927.245  |
| 97    | -361.127 | -942.710  | -389.169 | -897.604  |
| 98    | -393.098 | -918.156  | -497.589 | -750.083  |
| 99    | -427.739 | -653.891  | -364.119 | -735.323  |
| 100   | -364.637 | -748.755  | -149.129 | -1024.599 |
| 101   | -161.027 | -1045.661 | -392.736 | -749.081  |
| 102   | -376.792 | -738.761  | -365.467 | -753.256  |
| 103   | -415.968 | -897.265  | -419.610 | -891.407  |
| 104   | -410.085 | -897.065  | -392.649 | -925.111  |
| 105   | -379.965 | -925.409  | -357.834 | -961.006  |
| 106   | -333.363 | -851.799  | -312.130 | -885.953  |
| 107   | -312.402 | -886.208  | -293.386 | -916.796  |
| 108   | -292.886 | -916.269  | -278.707 | -939.077  |
| 109   | -278.922 | -939.285  | -268.728 | -955.682  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== | =====    | =====     | =====    | =====     |
| 110   | -270.100 | -957.061  | -263.287 | -968.019  |
| 111   | -266.184 | -970.883  | -258.018 | -984.018  |
| 112   | -262.579 | -988.583  | -258.628 | -994.937  |
| 113   | -264.914 | -1001.208 | -266.679 | -998.368  |
| 114   | -274.578 | -1006.297 | -284.205 | -990.812  |
| 115   | -293.403 | -1000.018 | -306.435 | -979.055  |
| 116   | -316.341 | -988.974  | -341.974 | -947.744  |
| 117   | -347.656 | -963.521  | -374.324 | -920.625  |
| 118   | -379.887 | -939.096  | -481.788 | -775.188  |
| 119   | -412.881 | -673.382  | -346.847 | -757.903  |
| 120   | -347.586 | -771.548  | -126.467 | -1054.574 |
| 121   | -138.425 | -1075.790 | -378.537 | -768.454  |
| 122   | -362.436 | -757.999  | -356.431 | -765.686  |
| 123   | -406.159 | -913.292  | -413.683 | -901.188  |
| 124   | -403.935 | -906.822  | -391.068 | -927.519  |
| 125   | -378.375 | -927.866  | -360.826 | -956.095  |
| 126   | -338.594 | -844.994  | -326.993 | -863.655  |
| 127   | -327.463 | -864.123  | -317.376 | -880.348  |
| 128   | -317.128 | -880.099  | -311.674 | -888.873  |
| 129   | -312.171 | -889.376  | -310.682 | -891.770  |
| 130   | -312.341 | -893.441  | -314.361 | -890.192  |
| 131   | -317.525 | -893.342  | -320.173 | -889.083  |
| 132   | -324.967 | -893.899  | -330.456 | -885.070  |
| 133   | -336.906 | -891.545  | -348.352 | -873.134  |
| 134   | -356.353 | -881.136  | -375.922 | -849.659  |
| 135   | -385.087 | -858.823  | -415.270 | -810.273  |
| 136   | -424.960 | -819.992  | -463.723 | -757.642  |
| 137   | -467.714 | -775.004  | -500.635 | -722.050  |
| 138   | -499.442 | -749.434  | -593.813 | -597.638  |
| 139   | -520.645 | -534.935  | -463.814 | -607.677  |
| 140   | -463.279 | -621.224  | -261.904 | -878.977  |
| 141   | -267.095 | -893.654  | -432.801 | -681.557  |
| 142   | -413.889 | -666.434  | -380.237 | -709.508  |
| 143   | -431.247 | -837.638  | -401.272 | -885.853  |
| 144   | -393.290 | -889.968  | -355.275 | -951.114  |
| 145   | -344.286 | -954.268  | -304.369 | -1018.474 |
| 146   | -402.323 | -715.272  | -316.277 | -853.678  |
| 147   | -352.941 | -890.334  | -297.985 | -978.731  |
| 148   | -296.926 | -977.702  | -258.440 | -1039.606 |
| 149   | -257.215 | -1038.416 | -233.679 | -1076.274 |
| 150   | -233.412 | -1076.065 | -223.021 | -1092.778 |
| 151   | -224.776 | -1094.523 | -233.342 | -1080.745 |
| 152   | -232.618 | -1080.012 | -247.943 | -1055.361 |
| 153   | -245.894 | -1053.294 | -256.260 | -1036.621 |
| 154   | -254.363 | -1034.702 | -259.714 | -1026.095 |
| 155   | -257.959 | -1024.317 | -258.240 | -1023.866 |
| 156   | -256.620 | -1022.249 | -251.749 | -1030.084 |
| 157   | -250.295 | -1028.620 | -240.121 | -1044.986 |
| 158   | -238.913 | -1043.806 | -223.491 | -1068.613 |
| 159   | -222.484 | -1067.621 | -201.726 | -1101.009 |
| 160   | -201.068 | -1100.378 | -171.325 | -1148.218 |



## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -146.162 | -973.244 | -181.068 | -917.098 |
| 2     | -189.816 | -934.083 | -220.631 | -884.517 |
| 3     | -221.556 | -885.432 | -245.929 | -846.228 |
| 4     | -247.138 | -847.438 | -265.137 | -818.486 |
| 5     | -266.530 | -819.899 | -278.255 | -801.040 |
| 6     | -279.780 | -802.547 | -285.335 | -793.612 |
| 7     | -286.911 | -795.205 | -286.415 | -796.002 |
| 8     | -288.040 | -797.608 | -281.588 | -807.986 |
| 9     | -283.220 | -809.635 | -270.916 | -829.426 |
| 10    | -272.575 | -831.086 | -257.657 | -855.081 |
| 11    | -261.363 | -858.787 | -251.749 | -874.250 |
| 12    | -256.844 | -879.340 | -253.499 | -884.720 |
| 13    | -259.881 | -891.092 | -264.250 | -884.064 |
| 14    | -271.688 | -891.544 | -285.423 | -869.451 |
| 15    | -293.581 | -877.598 | -318.450 | -837.596 |
| 16    | -326.671 | -845.805 | -364.061 | -785.664 |
| 17    | -371.401 | -793.055 | -421.273 | -712.835 |
| 18    | -426.091 | -724.976 | -550.431 | -524.975 |
| 19    | -486.348 | -470.099 | -450.230 | -516.328 |
| 20    | -456.035 | -526.238 | -312.066 | -710.513 |
| 21    | -323.782 | -725.159 | -524.964 | -467.651 |
| 22    | -511.193 | -456.607 | -478.523 | -498.423 |
| 23    | -533.931 | -565.691 | -530.592 | -571.061 |
| 24    | -525.284 | -572.577 | -508.297 | -599.902 |
| 25    | -498.980 | -599.820 | -479.451 | -631.233 |
| 26    | -464.336 | -647.066 | -437.640 | -690.006 |
| 27    | -437.195 | -689.549 | -416.235 | -723.263 |
| 28    | -415.833 | -722.849 | -395.115 | -756.175 |
| 29    | -395.346 | -756.376 | -378.765 | -783.046 |
| 30    | -380.083 | -784.334 | -366.107 | -806.815 |
| 31    | -368.878 | -809.564 | -356.720 | -829.122 |
| 32    | -361.118 | -833.529 | -353.330 | -846.055 |
| 33    | -359.413 | -852.146 | -357.364 | -855.443 |
| 34    | -365.057 | -863.146 | -370.832 | -853.856 |
| 35    | -379.799 | -862.837 | -394.266 | -839.566 |
| 36    | -403.944 | -849.256 | -429.975 | -807.386 |
| 37    | -438.181 | -818.551 | -473.574 | -761.621 |
| 38    | -480.845 | -776.864 | -607.852 | -572.572 |
| 39    | -536.559 | -514.924 | -508.736 | -550.536 |
| 40    | -512.241 | -560.639 | -336.428 | -785.674 |
| 41    | -350.345 | -804.516 | -538.348 | -563.878 |
| 42    | -523.537 | -551.926 | -469.743 | -620.781 |
| 43    | -527.956 | -717.492 | -505.602 | -753.449 |
| 44    | -498.676 | -754.271 | -469.096 | -801.851 |
| 45    | -458.700 | -798.070 | -429.182 | -845.549 |
| 46    | -408.235 | -730.502 | -386.655 | -765.214 |
| 47    | -386.931 | -765.464 | -368.366 | -795.327 |
| 48    | -367.898 | -794.871 | -352.964 | -818.893 |
| 49    | -353.255 | -819.191 | -342.223 | -836.935 |
| 50    | -343.701 | -838.403 | -336.033 | -850.738 |
| 51    | -339.015 | -853.753 | -331.927 | -865.154 |
| 52    | -336.599 | -869.826 | -333.832 | -874.276 |
| 53    | -340.195 | -880.683 | -343.187 | -875.870 |
| 54    | -351.183 | -883.852 | -362.075 | -866.332 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -371.335 | -875.559 | -391.563 | -843.023 |
| 56    | -401.476 | -852.919 | -432.036 | -803.762 |
| 57    | -439.800 | -816.011 | -478.215 | -754.220 |
| 58    | -484.479 | -771.133 | -615.053 | -561.102 |
| 59    | -543.202 | -506.142 | -517.864 | -538.574 |
| 60    | -521.121 | -548.500 | -347.849 | -770.282 |
| 61    | -361.653 | -788.872 | -548.865 | -549.246 |
| 62    | -534.123 | -537.351 | -479.817 | -606.861 |
| 63    | -538.804 | -699.656 | -515.497 | -737.144 |
| 64    | -508.803 | -738.313 | -478.167 | -787.592 |
| 65    | -467.927 | -784.069 | -437.321 | -833.299 |
| 66    | -416.457 | -718.425 | -392.906 | -756.306 |
| 67    | -393.230 | -756.629 | -372.834 | -789.436 |
| 68    | -372.384 | -788.976 | -356.804 | -814.037 |
| 69    | -357.066 | -814.312 | -345.466 | -832.970 |
| 70    | -346.887 | -834.397 | -338.735 | -847.510 |
| 71    | -341.654 | -850.448 | -334.059 | -862.665 |
| 72    | -338.648 | -867.268 | -335.366 | -872.548 |
| 73    | -341.654 | -878.860 | -344.127 | -874.882 |
| 74    | -352.032 | -882.799 | -362.394 | -866.132 |
| 75    | -371.566 | -875.312 | -391.146 | -843.817 |
| 76    | -401.002 | -853.663 | -430.685 | -805.918 |
| 77    | -438.251 | -818.410 | -475.259 | -758.882 |
| 78    | -481.407 | -776.016 | -610.758 | -567.955 |
| 79    | -539.162 | -511.428 | -512.594 | -545.434 |
| 80    | -515.922 | -555.443 | -341.401 | -778.825 |
| 81    | -355.289 | -797.432 | -543.129 | -557.003 |
| 82    | -528.344 | -545.094 | -474.612 | -613.870 |
| 83    | -533.237 | -708.737 | -510.657 | -745.057 |
| 84    | -503.888 | -746.117 | -474.018 | -794.163 |
| 85    | -463.723 | -790.588 | -433.878 | -838.595 |
| 86    | -413.074 | -723.562 | -389.863 | -760.897 |
| 87    | -390.181 | -761.230 | -370.772 | -792.449 |
| 88    | -370.342 | -792.000 | -355.717 | -815.524 |
| 89    | -356.012 | -815.817 | -345.375 | -832.928 |
| 90    | -346.826 | -834.398 | -339.616 | -845.995 |
| 91    | -342.595 | -848.940 | -335.943 | -859.640 |
| 92    | -340.576 | -864.275 | -338.247 | -868.022 |
| 93    | -344.580 | -874.353 | -348.008 | -868.838 |
| 94    | -355.940 | -876.785 | -367.291 | -858.527 |
| 95    | -376.471 | -867.735 | -396.390 | -835.695 |
| 96    | -406.234 | -845.559 | -436.802 | -796.390 |
| 97    | -444.286 | -808.948 | -482.060 | -748.189 |
| 98    | -488.938 | -763.997 | -618.226 | -556.038 |
| 99    | -546.202 | -502.263 | -521.722 | -533.597 |
| 100   | -524.964 | -543.542 | -355.532 | -760.410 |
| 101   | -369.377 | -778.980 | -551.006 | -546.500 |
| 102   | -536.253 | -534.655 | -479.328 | -607.518 |
| 103   | -538.298 | -700.497 | -513.811 | -739.884 |
| 104   | -507.100 | -741.016 | -475.302 | -792.162 |
| 105   | -465.024 | -788.591 | -433.283 | -839.646 |
| 106   | -412.756 | -724.095 | -388.337 | -763.373 |
| 107   | -388.608 | -763.630 | -368.098 | -796.621 |
| 108   | -367.597 | -796.097 | -351.919 | -821.316 |
| 109   | -352.131 | -821.526 | -340.436 | -840.339 |

## TENSIONES CON AXIL FINAL

=====

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== |          |           |          |           |
| 110   | -341.808 | -841.718  | -333.497 | -855.086  |
| 111   | -336.395 | -857.948  | -328.679 | -870.359  |
| 112   | -333.241 | -874.922  | -329.768 | -880.509  |
| 113   | -336.053 | -886.780  | -338.295 | -883.174  |
| 114   | -346.195 | -891.102  | -356.294 | -874.856  |
| 115   | -365.492 | -884.062  | -381.786 | -857.854  |
| 116   | -391.691 | -867.773  | -420.693 | -821.123  |
| 117   | -428.241 | -833.900  | -464.430 | -775.690  |
| 118   | -472.377 | -790.326  | -599.425 | -585.969  |
| 119   | -528.516 | -525.371  | -501.432 | -560.038  |
| 120   | -504.904 | -570.186  | -329.714 | -794.424  |
| 121   | -343.636 | -813.127  | -534.384 | -568.974  |
| 122   | -519.479 | -556.989  | -468.594 | -622.121  |
| 123   | -526.731 | -719.350  | -507.044 | -751.018  |
| 124   | -500.143 | -752.070  | -473.569 | -794.814  |
| 125   | -463.292 | -791.276  | -436.742 | -833.983  |
| 126   | -417.474 | -718.115  | -400.902 | -744.772  |
| 127   | -401.371 | -745.241  | -388.248 | -766.350  |
| 128   | -388.000 | -766.102  | -379.560 | -779.677  |
| 129   | -380.057 | -780.181  | -375.582 | -787.378  |
| 130   | -377.242 | -789.047  | -376.272 | -790.607  |
| 131   | -379.436 | -793.757  | -380.307 | -792.357  |
| 132   | -385.101 | -797.173  | -389.473 | -790.141  |
| 133   | -395.921 | -796.618  | -406.250 | -780.005  |
| 134   | -414.250 | -788.009  | -432.703 | -758.327  |
| 135   | -441.868 | -767.490  | -470.932 | -720.740  |
| 136   | -480.623 | -730.459  | -520.035 | -667.064  |
| 137   | -526.498 | -680.450  | -568.932 | -612.194  |
| 138   | -572.608 | -631.746  | -697.631 | -430.646  |
| 139   | -622.132 | -405.035  | -602.427 | -430.257  |
| 140   | -604.868 | -439.993  | -448.760 | -639.807  |
| 141   | -455.968 | -651.903  | -583.592 | -488.548  |
| 142   | -565.487 | -472.394  | -496.731 | -560.399  |
| 143   | -555.435 | -637.881  | -501.713 | -724.294  |
| 144   | -495.975 | -724.799  | -446.659 | -804.123  |
| 145   | -438.289 | -803.063  | -392.312 | -877.017  |
| 146   | -490.442 | -573.532  | -398.521 | -721.387  |
| 147   | -435.186 | -758.044  | -374.359 | -855.884  |
| 148   | -373.300 | -854.853  | -328.947 | -926.195  |
| 149   | -327.723 | -925.004  | -298.315 | -972.307  |
| 150   | -298.048 | -972.098  | -281.789 | -998.250  |
| 151   | -283.544 | -999.994  | -286.236 | -995.665  |
| 152   | -285.511 | -994.932  | -294.962 | -979.730  |
| 153   | -292.913 | -977.663  | -297.409 | -970.431  |
| 154   | -295.513 | -968.512  | -294.987 | -969.358  |
| 155   | -293.233 | -967.579  | -287.635 | -976.583  |
| 156   | -286.015 | -974.966  | -275.263 | -992.261  |
| 157   | -273.809 | -990.799  | -257.757 | -1016.618 |
| 158   | -256.550 | -1015.437 | -235.247 | -1049.703 |
| 159   | -234.240 | -1048.710 | -207.605 | -1091.553 |
| 160   | -206.947 | -1090.921 | -171.328 | -1148.215 |



## COMBINACION 21 G1 + G2 + 0.9 PRETD

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.549 | -875.915 | -176.116 | -804.228 |
| 2     | -186.835 | -814.938 | -229.219 | -746.762 |
| 3     | -230.052 | -747.586 | -265.298 | -690.891 |
| 4     | -266.386 | -691.981 | -294.538 | -646.698 |
| 5     | -295.792 | -647.969 | -316.952 | -613.934 |
| 6     | -318.324 | -615.291 | -332.589 | -592.346 |
| 7     | -334.008 | -593.778 | -341.480 | -581.760 |
| 8     | -342.942 | -583.206 | -343.695 | -581.994 |
| 9     | -345.164 | -583.478 | -339.297 | -592.916 |
| 10    | -340.788 | -594.412 | -331.217 | -609.807 |
| 11    | -334.553 | -613.140 | -328.409 | -623.023 |
| 12    | -332.994 | -627.605 | -331.146 | -630.577 |
| 13    | -336.890 | -636.311 | -340.639 | -630.281 |
| 14    | -347.332 | -637.014 | -358.155 | -619.605 |
| 15    | -365.496 | -626.938 | -384.994 | -595.576 |
| 16    | -392.393 | -602.964 | -421.812 | -555.644 |
| 17    | -428.425 | -562.286 | -467.910 | -498.774 |
| 18    | -474.776 | -505.632 | -601.247 | -302.203 |
| 19    | -540.773 | -291.174 | -530.455 | -304.382 |
| 20    | -537.295 | -311.232 | -433.429 | -444.178 |
| 21    | -445.139 | -455.866 | -588.903 | -271.853 |
| 22    | -577.591 | -260.528 | -514.932 | -340.729 |
| 23    | -571.513 | -362.786 | -551.440 | -395.075 |
| 24    | -549.019 | -392.650 | -532.711 | -418.881 |
| 25    | -527.513 | -413.681 | -512.182 | -438.341 |
| 26    | -502.179 | -446.799 | -483.996 | -476.046 |
| 27    | -483.597 | -475.634 | -468.567 | -499.809 |
| 28    | -468.204 | -499.438 | -455.565 | -519.769 |
| 29    | -455.772 | -519.950 | -444.753 | -537.675 |
| 30    | -445.938 | -538.837 | -436.043 | -554.752 |
| 31    | -438.537 | -557.228 | -429.821 | -571.247 |
| 32    | -433.779 | -575.214 | -426.886 | -586.301 |
| 33    | -432.362 | -591.782 | -428.535 | -597.936 |
| 34    | -435.460 | -604.867 | -436.580 | -603.065 |
| 35    | -444.650 | -611.150 | -452.951 | -597.797 |
| 36    | -461.661 | -606.518 | -479.355 | -578.058 |
| 37    | -487.766 | -586.455 | -515.656 | -541.595 |
| 38    | -524.941 | -550.904 | -651.597 | -347.178 |
| 39    | -585.809 | -331.715 | -588.996 | -327.635 |
| 40    | -594.746 | -333.406 | -469.757 | -493.389 |
| 41    | -484.165 | -507.935 | -615.505 | -339.824 |
| 42    | -603.310 | -327.616 | -519.805 | -434.499 |
| 43    | -579.741 | -477.524 | -544.789 | -533.746 |
| 44    | -541.232 | -530.181 | -513.637 | -574.567 |
| 45    | -506.562 | -567.494 | -480.940 | -608.708 |
| 46    | -466.213 | -498.528 | -451.284 | -522.542 |
| 47    | -451.533 | -522.767 | -440.234 | -540.942 |
| 48    | -439.812 | -540.534 | -430.691 | -555.204 |
| 49    | -430.954 | -555.470 | -423.235 | -567.887 |
| 50    | -424.563 | -569.211 | -417.809 | -580.074 |
| 51    | -420.493 | -582.788 | -414.784 | -591.971 |
| 52    | -418.989 | -596.177 | -415.057 | -602.501 |
| 53    | -420.782 | -608.270 | -419.924 | -609.649 |
| 54    | -427.119 | -616.836 | -431.264 | -610.168 |

## COMBINACION 21 G1 + G2 + 0.9 PRETD

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -439.598 | -618.471 | -451.041 | -600.066 |
| 56    | -459.963 | -608.972 | -480.947 | -575.220 |
| 57    | -489.471 | -583.771 | -520.763 | -533.437 |
| 58    | -530.072 | -542.753 | -660.069 | -333.652 |
| 59    | -593.746 | -321.306 | -599.973 | -313.335 |
| 60    | -605.528 | -318.910 | -483.602 | -474.971 |
| 61    | -497.914 | -489.285 | -628.378 | -322.294 |
| 62    | -616.244 | -310.137 | -532.015 | -417.948 |
| 63    | -592.817 | -456.143 | -556.816 | -514.050 |
| 64    | -553.506 | -510.736 | -524.728 | -557.025 |
| 65    | -517.831 | -550.124 | -490.991 | -593.297 |
| 66    | -476.369 | -483.226 | -460.242 | -509.167 |
| 67    | -460.536 | -509.454 | -448.093 | -529.467 |
| 68    | -447.688 | -529.053 | -437.472 | -545.486 |
| 69    | -437.708 | -545.733 | -428.972 | -559.785 |
| 70    | -430.249 | -561.072 | -422.510 | -573.520 |
| 71    | -425.138 | -576.164 | -418.486 | -586.864 |
| 72    | -422.616 | -591.007 | -417.736 | -598.856 |
| 73    | -423.394 | -604.539 | -421.585 | -607.448 |
| 74    | -428.697 | -614.578 | -431.886 | -609.448 |
| 75    | -440.141 | -617.710 | -450.570 | -600.935 |
| 76    | -459.440 | -609.797 | -479.377 | -577.728 |
| 77    | -487.886 | -586.239 | -518.082 | -537.668 |
| 78    | -527.407 | -546.989 | -656.390 | -339.519 |
| 79    | -590.296 | -325.824 | -595.579 | -319.061 |
| 80    | -601.202 | -324.706 | -478.328 | -481.981 |
| 81    | -492.701 | -496.330 | -623.758 | -328.580 |
| 82    | -611.593 | -316.402 | -527.882 | -423.550 |
| 83    | -588.387 | -463.383 | -553.061 | -520.205 |
| 84    | -549.679 | -516.800 | -521.604 | -561.959 |
| 85    | -514.657 | -555.012 | -488.520 | -597.054 |
| 86    | -473.873 | -486.966 | -458.451 | -511.772 |
| 87    | -458.738 | -512.071 | -446.962 | -531.013 |
| 88    | -446.578 | -530.603 | -437.002 | -546.008 |
| 89    | -437.268 | -546.271 | -429.168 | -559.300 |
| 90    | -430.475 | -560.622 | -423.346 | -572.089 |
| 91    | -426.026 | -574.740 | -419.968 | -584.484 |
| 92    | -424.140 | -588.653 | -419.884 | -595.498 |
| 93    | -425.584 | -601.196 | -424.413 | -603.080 |
| 94    | -431.551 | -610.233 | -435.405 | -604.034 |
| 95    | -443.667 | -612.320 | -454.804 | -594.406 |
| 96    | -463.664 | -603.284 | -484.306 | -570.082 |
| 97    | -492.785 | -578.579 | -523.692 | -528.864 |
| 98    | -532.960 | -538.143 | -662.624 | -329.576 |
| 99    | -596.164 | -318.175 | -603.485 | -308.804 |
| 100   | -609.035 | -314.385 | -491.197 | -465.215 |
| 101   | -505.532 | -479.528 | -630.693 | -319.326 |
| 102   | -618.563 | -307.197 | -531.984 | -418.015 |
| 103   | -592.785 | -456.219 | -555.897 | -515.554 |
| 104   | -552.568 | -512.211 | -522.904 | -559.926 |
| 105   | -515.971 | -552.983 | -488.271 | -597.538 |
| 106   | -473.600 | -487.426 | -456.641 | -514.703 |
| 107   | -456.885 | -514.935 | -443.616 | -536.278 |
| 108   | -443.164 | -535.808 | -432.135 | -553.550 |
| 109   | -432.324 | -553.742 | -422.769 | -569.111 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -424.006 | -570.349 | -415.396 | -584.199  |
| 111   | -418.006 | -586.771 | -410.457 | -598.914  |
| 112   | -414.564 | -603.019 | -408.765 | -612.347  |
| 113   | -414.420 | -617.993 | -411.658 | -622.436  |
| 114   | -418.768 | -629.571 | -420.967 | -626.033  |
| 115   | -429.246 | -634.318 | -438.675 | -619.151  |
| 116   | -447.589 | -628.081 | -466.501 | -597.660  |
| 117   | -475.093 | -606.266 | -504.302 | -559.282  |
| 118   | -513.755 | -568.753 | -641.887 | -362.652  |
| 119   | -576.641 | -343.588 | -581.212 | -337.737  |
| 120   | -586.972 | -343.496 | -463.310 | -501.781  |
| 121   | -477.735 | -516.187 | -612.460 | -343.742  |
| 122   | -600.198 | -331.481 | -520.121 | -433.977  |
| 123   | -580.089 | -476.863 | -548.704 | -527.347  |
| 124   | -545.238 | -523.879 | -521.110 | -562.689  |
| 125   | -514.187 | -555.763 | -491.953 | -591.527  |
| 126   | -477.471 | -482.648 | -465.718 | -501.552  |
| 127   | -466.140 | -501.975 | -457.992 | -515.082  |
| 128   | -457.770 | -514.856 | -451.805 | -524.451  |
| 129   | -452.251 | -524.906 | -447.748 | -532.149  |
| 130   | -449.244 | -533.647 | -445.784 | -539.212  |
| 131   | -448.631 | -542.049 | -446.357 | -545.707  |
| 132   | -450.672 | -550.040 | -450.338 | -550.578  |
| 133   | -456.138 | -556.412 | -459.057 | -551.718  |
| 134   | -466.254 | -558.926 | -474.379 | -545.857  |
| 135   | -482.628 | -554.103 | -498.195 | -529.064  |
| 136   | -506.916 | -537.811 | -532.080 | -497.335  |
| 137   | -540.281 | -505.547 | -575.629 | -448.690  |
| 138   | -584.415 | -457.475 | -718.146 | -242.368  |
| 139   | -648.396 | -251.284 | -657.635 | -239.458  |
| 140   | -662.705 | -244.543 | -555.795 | -381.384  |
| 141   | -564.228 | -389.781 | -650.953 | -278.775  |
| 142   | -635.433 | -263.244 | -547.269 | -376.092  |
| 143   | -606.951 | -401.887 | -545.716 | -500.384  |
| 144   | -542.714 | -497.360 | -498.998 | -567.678  |
| 145   | -493.989 | -562.665 | -456.526 | -622.924  |
| 146   | -545.012 | -349.514 | -464.810 | -478.519  |
| 147   | -497.809 | -511.508 | -444.251 | -597.657  |
| 148   | -443.299 | -596.729 | -403.221 | -661.193  |
| 149   | -402.119 | -660.122 | -374.141 | -705.125  |
| 150   | -373.901 | -704.937 | -356.413 | -733.066  |
| 151   | -357.994 | -734.634 | -356.207 | -737.508  |
| 152   | -355.555 | -736.849 | -358.501 | -732.109  |
| 153   | -356.657 | -730.249 | -353.804 | -734.838  |
| 154   | -352.098 | -733.110 | -343.365 | -747.156  |
| 155   | -341.788 | -745.554 | -327.140 | -769.115  |
| 156   | -325.682 | -767.660 | -305.045 | -800.855  |
| 157   | -303.735 | -799.541 | -276.985 | -842.568  |
| 158   | -275.898 | -841.505 | -243.070 | -894.310  |
| 159   | -242.163 | -893.417 | -203.194 | -956.099  |
| 160   | -202.602 | -955.531 | -154.198 | -1033.388 |

COMBINACION 22 G1 + G2 + 0.9 PRETD + TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.549 | -875.915 | -180.200 | -797.659 |
| 2     | -190.919 | -808.369 | -237.388 | -733.622 |
| 3     | -238.221 | -734.445 | -277.553 | -671.180 |
| 4     | -278.641 | -672.269 | -310.879 | -620.414 |
| 5     | -312.132 | -621.686 | -337.376 | -581.082 |
| 6     | -338.749 | -582.438 | -357.099 | -552.922 |
| 7     | -358.518 | -554.354 | -370.076 | -535.764 |
| 8     | -371.537 | -537.211 | -376.378 | -529.424 |
| 9     | -377.847 | -530.907 | -376.068 | -533.770 |
| 10    | -377.559 | -535.266 | -372.082 | -544.076 |
| 11    | -375.417 | -547.411 | -373.361 | -550.718 |
| 12    | -377.945 | -555.301 | -380.188 | -551.693 |
| 13    | -385.931 | -557.429 | -393.769 | -544.820 |
| 14    | -400.462 | -551.554 | -415.378 | -527.561 |
| 15    | -422.719 | -534.895 | -446.306 | -496.955 |
| 16    | -453.706 | -504.343 | -487.216 | -450.442 |
| 17    | -493.829 | -457.083 | -537.404 | -386.992 |
| 18    | -544.270 | -393.850 | -674.832 | -183.841 |
| 19    | -611.043 | -201.231 | -604.630 | -209.440 |
| 20    | -611.470 | -216.290 | -511.510 | -344.237 |
| 21    | -523.220 | -355.925 | -665.985 | -173.190 |
| 22    | -654.673 | -161.865 | -591.016 | -243.345 |
| 23    | -651.186 | -234.632 | -630.066 | -268.604 |
| 24    | -627.645 | -266.179 | -610.291 | -294.093 |
| 25    | -605.093 | -288.893 | -588.716 | -315.237 |
| 26    | -578.713 | -323.694 | -559.484 | -354.624 |
| 27    | -559.084 | -354.212 | -543.009 | -380.069 |
| 28    | -542.646 | -379.699 | -528.960 | -401.713 |
| 29    | -529.167 | -401.894 | -517.101 | -421.302 |
| 30    | -518.286 | -422.463 | -507.345 | -440.062 |
| 31    | -509.839 | -442.538 | -500.077 | -458.240 |
| 32    | -504.035 | -462.206 | -496.095 | -474.977 |
| 33    | -501.571 | -480.457 | -496.699 | -488.295 |
| 34    | -503.624 | -495.225 | -503.699 | -495.105 |
| 35    | -511.768 | -503.189 | -519.024 | -491.518 |
| 36    | -527.734 | -500.239 | -544.383 | -473.459 |
| 37    | -552.795 | -481.857 | -579.639 | -438.678 |
| 38    | -588.924 | -447.988 | -714.534 | -245.942 |
| 39    | -645.911 | -254.785 | -648.100 | -251.984 |
| 40    | -653.850 | -257.754 | -527.862 | -419.015 |
| 41    | -542.271 | -433.562 | -673.894 | -265.088 |
| 42    | -661.698 | -252.880 | -578.477 | -359.401 |
| 43    | -641.181 | -378.698 | -606.525 | -434.442 |
| 44    | -602.968 | -430.877 | -575.670 | -474.786 |
| 45    | -568.596 | -467.713 | -543.270 | -508.450 |
| 46    | -528.543 | -398.269 | -513.911 | -421.806 |
| 47    | -514.160 | -422.032 | -503.157 | -439.729 |
| 48    | -502.735 | -439.321 | -493.911 | -453.515 |
| 49    | -494.174 | -453.780 | -486.751 | -465.721 |
| 50    | -488.079 | -467.045 | -481.623 | -477.431 |
| 51    | -484.306 | -480.144 | -478.894 | -488.850 |
| 52    | -483.098 | -493.056 | -479.463 | -498.903 |
| 53    | -485.188 | -504.672 | -484.627 | -505.574 |
| 54    | -491.822 | -512.760 | -496.263 | -505.616 |

COMBINACION 22 G1 + G2 + 0.9 PRETD + TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -504.598 | -513.919 | -516.337 | -495.036 |
| 56    | -525.260 | -503.942 | -546.540 | -469.713 |
| 57    | -555.064 | -478.264 | -586.653 | -427.453 |
| 58    | -595.962 | -436.769 | -726.256 | -227.191 |
| 59    | -656.950 | -240.406 | -663.461 | -232.072 |
| 60    | -669.016 | -237.648 | -547.373 | -393.346 |
| 61    | -561.685 | -407.659 | -692.051 | -240.795 |
| 62    | -679.917 | -228.638 | -595.589 | -336.575 |
| 63    | -659.391 | -349.059 | -623.287 | -407.132 |
| 64    | -619.977 | -403.817 | -591.096 | -450.272 |
| 65    | -584.199 | -443.372 | -557.255 | -486.711 |
| 66    | -542.633 | -376.640 | -526.402 | -402.747 |
| 67    | -526.696 | -403.034 | -514.151 | -423.214 |
| 68    | -513.746 | -422.800 | -503.426 | -439.399 |
| 69    | -503.662 | -439.646 | -494.823 | -453.864 |
| 70    | -496.100 | -455.151 | -488.257 | -467.766 |
| 71    | -490.885 | -470.410 | -484.130 | -481.275 |
| 72    | -488.260 | -485.419 | -483.277 | -493.434 |
| 73    | -488.934 | -499.117 | -487.022 | -502.193 |
| 74    | -494.134 | -509.323 | -497.219 | -504.359 |
| 75    | -505.474 | -512.621 | -515.800 | -496.013 |
| 76    | -524.669 | -504.875 | -544.504 | -472.971 |
| 77    | -553.012 | -481.483 | -583.105 | -433.078 |
| 78    | -592.430 | -442.399 | -721.309 | -235.096 |
| 79    | -652.291 | -246.472 | -657.476 | -239.836 |
| 80    | -663.098 | -245.481 | -540.126 | -402.883 |
| 81    | -554.498 | -417.231 | -685.654 | -249.355 |
| 82    | -673.489 | -237.177 | -589.877 | -344.198 |
| 83    | -653.306 | -358.959 | -618.084 | -415.615 |
| 84    | -614.702 | -412.209 | -586.730 | -457.202 |
| 85    | -579.784 | -450.255 | -553.750 | -492.131 |
| 86    | -539.103 | -382.043 | -523.785 | -406.683 |
| 87    | -524.071 | -406.982 | -512.399 | -425.757 |
| 88    | -512.015 | -425.348 | -502.542 | -440.586 |
| 89    | -502.808 | -440.849 | -494.811 | -453.712 |
| 90    | -496.118 | -455.034 | -489.093 | -466.334 |
| 91    | -491.773 | -468.985 | -485.818 | -478.564 |
| 92    | -489.990 | -482.733 | -485.837 | -489.412 |
| 93    | -491.537 | -495.110 | -490.469 | -496.828 |
| 94    | -497.607 | -503.981 | -501.565 | -497.615 |
| 95    | -509.827 | -505.902 | -521.067 | -487.822 |
| 96    | -529.927 | -496.699 | -550.672 | -463.331 |
| 97    | -559.152 | -471.828 | -590.162 | -421.947 |
| 98    | -599.430 | -431.225 | -729.197 | -222.493 |
| 99    | -659.738 | -236.802 | -667.158 | -227.304 |
| 100   | -672.708 | -232.886 | -554.969 | -383.589 |
| 101   | -569.304 | -397.902 | -694.181 | -238.063 |
| 102   | -682.051 | -225.933 | -595.189 | -337.115 |
| 103   | -658.972 | -349.757 | -621.787 | -409.569 |
| 104   | -618.458 | -406.226 | -588.497 | -454.418 |
| 105   | -581.564 | -447.476 | -553.568 | -492.508 |
| 106   | -538.896 | -382.396 | -521.641 | -410.151 |
| 107   | -521.885 | -410.383 | -508.319 | -432.203 |
| 108   | -507.867 | -431.733 | -496.541 | -449.952 |
| 109   | -496.731 | -450.144 | -486.879 | -465.991 |

## COMBINACION 22      G1 + G2 + 0.9 PRETD + TEMP

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== |          |          |          |           |
| 110   | -488.116 | -467.229 | -479.209 | -481.556  |
| 111   | -481.819 | -484.128 | -473.973 | -496.748  |
| 112   | -478.080 | -500.853 | -471.984 | -510.658  |
| 113   | -477.639 | -516.305 | -474.580 | -521.225  |
| 114   | -481.690 | -528.360 | -483.593 | -525.299  |
| 115   | -491.871 | -533.584 | -501.004 | -518.894  |
| 116   | -509.918 | -527.824 | -528.534 | -497.880  |
| 117   | -537.125 | -506.486 | -566.038 | -459.980  |
| 118   | -575.491 | -469.451 | -703.326 | -263.827  |
| 119   | -635.312 | -268.491 | -639.600 | -263.002  |
| 120   | -645.360 | -268.762 | -521.414 | -427.409  |
| 121   | -535.839 | -441.815 | -671.563 | -268.092  |
| 122   | -659.301 | -255.831 | -580.223 | -357.049  |
| 123   | -643.026 | -375.629 | -612.686 | -424.430  |
| 124   | -609.221 | -420.963 | -586.138 | -458.091  |
| 125   | -579.215 | -451.164 | -558.027 | -485.246  |
| 126   | -543.546 | -376.366 | -532.839 | -393.588  |
| 127   | -533.261 | -394.011 | -526.158 | -405.435  |
| 128   | -525.936 | -405.210 | -521.018 | -413.121  |
| 129   | -521.464 | -413.577 | -518.007 | -419.136  |
| 130   | -519.504 | -420.633 | -517.089 | -424.517  |
| 131   | -519.937 | -427.353 | -518.708 | -429.329  |
| 132   | -523.023 | -433.663 | -523.735 | -432.519  |
| 133   | -529.534 | -438.354 | -533.498 | -431.979  |
| 134   | -540.696 | -439.186 | -549.866 | -424.436  |
| 135   | -558.116 | -432.682 | -574.727 | -405.962  |
| 136   | -583.448 | -414.709 | -609.657 | -372.551  |
| 137   | -617.859 | -380.763 | -654.251 | -322.226  |
| 138   | -663.037 | -331.011 | -797.813 | -114.223  |
| 139   | -724.474 | -153.907 | -734.711 | -140.803  |
| 140   | -739.781 | -145.888 | -633.870 | -281.451  |
| 141   | -642.302 | -289.848 | -725.125 | -183.838  |
| 142   | -709.604 | -168.308 | -617.536 | -286.153  |
| 143   | -680.532 | -283.531 | -615.209 | -388.604  |
| 144   | -612.207 | -385.580 | -564.400 | -462.478  |
| 145   | -559.391 | -457.464 | -517.843 | -524.296  |
| 146   | -606.328 | -250.887 | -522.038 | -386.468  |
| 147   | -555.037 | -419.458 | -497.388 | -512.186  |
| 148   | -496.435 | -511.258 | -452.269 | -582.299  |
| 149   | -451.167 | -581.229 | -419.101 | -632.807  |
| 150   | -418.859 | -632.621 | -397.282 | -667.328  |
| 151   | -398.862 | -668.898 | -392.985 | -678.350  |
| 152   | -392.333 | -677.691 | -391.190 | -679.529  |
| 153   | -389.347 | -677.667 | -382.405 | -688.833  |
| 154   | -380.698 | -687.107 | -367.880 | -707.724  |
| 155   | -366.301 | -706.124 | -347.570 | -736.253  |
| 156   | -346.111 | -734.799 | -321.389 | -774.565  |
| 157   | -320.078 | -773.253 | -289.244 | -822.849  |
| 158   | -288.157 | -821.787 | -251.242 | -881.166  |
| 159   | -250.336 | -880.272 | -207.281 | -949.525  |
| 160   | -206.689 | -948.956 | -154.198 | -1033.389 |

COMBINACION 23 G1 + G2 + 0.9 PRETD + SCMAX-IPF + 0.6 TEMP

TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 1     | -131.555 | -875.905 | -223.008 | -728.802 |
| 2     | -278.101 | -668.135 | -401.476 | -469.687 |
| 3     | -402.309 | -470.509 | -508.300 | -300.021 |
| 4     | -509.387 | -301.113 | -598.043 | -158.508 |
| 5     | -599.299 | -159.775 | -670.758 | -44.834  |
| 6     | -672.132 | -46.189  | -726.297 | 40.936   |
| 7     | -727.719 | 39.508   | -764.870 | 99.266   |
| 8     | -766.334 | 97.823   | -786.547 | 130.336  |
| 9     | -788.015 | 128.851  | -791.310 | 134.151  |
| 10    | -792.799 | 132.652  | -782.178 | 115.566  |
| 11    | -785.518 | 112.239  | -767.987 | 84.040   |
| 12    | -772.571 | 79.457   | -749.070 | 41.656   |
| 13    | -754.811 | 35.918   | -726.797 | -9.144   |
| 14    | -733.493 | -15.872  | -702.238 | -66.145  |
| 15    | -709.575 | -73.486  | -676.902 | -126.040 |
| 16    | -684.300 | -133.430 | -651.115 | -186.810 |
| 17    | -657.772 | -193.380 | -628.022 | -241.233 |
| 18    | -648.760 | -225.777 | -728.482 | -97.544  |
| 19    | -673.080 | -121.826 | -645.796 | -156.749 |
| 20    | -661.472 | -152.289 | -553.115 | -290.983 |
| 21    | -571.317 | -294.363 | -696.665 | -133.921 |
| 22    | -691.351 | -114.918 | -615.308 | -212.251 |
| 23    | -691.776 | -169.343 | -680.232 | -187.912 |
| 24    | -690.795 | -164.602 | -713.125 | -128.684 |
| 25    | -725.518 | -95.190  | -769.364 | -24.662  |
| 26    | -779.186 | -1.232   | -837.917 | 93.238   |
| 27    | -837.522 | 93.658   | -884.042 | 168.486  |
| 28    | -883.677 | 168.852  | -917.079 | 222.579  |
| 29    | -917.285 | 222.397  | -936.523 | 253.341  |
| 30    | -937.706 | 252.177  | -942.420 | 259.759  |
| 31    | -944.912 | 257.281  | -935.141 | 241.564  |
| 32    | -939.099 | 237.597  | -915.431 | 199.527  |
| 33    | -920.910 | 194.052  | -884.438 | 135.386  |
| 34    | -891.368 | 128.464  | -844.160 | 52.530   |
| 35    | -852.229 | 44.445   | -796.498 | -45.198  |
| 36    | -805.212 | -53.913  | -743.189 | -153.678 |
| 37    | -757.232 | -153.018 | -710.796 | -227.711 |
| 38    | -733.579 | -215.309 | -808.672 | -94.521  |
| 39    | -752.767 | -118.013 | -740.845 | -133.273 |
| 40    | -760.801 | -120.860 | -639.086 | -276.651 |
| 41    | -663.846 | -277.950 | -773.367 | -137.766 |
| 42    | -767.463 | -117.505 | -667.148 | -245.904 |
| 43    | -750.413 | -202.998 | -717.167 | -256.474 |
| 44    | -728.388 | -229.138 | -734.046 | -220.037 |
| 45    | -739.571 | -192.697 | -770.224 | -143.392 |
| 46    | -778.212 | 3.325    | -836.968 | 97.834   |
| 47    | -837.214 | 97.604   | -884.254 | 173.267  |
| 48    | -883.829 | 173.671  | -917.517 | 227.859  |
| 49    | -917.784 | 227.598  | -937.069 | 258.619  |
| 50    | -938.391 | 257.284  | -942.967 | 264.646  |
| 51    | -945.654 | 261.937  | -935.583 | 245.738  |
| 52    | -939.788 | 241.533  | -915.778 | 202.912  |
| 53    | -921.496 | 197.133  | -884.656 | 137.875  |
| 54    | -891.843 | 130.677  | -844.279 | 54.169   |

COMBINACION 23 G1 + G2 + 0.9 PRETD + SCMAX-IPF + 0.6 TEMP

TENSIONES CON AXIL FINAL

=====

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| ===== | =====    | =====    | =====    | =====    |
| 55    | -852.615 | 45.868   | -796.654 | -44.144  |
| 56    | -805.578 | -53.047  | -743.449 | -152.983 |
| 57    | -760.419 | -147.950 | -723.494 | -207.344 |
| 58    | -745.207 | -196.707 | -830.070 | -60.205  |
| 59    | -773.326 | -91.448  | -769.903 | -95.829  |
| 60    | -789.815 | -83.028  | -676.671 | -227.849 |
| 61    | -701.362 | -228.877 | -808.534 | -91.701  |
| 62    | -802.721 | -71.452  | -700.214 | -202.658 |
| 63    | -785.446 | -146.298 | -749.609 | -203.942 |
| 64    | -761.281 | -176.528 | -762.394 | -174.738 |
| 65    | -768.296 | -147.250 | -796.310 | -102.189 |
| 66    | -804.564 | 44.678   | -860.456 | 134.581  |
| 67    | -860.759 | 134.308  | -904.960 | 205.406  |
| 68    | -904.555 | 205.819  | -935.434 | 255.490  |
| 69    | -935.671 | 255.243  | -952.239 | 281.894  |
| 70    | -953.513 | 280.602  | -955.437 | 283.697  |
| 71    | -958.070 | 281.061  | -945.411 | 260.699  |
| 72    | -949.543 | 256.558  | -922.945 | 213.776  |
| 73    | -928.602 | 208.092  | -889.160 | 144.649  |
| 74    | -896.264 | 137.507  | -846.121 | 56.851   |
| 75    | -854.379 | 48.594   | -795.825 | -45.591  |
| 76    | -804.694 | -54.453  | -739.881 | -158.706 |
| 77    | -757.715 | -152.217 | -720.492 | -212.090 |
| 78    | -742.253 | -201.407 | -826.928 | -65.207  |
| 79    | -770.420 | -95.270  | -766.807 | -99.895  |
| 80    | -786.801 | -87.145  | -673.464 | -232.214 |
| 81    | -698.217 | -233.275 | -806.136 | -95.141  |
| 82    | -800.294 | -74.871  | -698.453 | -205.224 |
| 83    | -783.506 | -149.531 | -748.500 | -205.840 |
| 84    | -760.093 | -178.347 | -761.965 | -175.335 |
| 85    | -767.806 | -147.820 | -796.700 | -101.343 |
| 86    | -804.497 | 44.844   | -860.576 | 135.049  |
| 87    | -860.866 | 134.756  | -905.259 | 206.161  |
| 88    | -904.886 | 206.588  | -935.941 | 256.540  |
| 89    | -936.209 | 256.279  | -952.920 | 283.159  |
| 90    | -954.229 | 281.841  | -956.239 | 285.074  |
| 91    | -958.914 | 282.413  | -946.280 | 262.092  |
| 92    | -950.455 | 257.929  | -923.964 | 215.318  |
| 93    | -929.663 | 209.619  | -890.396 | 146.457  |
| 94    | -897.531 | 139.299  | -847.581 | 58.955   |
| 95    | -855.845 | 50.671   | -797.475 | -43.217  |
| 96    | -806.337 | -52.093  | -741.804 | -155.893 |
| 97    | -759.862 | -148.984 | -723.510 | -207.456 |
| 98    | -745.224 | -196.714 | -830.753 | -59.140  |
| 99    | -773.999 | -90.551  | -772.587 | -92.359  |
| 100   | -792.505 | -79.550  | -684.363 | -217.968 |
| 101   | -709.077 | -218.997 | -811.835 | -87.469  |
| 102   | -806.028 | -67.247  | -702.059 | -200.324 |
| 103   | -787.382 | -143.208 | -751.587 | -200.784 |
| 104   | -763.229 | -173.360 | -764.288 | -171.658 |
| 105   | -770.148 | -144.137 | -798.231 | -98.966  |
| 106   | -804.498 | 44.826   | -857.494 | 130.070  |
| 107   | -857.736 | 129.837  | -899.021 | 196.244  |
| 108   | -898.567 | 196.710  | -926.555 | 241.728  |
| 109   | -926.739 | 241.527  | -940.393 | 263.490  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== |          |          |          |           |
| 110   | -941.632 | 262.255  | -940.602 | 260.599   |
| 111   | -943.216 | 258.033  | -927.562 | 232.852   |
| 112   | -931.673 | 228.753  | -902.026 | 181.066   |
| 113   | -907.676 | 175.413  | -865.165 | 107.033   |
| 114   | -872.276 | 99.900   | -819.001 | 14.206    |
| 115   | -827.281 | 5.925    | -765.516 | -93.425   |
| 116   | -774.424 | -102.363 | -706.471 | -211.666  |
| 117   | -724.947 | -204.374 | -685.531 | -267.775  |
| 118   | -707.604 | -256.947 | -790.340 | -123.865  |
| 119   | -735.860 | -139.793 | -730.392 | -146.791  |
| 120   | -750.631 | -134.018 | -635.367 | -281.552  |
| 121   | -660.201 | -282.635 | -777.414 | -132.606  |
| 122   | -771.503 | -112.216 | -678.918 | -230.721  |
| 123   | -762.987 | -182.670 | -737.758 | -223.251  |
| 124   | -749.431 | -195.433 | -760.977 | -176.861  |
| 125   | -766.911 | -149.255 | -806.467 | -85.629   |
| 126   | -806.349 | 46.355   | -861.134 | 134.478   |
| 127   | -861.552 | 134.048  | -904.536 | 203.188   |
| 128   | -904.320 | 203.422  | -933.984 | 251.137   |
| 129   | -934.428 | 250.679  | -949.752 | 275.329   |
| 130   | -951.255 | 273.842  | -951.954 | 274.965   |
| 131   | -954.794 | 272.119  | -940.978 | 249.894   |
| 132   | -945.294 | 245.563  | -917.726 | 201.219   |
| 133   | -923.517 | 195.370  | -883.298 | 130.677   |
| 134   | -890.490 | 123.460  | -839.762 | 41.864    |
| 135   | -848.013 | 33.620   | -789.032 | -61.251   |
| 136   | -797.753 | -69.999  | -732.693 | -174.647  |
| 137   | -754.000 | -161.779 | -718.305 | -219.194  |
| 138   | -742.167 | -203.730 | -836.565 | -51.890   |
| 139   | -773.897 | -90.647  | -770.653 | -94.798   |
| 140   | -791.478 | -79.718  | -690.612 | -208.823  |
| 141   | -709.772 | -203.488 | -789.221 | -101.796  |
| 142   | -778.009 | -80.752  | -685.886 | -198.667  |
| 143   | -763.758 | -149.662 | -711.440 | -233.816  |
| 144   | -720.399 | -211.553 | -701.039 | -242.694  |
| 145   | -709.953 | -215.285 | -730.244 | -182.647  |
| 146   | -819.665 | 92.266   | -792.738 | 48.955    |
| 147   | -825.742 | 15.973   | -815.407 | -0.651    |
| 148   | -814.457 | 0.282    | -807.381 | -11.100   |
| 149   | -806.277 | -10.031  | -801.166 | -18.252   |
| 150   | -800.927 | -18.062  | -796.050 | -25.907   |
| 151   | -797.629 | -27.477  | -798.125 | -26.679   |
| 152   | -797.471 | -26.024  | -792.441 | -34.114   |
| 153   | -790.597 | -32.254  | -769.513 | -66.167   |
| 154   | -767.809 | -64.436  | -730.549 | -124.369  |
| 155   | -728.967 | -122.773 | -675.616 | -208.589  |
| 156   | -674.153 | -207.142 | -604.368 | -319.391  |
| 157   | -603.055 | -318.081 | -516.897 | -456.668  |
| 158   | -515.810 | -455.605 | -413.276 | -620.532  |
| 159   | -412.368 | -619.642 | -293.450 | -810.922  |
| 160   | -292.855 | -810.357 | -154.200 | -1033.384 |



## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.554 | -875.907 | -215.754 | -740.471 |
| 2     | -261.324 | -695.122 | -370.049 | -520.236 |
| 3     | -370.883 | -521.058 | -464.349 | -370.717 |
| 4     | -465.435 | -371.808 | -543.689 | -245.937 |
| 5     | -544.945 | -247.205 | -608.114 | -145.597 |
| 6     | -609.488 | -146.951 | -657.518 | -69.695  |
| 7     | -658.940 | -71.124  | -692.074 | -17.827  |
| 8     | -693.537 | -19.271  | -711.853 | 10.189   |
| 9     | -713.321 | 8.704    | -716.852 | 14.384   |
| 10    | -718.341 | 12.885   | -710.075 | -0.412   |
| 11    | -713.414 | -3.741   | -700.376 | -24.712  |
| 12    | -704.960 | -29.295  | -688.081 | -56.446  |
| 13    | -693.822 | -62.183  | -674.525 | -93.223  |
| 14    | -681.220 | -99.953  | -660.821 | -132.765 |
| 15    | -668.159 | -140.104 | -648.432 | -171.835 |
| 16    | -655.831 | -179.224 | -637.753 | -208.302 |
| 17    | -644.401 | -214.887 | -631.148 | -236.204 |
| 18    | -648.981 | -225.421 | -740.516 | -78.187  |
| 19    | -682.310 | -110.012 | -660.631 | -137.760 |
| 20    | -674.457 | -135.669 | -569.094 | -270.531 |
| 21    | -585.936 | -275.650 | -714.616 | -110.944 |
| 22    | -708.046 | -93.549  | -634.281 | -187.967 |
| 23    | -708.471 | -142.490 | -694.620 | -164.768 |
| 24    | -702.464 | -145.833 | -716.336 | -123.518 |
| 25    | -725.045 | -95.949  | -756.134 | -45.943  |
| 26    | -761.804 | -29.191  | -804.036 | 38.739   |
| 27    | -803.639 | 39.157   | -836.848 | 92.574   |
| 28    | -836.483 | 92.940   | -859.791 | 130.431  |
| 29    | -859.997 | 130.248  | -872.412 | 150.218  |
| 30    | -873.596 | 149.055  | -874.732 | 150.882  |
| 31    | -877.225 | 148.405  | -867.124 | 132.158  |
| 32    | -871.082 | 128.192  | -850.344 | 94.834   |
| 33    | -855.822 | 89.358   | -825.569 | 40.696   |
| 34    | -832.498 | 33.772   | -794.762 | -26.928  |
| 35    | -802.831 | -35.012  | -759.828 | -104.184 |
| 36    | -768.541 | -112.900 | -722.497 | -186.961 |
| 37    | -735.361 | -188.198 | -703.740 | -239.060 |
| 38    | -723.710 | -231.184 | -808.946 | -94.081  |
| 39    | -749.477 | -122.225 | -740.229 | -134.062 |
| 40    | -757.210 | -125.457 | -634.319 | -282.754 |
| 41    | -656.910 | -286.827 | -771.140 | -140.616 |
| 42    | -763.919 | -122.041 | -667.264 | -245.757 |
| 43    | -747.104 | -208.320 | -713.647 | -262.137 |
| 44    | -721.773 | -239.779 | -720.714 | -241.482 |
| 45    | -723.600 | -218.386 | -742.809 | -187.488 |
| 46    | -746.041 | -48.423  | -789.679 | 21.769   |
| 47    | -789.926 | 21.540   | -825.032 | 78.008   |
| 48    | -824.607 | 78.413   | -849.584 | 118.587  |
| 49    | -849.849 | 118.325  | -863.699 | 140.602  |
| 50    | -865.022 | 139.269  | -867.413 | 143.116  |
| 51    | -870.099 | 140.406  | -861.096 | 125.925  |
| 52    | -865.301 | 121.720  | -845.618 | 90.060   |
| 53    | -851.338 | 84.283   | -822.121 | 37.287   |
| 54    | -829.310 | 30.092   | -792.630 | -28.909  |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| 55    | -800.965 | -37.210  | -759.143 | -104.481 |
| 56    | -768.067 | -113.385 | -723.333 | -185.340 |
| 57    | -738.534 | -183.152 | -715.864 | -219.617 |
| 58    | -734.980 | -213.157 | -829.358 | -61.349  |
| 59    | -769.037 | -96.938  | -767.824 | -98.491  |
| 60    | -784.729 | -89.537  | -669.935 | -236.470 |
| 61    | -692.453 | -240.281 | -804.439 | -96.941  |
| 62    | -797.303 | -78.387  | -698.561 | -204.774 |
| 63    | -780.260 | -154.639 | -744.323 | -212.444 |
| 64    | -752.858 | -190.077 | -747.729 | -198.327 |
| 65    | -750.950 | -175.151 | -767.608 | -148.357 |
| 66    | -771.071 | -9.196   | -811.984 | 56.613   |
| 67    | -812.285 | 56.338   | -844.697 | 108.472  |
| 68    | -844.292 | 108.886  | -866.607 | 144.781  |
| 69    | -866.843 | 144.534  | -878.122 | 162.676  |
| 70    | -879.396 | 161.384  | -879.273 | 161.186  |
| 71    | -881.905 | 158.549  | -870.448 | 140.121  |
| 72    | -874.580 | 135.980  | -852.442 | 100.371  |
| 73    | -858.100 | 94.688   | -826.415 | 43.724   |
| 74    | -833.521 | 36.585   | -794.392 | -26.356  |
| 75    | -802.649 | -34.614  | -758.353 | -105.863 |
| 76    | -767.223 | -114.725 | -719.938 | -190.784 |
| 77    | -735.819 | -187.437 | -712.473 | -224.988 |
| 78    | -731.630 | -218.494 | -825.439 | -67.603  |
| 79    | -765.381 | -101.720 | -763.620 | -103.974 |
| 80    | -780.605 | -95.077  | -665.258 | -242.717 |
| 81    | -687.838 | -246.560 | -800.643 | -102.172 |
| 82    | -793.477 | -83.596  | -695.474 | -209.038 |
| 83    | -776.930 | -160.109 | -741.900 | -216.456 |
| 84    | -750.356 | -194.008 | -746.083 | -200.882 |
| 85    | -749.246 | -177.674 | -766.855 | -149.349 |
| 86    | -769.951 | -10.722  | -811.269 | 55.737   |
| 87    | -811.558 | 55.443   | -844.370 | 108.220  |
| 88    | -843.995 | 108.644  | -866.692 | 145.152  |
| 89    | -866.959 | 144.891  | -878.592 | 163.602  |
| 90    | -879.900 | 162.283  | -880.082 | 162.575  |
| 91    | -882.758 | 159.916  | -871.554 | 141.895  |
| 92    | -875.728 | 137.730  | -853.914 | 102.643  |
| 93    | -859.613 | 96.943   | -828.310 | 46.592   |
| 94    | -835.446 | 39.435   | -796.717 | -22.860  |
| 95    | -804.981 | -31.144  | -761.088 | -101.746 |
| 96    | -769.949 | -110.622 | -723.142 | -185.911 |
| 97    | -739.194 | -182.229 | -716.795 | -218.257 |
| 98    | -735.902 | -211.708 | -830.637 | -59.326  |
| 99    | -770.270 | -95.324  | -770.779 | -94.672  |
| 100   | -787.688 | -85.715  | -677.608 | -226.614 |
| 101   | -700.148 | -230.425 | -807.438 | -93.097  |
| 102   | -800.307 | -74.570  | -699.819 | -203.191 |
| 103   | -781.582 | -152.538 | -745.390 | -210.752 |
| 104   | -753.897 | -188.371 | -748.437 | -197.154 |
| 105   | -751.618 | -173.943 | -768.048 | -147.515 |
| 106   | -769.930 | -10.776  | -808.277 | 50.905   |
| 107   | -808.520 | 50.673   | -838.352 | 98.657   |
| 108   | -837.898 | 99.124   | -857.655 | 130.903  |
| 109   | -857.841 | 130.704  | -866.541 | 144.699  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== | =====    | =====    | =====    | =====     |
| 110   | -867.780 | 143.463  | -865.038 | 139.053   |
| 111   | -867.651 | 136.485  | -853.536 | 113.782   |
| 112   | -857.647 | 109.683  | -832.804 | 69.723    |
| 113   | -838.456 | 64.071   | -804.044 | 8.720     |
| 114   | -811.155 | 1.586    | -769.240 | -65.834   |
| 115   | -777.520 | -74.116  | -730.375 | -149.949  |
| 116   | -739.285 | -158.886 | -689.201 | -239.446  |
| 117   | -705.606 | -235.483 | -680.219 | -276.318  |
| 118   | -699.650 | -269.741 | -791.647 | -121.764  |
| 119   | -733.452 | -142.874 | -729.979 | -147.320  |
| 120   | -747.185 | -138.429 | -630.054 | -288.353  |
| 121   | -652.708 | -292.226 | -774.102 | -136.845  |
| 122   | -766.861 | -118.158 | -677.409 | -232.653  |
| 123   | -757.929 | -190.807 | -731.949 | -232.596  |
| 124   | -740.451 | -209.878 | -745.147 | -202.324  |
| 125   | -748.389 | -179.048 | -775.751 | -135.035  |
| 126   | -772.613 | -7.910   | -814.169 | 58.934    |
| 127   | -814.588 | 58.506   | -847.540 | 111.509   |
| 128   | -847.322 | 111.742  | -870.170 | 148.493   |
| 129   | -870.614 | 148.035  | -882.399 | 166.991   |
| 130   | -883.900 | 165.501  | -884.307 | 166.155   |
| 131   | -887.149 | 163.311  | -876.297 | 145.855   |
| 132   | -880.613 | 141.523  | -859.262 | 107.180   |
| 133   | -865.055 | 101.333  | -834.350 | 51.944    |
| 134   | -841.543 | 44.728   | -803.587 | -16.323   |
| 135   | -811.838 | -24.568  | -768.883 | -93.660   |
| 136   | -777.604 | -102.408 | -731.821 | -176.050  |
| 137   | -750.383 | -167.597 | -729.934 | -200.490  |
| 138   | -750.639 | -190.103 | -853.748 | -24.251   |
| 139   | -787.705 | -72.972  | -787.641 | -73.054   |
| 140   | -805.167 | -62.197  | -703.601 | -192.198  |
| 141   | -720.514 | -189.739 | -799.426 | -88.734   |
| 142   | -787.312 | -68.844  | -693.956 | -188.337  |
| 143   | -769.769 | -139.993 | -713.426 | -230.622  |
| 144   | -719.879 | -212.389 | -693.259 | -255.208  |
| 145   | -699.257 | -232.489 | -705.423 | -222.571  |
| 146   | -794.648 | 52.026   | -754.555 | -12.463   |
| 147   | -787.557 | -45.447  | -766.139 | -79.899   |
| 148   | -765.188 | -78.967  | -749.148 | -104.767  |
| 149   | -748.045 | -103.699 | -736.071 | -122.959  |
| 150   | -735.831 | -122.770 | -726.214 | -138.237  |
| 151   | -727.794 | -139.808 | -725.690 | -143.192  |
| 152   | -725.036 | -142.536 | -719.533 | -151.388  |
| 153   | -717.689 | -149.527 | -698.257 | -180.784  |
| 154   | -696.551 | -179.055 | -663.077 | -232.897  |
| 155   | -661.496 | -231.301 | -614.041 | -307.633  |
| 156   | -612.579 | -306.184 | -550.853 | -405.471  |
| 157   | -549.539 | -404.162 | -473.566 | -526.366  |
| 158   | -472.479 | -525.304 | -382.262 | -670.419  |
| 159   | -381.354 | -669.528 | -276.876 | -837.582  |
| 160   | -276.281 | -837.016 | -154.200 | -1033.385 |



COMBINACION 25 G1 + G2 + 0.9 PRETD + 0.60 SCMAX-IPF + 0.2 TEMP

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.552 | -875.909 | -203.598 | -760.023 |
| 2     | -238.719 | -731.482 | -327.074 | -589.362 |
| 3     | -327.907 | -590.185 | -403.230 | -469.028 |
| 4     | -404.317 | -470.119 | -466.655 | -369.847 |
| 5     | -467.910 | -371.116 | -517.386 | -291.534 |
| 6     | -518.759 | -292.890 | -555.352 | -234.030 |
| 7     | -556.773 | -235.459 | -580.694 | -196.982 |
| 8     | -582.158 | -198.426 | -593.482 | -180.210 |
| 9     | -594.951 | -181.695 | -593.730 | -183.659 |
| 10    | -595.220 | -185.157 | -584.420 | -202.528 |
| 11    | -587.759 | -205.858 | -574.438 | -227.285 |
| 12    | -579.022 | -231.867 | -564.090 | -255.885 |
| 13    | -569.833 | -261.621 | -554.684 | -285.988 |
| 14    | -561.379 | -292.717 | -547.370 | -315.251 |
| 15    | -554.709 | -322.589 | -543.572 | -340.503 |
| 16    | -550.970 | -347.892 | -543.747 | -359.511 |
| 17    | -550.385 | -366.112 | -549.471 | -367.583 |
| 18    | -564.212 | -361.773 | -663.131 | -202.662 |
| 19    | -606.003 | -207.683 | -585.504 | -233.921 |
| 20    | -597.360 | -234.350 | -490.395 | -371.263 |
| 21    | -505.791 | -378.234 | -639.240 | -207.423 |
| 22    | -631.333 | -191.739 | -561.217 | -281.486 |
| 23    | -628.583 | -270.989 | -613.600 | -295.089 |
| 24    | -618.550 | -280.808 | -624.955 | -270.505 |
| 25    | -629.744 | -249.242 | -648.790 | -218.606 |
| 26    | -650.042 | -208.961 | -676.211 | -166.868 |
| 27    | -675.813 | -166.452 | -696.312 | -133.479 |
| 28    | -695.948 | -133.112 | -709.927 | -110.626 |
| 29    | -710.134 | -110.808 | -716.657 | -100.315 |
| 30    | -717.841 | -101.477 | -716.496 | -103.641 |
| 31    | -718.989 | -106.118 | -709.819 | -120.867 |
| 32    | -713.778 | -124.834 | -697.395 | -151.185 |
| 33    | -702.873 | -156.663 | -680.429 | -192.764 |
| 34    | -687.357 | -199.690 | -660.845 | -242.334 |
| 35    | -668.914 | -250.419 | -640.556 | -296.034 |
| 36    | -649.268 | -304.751 | -621.286 | -349.760 |
| 37    | -632.894 | -353.016 | -618.050 | -376.894 |
| 38    | -635.042 | -373.806 | -732.209 | -217.512 |
| 39    | -672.418 | -220.858 | -667.287 | -227.426 |
| 40    | -681.101 | -222.874 | -558.230 | -380.145 |
| 41    | -578.515 | -387.171 | -697.395 | -235.007 |
| 42    | -688.772 | -218.227 | -595.651 | -337.419 |
| 43    | -668.463 | -334.815 | -634.403 | -389.601 |
| 44    | -639.235 | -372.541 | -630.789 | -386.128 |
| 45    | -630.867 | -367.549 | -637.786 | -356.419 |
| 46    | -635.955 | -225.497 | -663.354 | -181.425 |
| 47    | -663.602 | -181.653 | -685.819 | -145.917 |
| 48    | -685.395 | -145.512 | -700.868 | -120.623 |
| 49    | -701.133 | -120.886 | -708.920 | -108.361 |
| 50    | -710.244 | -109.691 | -709.989 | -110.102 |
| 51    | -712.674 | -112.813 | -704.443 | -126.052 |
| 52    | -708.648 | -130.257 | -693.161 | -155.168 |
| 53    | -698.883 | -160.943 | -677.323 | -195.622 |
| 54    | -684.513 | -202.815 | -658.915 | -243.989 |

COMBINACION 25 G1 + G2 + 0.9 PRETD + 0.60 SCMAX-IPF + 0.2 TEMP

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -667.250 | -252.291 | -639.929 | -296.237 |
| 56    | -648.853 | -305.142 | -622.042 | -348.267 |
| 57    | -635.361 | -349.106 | -627.243 | -362.164 |
| 58    | -643.595 | -360.151 | -747.612 | -192.839 |
| 59    | -687.131 | -201.775 | -687.978 | -200.691 |
| 60    | -701.684 | -195.833 | -584.842 | -345.388 |
| 61    | -605.046 | -352.159 | -722.262 | -202.126 |
| 62    | -713.717 | -185.375 | -619.087 | -306.498 |
| 63    | -693.361 | -294.417 | -657.427 | -352.217 |
| 64    | -662.622 | -335.221 | -651.076 | -353.793 |
| 65    | -651.445 | -335.206 | -656.396 | -327.243 |
| 66    | -654.760 | -196.283 | -680.072 | -155.568 |
| 67    | -680.371 | -155.847 | -700.537 | -123.410 |
| 68    | -700.132 | -122.996 | -713.592 | -101.346 |
| 69    | -713.828 | -101.592 | -719.688 | -92.165  |
| 70    | -720.964 | -93.456  | -718.831 | -96.886  |
| 71    | -721.462 | -99.525  | -711.410 | -115.693 |
| 72    | -715.541 | -119.835 | -698.231 | -147.678 |
| 73    | -703.888 | -153.362 | -680.495 | -190.990 |
| 74    | -687.603 | -198.127 | -660.183 | -242.231 |
| 75    | -668.440 | -250.490 | -639.264 | -297.420 |
| 76    | -648.134 | -306.282 | -619.403 | -352.496 |
| 77    | -633.205 | -352.491 | -624.501 | -366.492 |
| 78    | -640.887 | -364.456 | -744.417 | -197.927 |
| 79    | -684.161 | -205.679 | -684.547 | -205.186 |
| 80    | -698.328 | -200.388 | -581.021 | -350.538 |
| 81    | -601.286 | -357.343 | -719.156 | -206.474 |
| 82    | -710.580 | -189.702 | -616.524 | -310.091 |
| 83    | -690.579 | -299.006 | -655.379 | -355.625 |
| 84    | -660.498 | -338.545 | -649.655 | -355.987 |
| 85    | -649.968 | -337.364 | -655.693 | -328.155 |
| 86    | -653.787 | -197.574 | -679.481 | -156.245 |
| 87    | -679.769 | -156.540 | -700.304 | -123.511 |
| 88    | -699.926 | -123.091 | -713.733 | -100.883 |
| 89    | -714.001 | -101.145 | -720.188 | -91.193  |
| 90    | -721.496 | -92.512  | -719.647 | -95.486  |
| 91    | -722.324 | -98.143  | -712.514 | -113.922 |
| 92    | -716.687 | -118.088 | -699.679 | -145.447 |
| 93    | -705.378 | -151.146 | -682.331 | -188.217 |
| 94    | -689.467 | -195.373 | -662.417 | -238.884 |
| 95    | -670.680 | -247.169 | -641.885 | -293.484 |
| 96    | -650.746 | -302.361 | -622.451 | -347.874 |
| 97    | -636.367 | -347.626 | -628.437 | -360.383 |
| 98    | -644.770 | -358.295 | -749.051 | -190.558 |
| 99    | -688.508 | -199.977 | -690.996 | -196.792 |
| 100   | -704.703 | -191.934 | -592.494 | -335.557 |
| 101   | -612.721 | -342.329 | -725.165 | -198.404 |
| 102   | -716.625 | -181.680 | -620.175 | -305.134 |
| 103   | -694.502 | -292.605 | -658.236 | -350.939 |
| 104   | -663.407 | -333.926 | -651.470 | -353.126 |
| 105   | -651.800 | -334.501 | -656.445 | -327.030 |
| 106   | -653.661 | -197.797 | -676.996 | -160.262 |
| 107   | -677.239 | -160.494 | -695.419 | -131.251 |
| 108   | -694.966 | -130.783 | -706.459 | -112.296 |
| 109   | -706.646 | -112.494 | -710.525 | -106.255 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -711.763 | -107.491 | -707.605 | -114.180  |
| 111   | -710.216 | -116.749 | -698.103 | -136.233  |
| 112   | -702.213 | -140.334 | -682.801 | -171.559  |
| 113   | -688.453 | -177.209 | -662.932 | -218.259  |
| 114   | -670.043 | -225.393 | -640.445 | -273.003  |
| 115   | -648.724 | -281.285 | -617.320 | -331.800  |
| 116   | -626.230 | -340.734 | -595.301 | -390.485  |
| 117   | -609.503 | -390.065 | -599.156 | -406.709  |
| 118   | -615.774 | -404.656 | -717.868 | -240.437  |
| 119   | -659.107 | -238.034 | -658.158 | -239.248  |
| 120   | -672.138 | -234.487 | -553.422 | -386.440  |
| 121   | -573.756 | -393.282 | -698.360 | -233.792  |
| 122   | -689.704 | -216.917 | -602.347 | -328.731  |
| 123   | -675.623 | -323.196 | -647.545 | -368.360  |
| 124   | -652.674 | -351.069 | -648.896 | -357.146  |
| 125   | -649.271 | -338.479 | -662.645 | -316.968  |
| 126   | -656.273 | -195.044 | -682.681 | -152.565  |
| 127   | -683.101 | -152.992 | -704.266 | -118.947  |
| 128   | -704.047 | -118.717 | -718.489 | -95.488   |
| 129   | -718.933 | -95.945  | -725.751 | -84.978   |
| 130   | -727.251 | -86.470  | -726.107 | -88.311   |
| 131   | -728.950 | -91.153  | -719.967 | -105.604  |
| 132   | -724.283 | -109.935 | -708.219 | -135.774  |
| 133   | -714.015 | -141.616 | -692.058 | -176.934  |
| 134   | -699.253 | -184.147 | -673.469 | -225.620  |
| 135   | -681.719 | -233.865 | -654.356 | -277.879  |
| 136   | -663.076 | -286.626 | -636.299 | -329.697  |
| 137   | -651.941 | -325.942 | -646.188 | -335.195  |
| 138   | -663.533 | -330.213 | -774.530 | -151.674  |
| 139   | -709.288 | -173.343 | -711.441 | -170.588  |
| 140   | -725.455 | -164.225 | -621.976 | -296.675  |
| 141   | -636.499 | -297.276 | -719.611 | -190.895  |
| 142   | -706.537 | -172.234 | -616.643 | -287.295  |
| 143   | -686.212 | -274.395 | -630.582 | -363.877  |
| 144   | -634.369 | -349.932 | -605.023 | -397.136  |
| 145   | -607.918 | -379.408 | -604.220 | -385.358  |
| 146   | -693.236 | -111.095 | -644.333 | -189.756  |
| 147   | -677.334 | -222.741 | -649.296 | -267.841  |
| 148   | -648.345 | -266.910 | -627.907 | -299.784  |
| 149   | -626.804 | -298.714 | -612.638 | -321.501  |
| 150   | -612.399 | -321.311 | -602.822 | -336.715  |
| 151   | -604.402 | -338.284 | -604.583 | -337.993  |
| 152   | -603.929 | -337.336 | -602.942 | -338.925  |
| 153   | -601.098 | -337.065 | -588.410 | -357.473  |
| 154   | -586.705 | -355.743 | -562.213 | -395.138  |
| 155   | -560.634 | -393.539 | -524.374 | -451.862  |
| 156   | -522.914 | -450.411 | -474.652 | -528.040  |
| 157   | -473.340 | -526.729 | -413.062 | -623.687  |
| 158   | -411.976 | -622.624 | -339.695 | -738.889  |
| 159   | -338.787 | -737.997 | -254.471 | -873.620  |
| 160   | -253.877 | -873.054 | -154.199 | -1033.386 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 1     | -131.543 | -875.924  | -174.344 | -807.078  |
| 2     | -171.865 | -839.016  | -199.282 | -794.917  |
| 3     | -200.114 | -795.740  | -220.385 | -763.134  |
| 4     | -221.474 | -764.222  | -234.664 | -743.007  |
| 5     | -235.916 | -744.280  | -242.111 | -734.316  |
| 6     | -243.483 | -735.673  | -242.774 | -736.814  |
| 7     | -244.192 | -738.248  | -236.690 | -750.315  |
| 8     | -238.152 | -751.762  | -223.947 | -774.611  |
| 9     | -225.416 | -776.093  | -201.106 | -815.197  |
| 10    | -202.598 | -816.691  | -173.599 | -863.337  |
| 11    | -176.932 | -866.675  | -150.506 | -909.182  |
| 12    | -155.090 | -913.764  | -132.134 | -950.690  |
| 13    | -137.878 | -956.423  | -119.704 | -985.656  |
| 14    | -126.396 | -992.391  | -114.490 | -1011.542 |
| 15    | -121.833 | -1018.872 | -117.791 | -1025.374 |
| 16    | -125.191 | -1032.761 | -130.198 | -1024.707 |
| 17    | -136.764 | -1031.424 | -150.054 | -1010.047 |
| 18    | -143.048 | -1039.218 | -214.700 | -923.966  |
| 19    | -160.835 | -777.483  | -75.196  | -887.100  |
| 20    | -73.198  | -905.263  | 126.756  | -1161.198 |
| 21    | 121.535  | -1181.192 | -180.148 | -795.048  |
| 22    | -162.837 | -791.400  | -226.333 | -710.127  |
| 23    | -254.150 | -873.268  | -323.338 | -761.979  |
| 24    | -307.932 | -780.439  | -354.917 | -704.863  |
| 25    | -332.129 | -727.958  | -347.435 | -703.338  |
| 26    | -317.610 | -743.680  | -297.139 | -776.608  |
| 27    | -296.737 | -776.198  | -279.417 | -804.057  |
| 28    | -279.056 | -803.684  | -264.126 | -827.700  |
| 29    | -264.335 | -827.879  | -251.022 | -849.292  |
| 30    | -252.209 | -850.450  | -240.022 | -870.054  |
| 31    | -242.518 | -872.526  | -231.506 | -890.239  |
| 32    | -235.464 | -894.205  | -226.286 | -908.968  |
| 33    | -231.760 | -914.451  | -221.166 | -931.491  |
| 34    | -228.089 | -938.426  | -215.052 | -959.395  |
| 35    | -223.122 | -967.479  | -215.992 | -978.947  |
| 36    | -224.700 | -987.672  | -225.686 | -986.085  |
| 37    | -228.467 | -1003.540 | -218.335 | -1019.837 |
| 38    | -214.119 | -1050.864 | -275.147 | -952.701  |
| 39    | -209.360 | -813.558  | -117.205 | -931.514  |
| 40    | -108.746 | -955.471  | 142.873  | -1277.535 |
| 41    | 138.847  | -1305.372 | -153.969 | -930.576  |
| 42    | -135.483 | -926.420  | -172.828 | -878.619  |
| 43    | -200.020 | -1088.310 | -258.918 | -993.571  |
| 44    | -240.584 | -1013.774 | -273.743 | -960.438  |
| 45    | -254.068 | -973.633  | -263.961 | -957.720  |
| 46    | -226.521 | -884.075  | -214.469 | -903.461  |
| 47    | -214.721 | -903.681  | -206.297 | -917.231  |
| 48    | -205.878 | -916.817  | -199.619 | -926.885  |
| 49    | -199.881 | -927.154  | -195.040 | -934.940  |
| 50    | -196.372 | -936.257  | -192.511 | -942.469  |
| 51    | -195.194 | -945.184  | -192.388 | -949.696  |
| 52    | -196.593 | -953.902  | -195.580 | -955.530  |
| 53    | -201.308 | -961.295  | -200.385 | -962.779  |
| 54    | -207.584 | -969.959  | -202.258 | -978.525  |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 55    | -210.593 | -986.829  | -211.302 | -985.688  |
| 56    | -220.224 | -994.595  | -229.212 | -980.137  |
| 57    | -229.291 | -1002.273 | -217.830 | -1020.708 |
| 58    | -214.734 | -1049.976 | -275.536 | -952.176  |
| 59    | -209.296 | -813.390  | -116.654 | -931.968  |
| 60    | -107.849 | -955.924  | 144.275  | -1278.635 |
| 61    | 140.343  | -1306.235 | -152.552 | -931.337  |
| 62    | -134.098 | -927.269  | -171.110 | -879.895  |
| 63    | -198.393 | -1090.576 | -257.228 | -995.940  |
| 64    | -238.935 | -1016.725 | -271.908 | -963.687  |
| 65    | -252.211 | -977.376  | -261.907 | -961.780  |
| 66    | -224.411 | -888.503  | -212.433 | -907.768  |
| 67    | -212.722 | -908.064  | -204.433 | -921.397  |
| 68    | -204.027 | -920.984  | -197.970 | -930.727  |
| 69    | -198.205 | -930.976  | -193.617 | -938.355  |
| 70    | -194.896 | -939.639  | -191.312 | -945.404  |
| 71    | -193.935 | -948.055  | -191.435 | -952.076  |
| 72    | -195.564 | -956.222  | -194.845 | -957.377  |
| 73    | -200.504 | -963.059  | -199.942 | -963.963  |
| 74    | -207.059 | -971.084  | -201.987 | -979.243  |
| 75    | -210.240 | -987.507  | -211.131 | -986.074  |
| 76    | -220.001 | -994.935  | -229.125 | -980.260  |
| 77    | -228.305 | -1003.775 | -214.625 | -1025.780 |
| 78    | -211.515 | -1055.104 | -270.117 | -960.842  |
| 79    | -204.153 | -820.075  | -109.459 | -941.281  |
| 80    | -100.708 | -965.325  | 153.476  | -1290.672 |
| 81    | 149.482  | -1318.303 | -144.022 | -942.628  |
| 82    | -125.535 | -938.542  | -163.102 | -890.457  |
| 83    | -189.900 | -1104.352 | -249.415 | -1008.621 |
| 84    | -231.061 | -1029.298 | -264.780 | -975.062  |
| 85    | -245.046 | -988.684  | -255.499 | -971.869  |
| 86    | -218.412 | -897.877  | -207.839 | -914.885  |
| 87    | -208.124 | -915.185  | -201.189 | -926.340  |
| 88    | -200.800 | -925.939  | -196.063 | -933.560  |
| 89    | -196.328 | -933.824  | -193.084 | -939.042  |
| 90    | -194.389 | -940.367  | -192.131 | -943.999  |
| 91    | -194.815 | -946.644  | -193.655 | -948.511  |
| 92    | -197.822 | -952.686  | -198.440 | -951.693  |
| 93    | -204.139 | -957.392  | -204.918 | -956.138  |
| 94    | -212.056 | -963.291  | -208.349 | -969.255  |
| 95    | -216.610 | -977.543  | -218.898 | -973.862  |
| 96    | -227.758 | -982.741  | -238.280 | -965.815  |
| 97    | -237.182 | -989.718  | -224.235 | -1010.544 |
| 98    | -221.054 | -1039.845 | -280.358 | -944.453  |
| 99    | -213.837 | -807.542  | -121.249 | -926.052  |
| 100   | -112.426 | -950.030  | 136.679  | -1268.877 |
| 101   | 132.721  | -1296.473 | -153.778 | -929.762  |
| 102   | -135.325 | -925.727  | -168.873 | -882.786  |
| 103   | -196.049 | -1094.372 | -252.850 | -1003.006 |
| 104   | -234.551 | -1023.743 | -265.551 | -973.880  |
| 105   | -245.826 | -987.514  | -253.576 | -975.047  |
| 106   | -217.969 | -898.610  | -207.047 | -916.178  |
| 107   | -207.293 | -916.405  | -200.063 | -928.035  |
| 108   | -199.614 | -927.560  | -194.641 | -935.560  |
| 109   | -194.834 | -935.747  | -191.344 | -941.361  |

## COMBINACION 26 G1 + G2 + 0.9 PRETD + SCMIN-IPF

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== | =====    | =====     | =====    | =====     |
| 110   | -192.578 | -942.604  | -190.019 | -946.719  |
| 111   | -192.626 | -949.297  | -191.134 | -951.697  |
| 112   | -195.239 | -955.805  | -195.529 | -955.339  |
| 113   | -201.185 | -960.983  | -201.898 | -959.837  |
| 114   | -209.007 | -966.974  | -204.925 | -973.540  |
| 115   | -213.202 | -981.826  | -215.075 | -978.813  |
| 116   | -223.992 | -987.738  | -234.080 | -971.511  |
| 117   | -232.787 | -996.017  | -219.204 | -1017.864 |
| 118   | -216.036 | -1047.637 | -274.853 | -953.029  |
| 119   | -208.686 | -814.559  | -114.272 | -935.406  |
| 120   | -105.554 | -959.698  | 148.435  | -1284.795 |
| 121   | 144.414  | -1312.518 | -147.841 | -938.441  |
| 122   | -129.228 | -934.308  | -165.146 | -888.335  |
| 123   | -191.760 | -1101.493 | -250.340 | -1007.267 |
| 124   | -231.736 | -1028.149 | -264.656 | -975.198  |
| 125   | -244.877 | -988.950  | -253.330 | -975.354  |
| 126   | -224.488 | -889.573  | -223.421 | -891.289  |
| 127   | -223.844 | -891.710  | -226.357 | -887.667  |
| 128   | -226.135 | -887.443  | -230.840 | -879.875  |
| 129   | -231.288 | -880.326  | -237.454 | -870.409  |
| 130   | -238.947 | -871.911  | -246.165 | -860.300  |
| 131   | -249.015 | -863.133  | -257.438 | -849.585  |
| 132   | -261.751 | -853.920  | -272.111 | -837.257  |
| 133   | -277.917 | -843.083  | -291.534 | -821.179  |
| 134   | -298.735 | -828.382  | -310.816 | -808.950  |
| 135   | -319.063 | -817.199  | -332.536 | -795.529  |
| 136   | -341.256 | -804.276  | -363.051 | -769.219  |
| 137   | -358.150 | -798.506  | -355.853 | -802.201  |
| 138   | -349.562 | -835.239  | -411.691 | -735.302  |
| 139   | -343.329 | -641.760  | -258.202 | -750.720  |
| 140   | -247.517 | -775.972  | -14.777  | -1073.871 |
| 141   | -12.490  | -1095.989 | -206.808 | -847.267  |
| 142   | -186.982 | -837.249  | -186.233 | -838.208  |
| 143   | -217.230 | -1028.756 | -226.606 | -1013.674 |
| 144   | -211.646 | -1029.886 | -215.316 | -1023.982 |
| 145   | -196.385 | -1041.362 | -178.501 | -1070.129 |
| 146   | -266.054 | -798.220  | -204.454 | -897.305  |
| 147   | -237.450 | -930.298  | -202.474 | -986.558  |
| 148   | -201.520 | -985.631  | -180.016 | -1020.220 |
| 149   | -178.916 | -1019.146 | -169.525 | -1034.251 |
| 150   | -169.284 | -1034.064 | -170.372 | -1032.314 |
| 151   | -171.952 | -1033.883 | -188.761 | -1006.846 |
| 152   | -188.109 | -1006.186 | -209.652 | -971.534  |
| 153   | -207.808 | -969.674  | -223.537 | -944.374  |
| 154   | -221.830 | -942.647  | -231.701 | -926.770  |
| 155   | -230.123 | -925.167  | -234.084 | -918.797  |
| 156   | -232.627 | -917.339  | -230.604 | -920.594  |
| 157   | -229.296 | -919.276  | -221.154 | -932.372  |
| 158   | -220.068 | -931.309  | -205.853 | -954.174  |
| 159   | -204.947 | -953.279  | -184.583 | -986.035  |
| 160   | -183.991 | -985.466  | -154.196 | -1033.392 |

COMBINACION 27 G1 + G2 + 0.9 PRETD + 0.60 SCMIN-IPF

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.545 | -875.920 | -173.314 | -808.735 |
| 2     | -178.336 | -828.608 | -212.223 | -774.100 |
| 3     | -213.056 | -774.923 | -239.801 | -731.904 |
| 4     | -240.889 | -732.993 | -260.547 | -701.373 |
| 5     | -261.800 | -702.646 | -274.464 | -682.275 |
| 6     | -275.837 | -683.633 | -281.600 | -674.361 |
| 7     | -283.019 | -675.795 | -281.990 | -677.450 |
| 8     | -283.452 | -678.896 | -275.714 | -691.344 |
| 9     | -277.183 | -692.827 | -260.732 | -719.288 |
| 10    | -262.224 | -720.783 | -241.479 | -754.152 |
| 11    | -244.813 | -757.488 | -226.982 | -786.170 |
| 12    | -231.567 | -790.751 | -217.536 | -813.319 |
| 13    | -223.280 | -819.053 | -214.358 | -833.404 |
| 14    | -221.051 | -840.138 | -218.719 | -843.889 |
| 15    | -226.061 | -851.221 | -231.918 | -841.801 |
| 16    | -239.318 | -849.188 | -254.572 | -824.652 |
| 17    | -261.158 | -831.336 | -285.440 | -792.278 |
| 18    | -284.431 | -811.803 | -379.422 | -659.009 |
| 19    | -322.808 | -570.164 | -269.362 | -638.573 |
| 20    | -271.185 | -651.845 | -112.377 | -855.115 |
| 21    | -120.403 | -871.518 | -354.769 | -571.538 |
| 22    | -340.051 | -564.571 | -349.475 | -552.510 |
| 23    | -389.650 | -655.315 | -420.375 | -605.894 |
| 24    | -410.582 | -615.326 | -430.330 | -583.561 |
| 25    | -415.146 | -594.424 | -417.332 | -590.908 |
| 26    | -396.076 | -617.466 | -376.718 | -648.604 |
| 27    | -376.318 | -648.193 | -360.112 | -674.259 |
| 28    | -359.750 | -673.887 | -345.934 | -696.111 |
| 29    | -346.143 | -696.290 | -333.945 | -715.910 |
| 30    | -335.131 | -717.069 | -324.059 | -734.879 |
| 31    | -326.554 | -737.352 | -316.659 | -753.269 |
| 32    | -320.617 | -757.235 | -312.551 | -770.210 |
| 33    | -318.026 | -775.692 | -310.338 | -788.058 |
| 34    | -317.261 | -794.991 | -310.086 | -806.532 |
| 35    | -318.156 | -814.616 | -317.398 | -815.835 |
| 36    | -326.106 | -824.559 | -333.975 | -811.902 |
| 37    | -339.190 | -825.441 | -345.155 | -815.846 |
| 38    | -346.732 | -837.555 | -435.706 | -694.440 |
| 39    | -370.017 | -607.922 | -318.633 | -673.692 |
| 40    | -316.317 | -689.787 | -118.955 | -942.404 |
| 41    | -127.470 | -964.495 | -351.428 | -677.834 |
| 42    | -335.662 | -670.197 | -320.938 | -689.043 |
| 43    | -362.196 | -827.448 | -380.668 | -797.736 |
| 44    | -368.722 | -807.664 | -375.762 | -796.340 |
| 45    | -361.534 | -800.773 | -356.218 | -809.323 |
| 46    | -328.597 | -719.884 | -315.446 | -741.038 |
| 47    | -315.697 | -741.260 | -306.175 | -756.577 |
| 48    | -305.754 | -756.166 | -298.403 | -767.991 |
| 49    | -298.665 | -768.258 | -292.724 | -777.814 |
| 50    | -294.055 | -779.134 | -289.088 | -787.124 |
| 51    | -291.771 | -789.838 | -287.855 | -796.137 |
| 52    | -292.060 | -800.342 | -289.930 | -803.768 |
| 53    | -295.657 | -809.535 | -294.810 | -810.896 |
| 54    | -302.007 | -818.078 | -300.520 | -820.470 |

COMBINACION 27 G1 + G2 + 0.9 PRETD + 0.60 SCMIN-IPF

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | Tl_2     |
|-------|----------|----------|----------|----------|
| 55    | -308.855 | -828.773 | -313.907 | -820.646 |
| 56    | -322.830 | -829.552 | -336.666 | -807.297 |
| 57    | -340.396 | -823.560 | -347.036 | -812.879 |
| 58    | -349.303 | -833.522 | -439.596 | -688.285 |
| 59    | -373.417 | -603.319 | -323.074 | -667.757 |
| 60    | -320.477 | -683.767 | -124.156 | -935.051 |
| 61    | -132.575 | -956.908 | -356.200 | -670.675 |
| 62    | -340.478 | -663.109 | -325.235 | -682.620 |
| 63    | -366.919 | -819.501 | -384.902 | -790.576 |
| 64    | -373.086 | -800.943 | -379.509 | -790.610 |
| 65    | -365.346 | -795.398 | -359.392 | -804.975 |
| 66    | -331.784 | -715.791 | -318.158 | -737.709 |
| 67    | -318.449 | -738.001 | -308.510 | -753.988 |
| 68    | -308.104 | -753.575 | -300.395 | -765.976 |
| 69    | -300.630 | -766.224 | -294.394 | -776.255 |
| 70    | -295.672 | -777.540 | -290.438 | -785.960 |
| 71    | -293.062 | -788.609 | -288.913 | -795.283 |
| 72    | -293.042 | -799.428 | -290.670 | -803.243 |
| 73    | -296.328 | -808.925 | -295.278 | -810.614 |
| 74    | -302.393 | -817.739 | -300.636 | -820.565 |
| 75    | -308.890 | -828.828 | -313.608 | -821.240 |
| 76    | -322.478 | -830.102 | -335.938 | -808.451 |
| 77    | -339.151 | -825.480 | -344.057 | -817.588 |
| 78    | -346.323 | -838.264 | -434.928 | -695.742 |
| 79    | -369.006 | -609.068 | -317.089 | -675.520 |
| 80    | -314.552 | -691.611 | -116.651 | -944.917 |
| 81    | -125.132 | -966.806 | -349.359 | -679.803 |
| 82    | -333.604 | -672.219 | -318.900 | -691.040 |
| 83    | -360.180 | -830.456 | -378.841 | -800.439 |
| 84    | -366.959 | -810.705 | -374.110 | -799.203 |
| 85    | -359.904 | -803.934 | -354.685 | -812.329 |
| 86    | -327.299 | -722.733 | -314.774 | -742.878 |
| 87    | -315.060 | -743.177 | -306.178 | -757.465 |
| 88    | -305.791 | -757.060 | -299.107 | -767.812 |
| 89    | -299.373 | -768.076 | -294.175 | -776.436 |
| 90    | -295.481 | -777.760 | -291.263 | -784.546 |
| 91    | -293.945 | -787.193 | -290.813 | -792.231 |
| 92    | -294.982 | -796.404 | -293.639 | -798.565 |
| 93    | -299.338 | -804.264 | -299.326 | -804.284 |
| 94    | -306.464 | -811.437 | -305.769 | -812.553 |
| 95    | -314.031 | -820.840 | -319.848 | -811.484 |
| 96    | -328.708 | -820.362 | -343.267 | -796.943 |
| 97    | -346.309 | -814.187 | -351.939 | -805.131 |
| 98    | -354.139 | -825.776 | -443.438 | -682.139 |
| 99    | -377.041 | -598.645 | -327.201 | -662.439 |
| 100   | -324.592 | -678.464 | -131.751 | -925.294 |
| 101   | -140.195 | -947.148 | -357.896 | -668.498 |
| 102   | -342.176 | -660.963 | -323.950 | -684.292 |
| 103   | -365.572 | -821.692 | -382.017 | -795.240 |
| 104   | -370.190 | -805.567 | -375.110 | -797.653 |
| 105   | -360.915 | -802.391 | -353.486 | -814.341 |
| 106   | -326.929 | -723.346 | -313.543 | -744.878 |
| 107   | -313.788 | -745.107 | -304.093 | -760.702 |
| 108   | -303.643 | -760.230 | -296.197 | -772.207 |
| 109   | -296.388 | -772.396 | -290.422 | -781.994 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== | =====    | =====    | =====    | =====     |
| 110   | -291.657 | -783.234 | -286.628 | -791.324  |
| 111   | -289.236 | -793.899 | -285.271 | -800.277  |
| 112   | -289.377 | -804.384 | -287.180 | -807.918  |
| 113   | -292.836 | -813.563 | -292.107 | -814.735  |
| 114   | -299.216 | -821.871 | -297.595 | -824.478  |
| 115   | -305.873 | -832.764 | -310.717 | -824.972  |
| 116   | -319.633 | -833.899 | -333.199 | -812.078  |
| 117   | -336.179 | -829.710 | -340.715 | -822.412  |
| 118   | -343.004 | -843.409 | -431.364 | -701.280  |
| 119   | -365.692 | -613.596 | -313.628 | -680.236  |
| 120   | -311.169 | -696.517 | -113.039 | -950.116  |
| 121   | -121.558 | -972.082 | -346.656 | -683.964  |
| 122   | -330.788 | -676.317 | -316.702 | -694.347  |
| 123   | -357.646 | -834.665 | -377.481 | -802.760  |
| 124   | -365.421 | -813.117 | -373.826 | -799.597  |
| 125   | -359.605 | -804.410 | -354.894 | -811.987  |
| 126   | -332.304 | -716.150 | -326.764 | -725.060  |
| 127   | -327.187 | -725.482 | -325.238 | -728.617  |
| 128   | -325.016 | -728.392 | -325.254 | -728.008  |
| 129   | -325.702 | -728.461 | -327.402 | -725.726  |
| 130   | -328.897 | -727.226 | -331.645 | -722.805  |
| 131   | -334.494 | -725.639 | -338.439 | -719.293  |
| 132   | -342.754 | -723.628 | -348.637 | -714.164  |
| 133   | -354.440 | -719.994 | -363.580 | -705.294  |
| 134   | -370.779 | -712.499 | -381.079 | -695.932  |
| 135   | -389.327 | -704.179 | -403.438 | -681.482  |
| 136   | -412.159 | -690.229 | -435.102 | -653.324  |
| 137   | -435.865 | -673.500 | -449.491 | -651.583  |
| 138   | -449.718 | -674.137 | -542.409 | -525.043  |
| 139   | -473.526 | -475.112 | -428.779 | -532.387  |
| 140   | -424.905 | -548.920 | -246.109 | -777.774  |
| 141   | -248.456 | -793.960 | -396.678 | -604.240  |
| 142   | -378.713 | -591.839 | -340.287 | -641.023  |
| 143   | -383.590 | -761.166 | -362.558 | -794.995  |
| 144   | -352.767 | -802.891 | -336.070 | -829.748  |
| 145   | -323.158 | -837.448 | -296.927 | -879.639  |
| 146   | -384.884 | -607.082 | -315.360 | -718.912  |
| 147   | -348.357 | -751.903 | -305.465 | -820.895  |
| 148   | -304.512 | -819.968 | -275.096 | -867.283  |
| 149   | -273.995 | -866.210 | -256.687 | -894.051  |
| 150   | -256.446 | -893.864 | -249.621 | -904.841  |
| 151   | -251.202 | -906.409 | -260.089 | -892.114  |
| 152   | -259.437 | -891.454 | -273.058 | -869.545  |
| 153   | -271.214 | -867.685 | -279.028 | -855.117  |
| 154   | -277.321 | -853.389 | -279.267 | -850.259  |
| 155   | -277.690 | -848.656 | -273.724 | -855.036  |
| 156   | -272.266 | -853.579 | -262.314 | -869.588  |
| 157   | -261.005 | -868.272 | -244.937 | -894.118  |
| 158   | -243.850 | -893.055 | -221.707 | -928.673  |
| 159   | -220.800 | -927.779 | -192.511 | -973.283  |
| 160   | -191.919 | -972.714 | -154.197 | -1033.391 |



COMBINACION 28 G1 + G2 + 0.9 PRETD + SCMAX-EC1 + 0.6 TEMP

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.553 | -875.908 | -242.472 | -697.494 |
| 2     | -262.162 | -693.774 | -370.818 | -518.999 |
| 3     | -371.665 | -519.799 | -464.643 | -370.244 |
| 4     | -465.740 | -371.319 | -542.887 | -247.227 |
| 5     | -544.142 | -248.497 | -605.437 | -149.903 |
| 6     | -606.819 | -151.245 | -652.930 | -77.075  |
| 7     | -654.350 | -78.506  | -684.505 | -30.001  |
| 8     | -685.977 | -31.431  | -701.098 | -7.110   |
| 9     | -702.562 | -8.601   | -702.550 | -8.620   |
| 10    | -704.045 | -10.111  | -692.168 | -29.214  |
| 11    | -695.506 | -32.546  | -678.257 | -60.290  |
| 12    | -682.840 | -64.876  | -661.957 | -98.465  |
| 13    | -667.700 | -104.201 | -644.515 | -141.495 |
| 14    | -651.203 | -148.236 | -626.876 | -187.365 |
| 15    | -634.210 | -194.711 | -611.827 | -230.713 |
| 16    | -619.226 | -238.102 | -607.371 | -257.171 |
| 17    | -614.018 | -263.759 | -606.828 | -275.323 |
| 18    | -623.774 | -265.967 | -717.747 | -114.811 |
| 19    | -659.876 | -138.727 | -640.180 | -163.937 |
| 20    | -650.473 | -166.367 | -548.260 | -297.198 |
| 21    | -562.509 | -305.637 | -689.832 | -142.666 |
| 22    | -681.199 | -127.912 | -614.203 | -213.665 |
| 23    | -686.478 | -177.865 | -681.248 | -186.278 |
| 24    | -688.261 | -168.677 | -714.615 | -126.287 |
| 25    | -716.266 | -110.070 | -751.926 | -52.712  |
| 26    | -749.674 | -48.703  | -782.642 | 4.327    |
| 27    | -782.257 | 4.763    | -805.501 | 42.152   |
| 28    | -805.137 | 42.520   | -817.626 | 62.608   |
| 29    | -817.836 | 62.432   | -818.445 | 63.411   |
| 30    | -819.630 | 62.251   | -817.601 | 58.986   |
| 31    | -820.093 | 56.508   | -815.063 | 48.418   |
| 32    | -819.016 | 44.444   | -802.954 | 18.607   |
| 33    | -808.431 | 13.129   | -782.070 | -29.274  |
| 34    | -788.996 | -36.202  | -754.422 | -91.815  |
| 35    | -762.478 | -99.921  | -722.101 | -164.867 |
| 36    | -730.796 | -173.612 | -688.689 | -241.342 |
| 37    | -701.192 | -243.158 | -679.562 | -277.950 |
| 38    | -698.636 | -271.516 | -784.986 | -132.621 |
| 39    | -725.513 | -152.898 | -709.835 | -172.965 |
| 40    | -725.908 | -165.523 | -601.137 | -325.226 |
| 41    | -623.067 | -330.145 | -737.410 | -183.789 |
| 42    | -729.787 | -165.728 | -640.766 | -279.673 |
| 43    | -718.310 | -254.636 | -696.656 | -289.467 |
| 44    | -703.837 | -268.629 | -708.457 | -261.198 |
| 45    | -706.286 | -246.236 | -730.771 | -206.853 |
| 46    | -724.925 | -82.389  | -760.132 | -25.757  |
| 47    | -760.387 | -25.973  | -786.361 | 15.805   |
| 48    | -785.942 | 16.218   | -800.913 | 40.300   |
| 49    | -801.181 | 40.042   | -807.958 | 50.944   |
| 50    | -809.281 | 49.611   | -809.260 | 49.577   |
| 51    | -811.945 | 46.865   | -803.851 | 33.845   |
| 52    | -808.054 | 29.638   | -794.170 | 7.305    |
| 53    | -799.886 | 1.521    | -775.789 | -37.238  |
| 54    | -782.976 | -44.437  | -750.587 | -96.534  |

COMBINACION 28 G1 + G2 + 0.9 PRETD + SCMAX-EC1 + 0.6 TEMP

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -758.918 | -104.844 | -720.788 | -166.175 |
| 56    | -729.711 | -175.081 | -689.396 | -239.927 |
| 57    | -704.057 | -238.609 | -690.425 | -260.536 |
| 58    | -708.747 | -255.354 | -802.237 | -104.973 |
| 59    | -742.036 | -131.499 | -733.148 | -142.874 |
| 60    | -749.136 | -135.096 | -631.188 | -286.065 |
| 61    | -653.043 | -290.725 | -766.697 | -145.251 |
| 62    | -759.156 | -127.213 | -667.293 | -244.795 |
| 63    | -746.464 | -209.001 | -722.714 | -247.203 |
| 64    | -730.291 | -226.376 | -728.075 | -229.940 |
| 65    | -729.997 | -208.854 | -748.719 | -178.740 |
| 66    | -743.032 | -54.297  | -776.222 | -0.910   |
| 67    | -776.533 | -1.170   | -800.527 | 37.424   |
| 68    | -800.122 | 37.839   | -813.253 | 58.960   |
| 69    | -813.492 | 58.719   | -820.866 | 70.580   |
| 70    | -822.143 | 69.291   | -819.865 | 65.629   |
| 71    | -822.496 | 62.989   | -810.647 | 43.930   |
| 72    | -814.776 | 39.785   | -798.958 | 14.342   |
| 73    | -804.612 | 8.653    | -778.774 | -32.908  |
| 74    | -785.872 | -40.060  | -751.761 | -94.927  |
| 75    | -760.018 | -103.186 | -720.126 | -167.352 |
| 76    | -728.984 | -176.232 | -686.310 | -244.875 |
| 77    | -701.595 | -242.485 | -687.382 | -265.348 |
| 78    | -705.744 | -260.133 | -798.709 | -110.599 |
| 79    | -738.752 | -135.805 | -729.397 | -147.778 |
| 80    | -745.463 | -140.057 | -627.049 | -291.623 |
| 81    | -648.965 | -296.316 | -763.430 | -149.804 |
| 82    | -755.859 | -131.746 | -664.594 | -248.562 |
| 83    | -743.540 | -213.818 | -720.609 | -250.702 |
| 84    | -728.109 | -229.793 | -726.258 | -232.771 |
| 85    | -728.605 | -210.875 | -746.985 | -181.310 |
| 86    | -741.120 | -57.099  | -774.887 | -2.783   |
| 87    | -775.169 | -3.089   | -799.726 | 36.411   |
| 88    | -799.356 | 36.842   | -813.450 | 59.513   |
| 89    | -813.717 | 59.249   | -821.401 | 71.610   |
| 90    | -822.710 | 70.291   | -820.693 | 67.047   |
| 91    | -823.370 | 64.391   | -811.731 | 45.669   |
| 92    | -815.906 | 41.506   | -800.774 | 17.166   |
| 93    | -806.479 | 11.477   | -781.177 | -29.221  |
| 94    | -788.306 | -36.390  | -754.759 | -90.351  |
| 95    | -763.014 | -98.648  | -723.693 | -161.896 |
| 96    | -732.548 | -170.783 | -689.871 | -239.428 |
| 97    | -704.698 | -237.715 | -691.344 | -259.196 |
| 98    | -709.654 | -253.928 | -803.449 | -103.059 |
| 99    | -743.201 | -129.971 | -735.976 | -139.220 |
| 100   | -751.966 | -131.437 | -638.798 | -276.289 |
| 101   | -660.675 | -280.950 | -769.716 | -141.380 |
| 102   | -762.181 | -123.370 | -668.520 | -243.253 |
| 103   | -747.751 | -206.954 | -723.755 | -245.552 |
| 104   | -731.306 | -224.710 | -728.366 | -229.438 |
| 105   | -730.731 | -207.541 | -747.453 | -180.642 |
| 106   | -740.967 | -57.364  | -772.462 | -6.703   |
| 107   | -772.711 | -6.926   | -794.993 | 28.915   |
| 108   | -794.545 | 29.389   | -805.888 | 47.636   |
| 109   | -806.075 | 47.439   | -810.298 | 54.231   |

COMBINACION 28 G1 + G2 + 0.9 PRETD + SCMAX-EC1 + 0.6 TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -811.538 | 52.998   | -806.841 | 45.443    |
| 111   | -809.455 | 42.877   | -797.723 | 24.006    |
| 112   | -801.828 | 19.898   | -784.366 | -8.190    |
| 113   | -790.019 | -13.839  | -762.315 | -58.402   |
| 114   | -769.416 | -65.551  | -733.380 | -123.516  |
| 115   | -741.651 | -131.812 | -699.780 | -199.162  |
| 116   | -708.684 | -208.107 | -663.427 | -280.903  |
| 117   | -675.882 | -283.294 | -657.676 | -312.580  |
| 118   | -676.300 | -307.300 | -767.498 | -160.607  |
| 119   | -709.276 | -173.819 | -697.161 | -189.325  |
| 120   | -713.443 | -181.618 | -594.636 | -333.687  |
| 121   | -616.625 | -338.411 | -738.997 | -181.779  |
| 122   | -731.350 | -163.611 | -647.979 | -270.322  |
| 123   | -726.049 | -242.086 | -711.454 | -265.562  |
| 124   | -718.990 | -244.399 | -725.371 | -234.135  |
| 125   | -727.790 | -212.181 | -752.631 | -172.224  |
| 126   | -744.305 | -53.443  | -780.190 | 4.278     |
| 127   | -780.610 | 3.853    | -807.189 | 46.605    |
| 128   | -806.979 | 46.850   | -822.707 | 72.148    |
| 129   | -823.152 | 71.691   | -826.943 | 77.789    |
| 130   | -828.443 | 76.298   | -825.601 | 71.725    |
| 131   | -828.447 | 68.887   | -826.519 | 65.787    |
| 132   | -830.834 | 61.453   | -817.781 | 40.457    |
| 133   | -823.574 | 34.610   | -800.457 | -2.573    |
| 134   | -807.647 | -9.793   | -776.464 | -59.951   |
| 135   | -784.709 | -68.205  | -747.954 | -127.325  |
| 136   | -756.659 | -136.099 | -716.657 | -200.441  |
| 137   | -729.980 | -200.416 | -703.843 | -242.457  |
| 138   | -723.584 | -233.621 | -823.965 | -72.158   |
| 139   | -758.469 | -110.393 | -755.519 | -114.169  |
| 140   | -766.743 | -111.378 | -669.976 | -235.237  |
| 141   | -682.598 | -238.270 | -763.406 | -134.839  |
| 142   | -749.567 | -117.157 | -658.045 | -234.302  |
| 143   | -731.420 | -201.678 | -685.807 | -275.047  |
| 144   | -691.496 | -258.043 | -674.451 | -285.461  |
| 145   | -679.560 | -264.173 | -682.920 | -258.767  |
| 146   | -772.085 | 15.734   | -726.993 | -56.797   |
| 147   | -759.995 | -89.780  | -734.382 | -130.979  |
| 148   | -733.430 | -130.050 | -714.420 | -160.628  |
| 149   | -713.315 | -159.561 | -699.983 | -181.005  |
| 150   | -699.743 | -180.817 | -689.668 | -197.023  |
| 151   | -691.250 | -198.589 | -689.490 | -201.419  |
| 152   | -688.836 | -200.763 | -684.617 | -207.550  |
| 153   | -682.773 | -205.690 | -666.019 | -232.639  |
| 154   | -664.312 | -230.911 | -633.413 | -280.613  |
| 155   | -631.831 | -279.017 | -590.112 | -346.123  |
| 156   | -588.643 | -344.685 | -533.210 | -433.849  |
| 157   | -531.909 | -432.521 | -461.516 | -545.748  |
| 158   | -460.418 | -544.705 | -374.961 | -682.163  |
| 159   | -374.042 | -681.290 | -273.737 | -842.631  |
| 160   | -273.128 | -842.088 | -154.203 | -1033.381 |



## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.552 | -875.910 | -231.325 | -715.425 |
| 2     | -248.572 | -715.633 | -345.524 | -559.686 |
| 3     | -346.368 | -560.490 | -429.423 | -426.896 |
| 4     | -430.518 | -427.974 | -499.564 | -316.912 |
| 5     | -500.819 | -318.182 | -555.857 | -229.652 |
| 6     | -557.238 | -230.997 | -598.825 | -164.104 |
| 7     | -600.245 | -165.535 | -627.782 | -121.241 |
| 8     | -629.251 | -122.675 | -643.493 | -99.768  |
| 9     | -644.959 | -101.257 | -645.844 | -99.833  |
| 10    | -647.337 | -101.325 | -638.067 | -116.236 |
| 11    | -641.404 | -119.569 | -628.593 | -140.176 |
| 12    | -633.175 | -144.761 | -618.391 | -168.543 |
| 13    | -624.133 | -174.279 | -608.699 | -199.104 |
| 14    | -615.388 | -205.844 | -600.532 | -229.741 |
| 15    | -607.867 | -237.084 | -596.372 | -255.573 |
| 16    | -603.771 | -262.962 | -602.758 | -264.591 |
| 17    | -609.397 | -271.190 | -614.194 | -263.475 |
| 18    | -628.993 | -257.573 | -731.929 | -92.000  |
| 19    | -671.747 | -123.532 | -656.138 | -143.511 |
| 20    | -665.658 | -146.931 | -565.210 | -275.502 |
| 21    | -578.890 | -284.670 | -709.150 | -117.941 |
| 22    | -699.924 | -103.945 | -633.397 | -189.098 |
| 23    | -704.232 | -149.307 | -695.432 | -163.462 |
| 24    | -700.437 | -149.093 | -717.529 | -121.600 |
| 25    | -717.644 | -107.854 | -742.183 | -68.383  |
| 26    | -738.194 | -67.167  | -759.815 | -32.390  |
| 27    | -759.427 | -31.958  | -774.015 | -8.493   |
| 28    | -773.651 | -8.125   | -780.228 | 2.454    |
| 29    | -780.438 | 2.277    | -777.950 | -1.725   |
| 30    | -779.135 | -2.886   | -774.877 | -9.736   |
| 31    | -777.369 | -12.213  | -771.062 | -22.359  |
| 32    | -775.016 | -26.331  | -760.362 | -49.902  |
| 33    | -765.839 | -55.380  | -743.675 | -91.032  |
| 34    | -750.601 | -97.961  | -722.971 | -142.403 |
| 35    | -731.030 | -150.505 | -700.310 | -199.918 |
| 36    | -709.008 | -208.659 | -678.897 | -257.092 |
| 37    | -690.529 | -260.310 | -678.754 | -279.251 |
| 38    | -695.755 | -276.149 | -789.997 | -124.561 |
| 39    | -727.673 | -150.133 | -715.420 | -165.816 |
| 40    | -729.295 | -161.187 | -603.959 | -321.613 |
| 41    | -624.287 | -328.583 | -742.375 | -177.434 |
| 42    | -733.778 | -160.620 | -646.158 | -272.771 |
| 43    | -721.421 | -249.631 | -697.238 | -288.531 |
| 44    | -702.132 | -271.371 | -700.243 | -274.410 |
| 45    | -696.973 | -261.217 | -711.247 | -238.257 |
| 46    | -703.411 | -116.994 | -728.210 | -77.104  |
| 47    | -728.464 | -77.322  | -746.717 | -47.961  |
| 48    | -746.298 | -47.549  | -756.300 | -31.460  |
| 49    | -756.567 | -31.720  | -760.410 | -25.538  |
| 50    | -761.734 | -26.869  | -760.447 | -28.939  |
| 51    | -763.131 | -31.652  | -755.710 | -43.589  |
| 52    | -759.914 | -47.796  | -748.332 | -66.426  |
| 53    | -754.049 | -72.207  | -735.028 | -102.803 |
| 54    | -742.216 | -109.999 | -717.677 | -149.471 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -726.008 | -157.780 | -698.450 | -202.106 |
| 56    | -707.373 | -211.012 | -680.091 | -254.896 |
| 57    | -693.444 | -255.679 | -689.409 | -262.170 |
| 58    | -705.811 | -260.076 | -807.093 | -97.164  |
| 59    | -744.004 | -128.979 | -738.420 | -136.126 |
| 60    | -752.186 | -131.192 | -633.549 | -283.043 |
| 61    | -653.797 | -289.759 | -770.970 | -139.781 |
| 62    | -762.451 | -122.996 | -672.224 | -238.484 |
| 63    | -749.075 | -204.801 | -722.807 | -247.053 |
| 64    | -728.066 | -229.955 | -720.274 | -242.488 |
| 65    | -720.311 | -224.434 | -729.535 | -209.597 |
| 66    | -721.846 | -88.375  | -744.597 | -51.780  |
| 67    | -744.904 | -52.046  | -761.150 | -25.913  |
| 68    | -760.746 | -25.498  | -768.862 | -12.443  |
| 69    | -769.101 | -12.686  | -773.023 | -6.376   |
| 70    | -774.300 | -7.664   | -770.816 | -13.268  |
| 71    | -773.445 | -15.909  | -762.637 | -33.294  |
| 72    | -766.766 | -37.439  | -753.252 | -59.176  |
| 73    | -758.907 | -64.864  | -738.107 | -98.322  |
| 74    | -745.208 | -105.469 | -718.904 | -147.778 |
| 75    | -727.160 | -156.038 | -697.794 | -203.273 |
| 76    | -706.655 | -212.149 | -677.081 | -259.720 |
| 77    | -690.923 | -259.652 | -685.985 | -267.594 |
| 78    | -702.423 | -265.474 | -802.863 | -103.916 |
| 79    | -740.046 | -134.148 | -733.692 | -142.281 |
| 80    | -747.534 | -137.406 | -628.126 | -290.244 |
| 81    | -648.436 | -296.993 | -766.478 | -145.903 |
| 82    | -757.929 | -129.097 | -668.386 | -243.708 |
| 83    | -744.957 | -211.538 | -719.587 | -252.346 |
| 84    | -724.769 | -235.165 | -717.517 | -246.830 |
| 85    | -717.885 | -228.118 | -727.083 | -213.323 |
| 86    | -719.250 | -92.276  | -742.717 | -54.528  |
| 87    | -743.000 | -54.833  | -759.943 | -27.580  |
| 88    | -759.571 | -27.153  | -768.699 | -12.470  |
| 89    | -768.965 | -12.733  | -773.377 | -5.638   |
| 90    | -774.685 | -6.957   | -771.645 | -11.847  |
| 91    | -774.323 | -14.502  | -763.915 | -31.244  |
| 92    | -768.089 | -35.408  | -755.362 | -55.879  |
| 93    | -761.066 | -61.570  | -740.935 | -93.951  |
| 94    | -748.066 | -101.116 | -722.459 | -142.305 |
| 95    | -730.716 | -150.599 | -702.062 | -196.689 |
| 96    | -710.918 | -205.574 | -681.596 | -252.739 |
| 97    | -695.063 | -253.213 | -691.062 | -259.649 |
| 98    | -707.447 | -257.479 | -808.794 | -94.461  |
| 99    | -745.632 | -126.860 | -741.490 | -132.162 |
| 100   | -755.257 | -127.225 | -641.156 | -273.271 |
| 101   | -661.427 | -279.988 | -773.743 | -136.226 |
| 102   | -765.229 | -119.468 | -672.988 | -237.534 |
| 103   | -749.877 | -203.535 | -723.125 | -246.566 |
| 104   | -728.358 | -229.451 | -719.699 | -243.379 |
| 105   | -720.084 | -224.666 | -727.426 | -212.856 |
| 106   | -719.105 | -92.528  | -740.252 | -58.513  |
| 107   | -740.500 | -58.738  | -755.130 | -35.206  |
| 108   | -754.680 | -34.733  | -761.122 | -24.371  |
| 109   | -761.310 | -24.567  | -762.466 | -22.708  |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -763.705 | -23.942  | -758.029 | -33.071   |
| 111   | -760.642 | -35.639  | -749.666 | -53.295   |
| 112   | -753.771 | -57.402  | -738.676 | -81.682   |
| 113   | -744.330 | -87.331  | -721.764 | -123.628  |
| 114   | -728.867 | -130.774 | -700.744 | -176.012  |
| 115   | -709.016 | -184.306 | -677.786 | -234.539  |
| 116   | -686.692 | -243.481 | -654.765 | -294.836  |
| 117   | -666.355 | -298.619 | -657.935 | -312.162  |
| 118   | -674.606 | -310.024 | -773.373 | -151.157  |
| 119   | -712.185 | -170.095 | -703.394 | -181.348  |
| 120   | -717.434 | -176.509 | -597.469 | -330.060  |
| 121   | -617.847 | -336.847 | -743.368 | -176.184  |
| 122   | -734.739 | -159.273 | -652.658 | -264.334  |
| 123   | -728.378 | -238.339 | -710.905 | -266.445  |
| 124   | -716.098 | -249.051 | -716.662 | -248.143  |
| 125   | -717.092 | -229.389 | -732.683 | -204.311  |
| 126   | -722.977 | -87.749  | -749.414 | -45.226   |
| 127   | -749.835 | -45.650  | -769.662 | -13.757   |
| 128   | -769.450 | -13.517  | -781.149 | 5.301     |
| 129   | -781.594 | 4.845    | -784.151 | 8.958     |
| 130   | -785.651 | 7.466    | -783.225 | 3.564     |
| 131   | -786.071 | 0.726    | -784.730 | -1.431    |
| 132   | -789.045 | -5.766   | -779.306 | -21.430   |
| 133   | -785.101 | -27.274  | -768.077 | -54.657   |
| 134   | -775.269 | -61.874  | -752.949 | -97.776   |
| 135   | -761.194 | -106.028 | -736.021 | -146.520  |
| 136   | -744.728 | -155.288 | -718.992 | -196.685  |
| 137   | -731.167 | -198.506 | -718.364 | -219.099  |
| 138   | -735.772 | -214.016 | -843.668 | -40.466   |
| 139   | -775.363 | -88.769  | -775.534 | -88.551   |
| 140   | -785.379 | -87.525  | -687.092 | -213.329  |
| 141   | -698.775 | -217.564 | -778.774 | -115.168  |
| 142   | -764.558 | -97.969  | -671.684 | -216.845  |
| 143   | -743.899 | -181.606 | -692.919 | -263.607  |
| 144   | -696.757 | -249.580 | -671.988 | -289.421  |
| 145   | -674.943 | -271.599 | -667.564 | -283.467  |
| 146   | -756.584 | -9.200   | -701.959 | -97.064   |
| 147   | -734.960 | -130.049 | -701.319 | -184.161  |
| 148   | -700.367 | -183.232 | -674.780 | -224.389  |
| 149   | -673.675 | -223.322 | -655.124 | -253.161  |
| 150   | -654.883 | -252.974 | -641.109 | -275.131  |
| 151   | -642.690 | -276.698 | -638.782 | -282.984  |
| 152   | -638.128 | -282.327 | -633.273 | -290.136  |
| 153   | -631.429 | -288.276 | -615.461 | -313.962  |
| 154   | -613.754 | -312.235 | -585.369 | -357.892  |
| 155   | -583.787 | -356.296 | -545.638 | -417.660  |
| 156   | -544.171 | -416.219 | -493.926 | -497.038  |
| 157   | -492.622 | -495.714 | -429.261 | -597.630  |
| 158   | -428.165 | -596.583 | -351.609 | -719.724  |
| 159   | -350.693 | -718.846 | -261.105 | -862.949  |
| 160   | -260.500 | -862.401 | -154.202 | -1033.383 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.551 | -875.911 | -215.276 | -741.239 |
| 2     | -229.155 | -746.866 | -308.680 | -618.949 |
| 3     | -309.521 | -619.759 | -377.035 | -511.162 |
| 4     | -378.128 | -512.243 | -433.561 | -423.078 |
| 5     | -434.816 | -424.349 | -478.193 | -354.576 |
| 6     | -479.571 | -355.924 | -511.332 | -304.836 |
| 7     | -512.752 | -306.268 | -532.475 | -274.542 |
| 8     | -533.944 | -275.979 | -542.213 | -262.678 |
| 9     | -543.679 | -264.166 | -540.474 | -269.321 |
| 10    | -541.967 | -270.815 | -530.415 | -289.396 |
| 11    | -533.751 | -292.729 | -520.600 | -313.883 |
| 12    | -525.183 | -318.467 | -511.823 | -339.958 |
| 13    | -517.566 | -345.693 | -505.315 | -365.398 |
| 14    | -512.005 | -372.136 | -502.153 | -387.983 |
| 15    | -509.490 | -395.324 | -504.527 | -403.307 |
| 16    | -511.926 | -410.696 | -517.501 | -401.728 |
| 17    | -524.132 | -408.340 | -536.755 | -388.037 |
| 18    | -549.221 | -385.887 | -656.690 | -213.022 |
| 19    | -598.080 | -217.823 | -582.134 | -238.234 |
| 20    | -590.761 | -242.798 | -487.482 | -374.991 |
| 21    | -500.506 | -384.999 | -635.141 | -212.670 |
| 22    | -625.242 | -199.536 | -560.554 | -282.335 |
| 23    | -625.404 | -276.103 | -614.210 | -294.109 |
| 24    | -617.030 | -283.253 | -625.850 | -269.067 |
| 25    | -624.193 | -258.171 | -638.327 | -235.436 |
| 26    | -632.334 | -237.444 | -643.045 | -220.215 |
| 27    | -642.654 | -219.788 | -649.187 | -209.280 |
| 28    | -648.824 | -208.911 | -650.255 | -206.609 |
| 29    | -650.464 | -206.786 | -645.810 | -214.272 |
| 30    | -646.996 | -215.433 | -641.605 | -224.105 |
| 31    | -644.097 | -226.582 | -637.773 | -236.755 |
| 32    | -641.728 | -240.726 | -629.909 | -259.737 |
| 33    | -635.386 | -265.216 | -619.008 | -291.559 |
| 34    | -625.934 | -298.489 | -607.002 | -328.941 |
| 35    | -615.063 | -337.039 | -595.917 | -367.835 |
| 36    | -604.618 | -376.570 | -588.585 | -402.359 |
| 37    | -599.271 | -407.100 | -599.310 | -407.037 |
| 38    | -614.076 | -407.530 | -717.998 | -240.371 |
| 39    | -656.065 | -241.789 | -648.680 | -251.241 |
| 40    | -660.165 | -249.671 | -535.460 | -409.290 |
| 41    | -554.047 | -418.488 | -675.821 | -262.621 |
| 42    | -666.166 | -247.162 | -579.822 | -357.680 |
| 43    | -649.201 | -365.798 | -622.096 | -409.397 |
| 44    | -624.505 | -396.235 | -615.435 | -410.824 |
| 45    | -610.896 | -399.673 | -614.114 | -394.496 |
| 46    | -603.982 | -276.925 | -617.253 | -255.580 |
| 47    | -617.506 | -255.799 | -627.083 | -240.394 |
| 48    | -626.663 | -239.983 | -630.905 | -233.159 |
| 49    | -631.171 | -233.420 | -631.453 | -232.966 |
| 50    | -632.779 | -234.295 | -629.764 | -239.143 |
| 51    | -632.448 | -241.856 | -625.404 | -253.187 |
| 52    | -629.608 | -257.394 | -620.197 | -272.532 |
| 53    | -625.916 | -278.310 | -612.002 | -300.690 |
| 54    | -619.193 | -307.884 | -602.700 | -334.411 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -611.032 | -342.719 | -594.410 | -369.456 |
| 56    | -603.332 | -378.362 | -589.611 | -400.433 |
| 57    | -601.544 | -403.501 | -607.402 | -394.078 |
| 58    | -621.718 | -395.340 | -730.913 | -219.700 |
| 59    | -668.357 | -225.806 | -665.925 | -228.918 |
| 60    | -677.276 | -227.074 | -557.552 | -380.317 |
| 61    | -576.054 | -389.268 | -697.160 | -234.255 |
| 62    | -687.578 | -218.831 | -599.334 | -331.781 |
| 63    | -669.971 | -332.039 | -641.290 | -378.173 |
| 64    | -644.028 | -365.130 | -630.485 | -386.915 |
| 65    | -628.466 | -372.168 | -627.841 | -373.173 |
| 66    | -617.841 | -255.667 | -629.531 | -236.863 |
| 67    | -629.835 | -237.135 | -637.877 | -224.199 |
| 68    | -637.472 | -223.784 | -640.283 | -219.263 |
| 69    | -640.521 | -219.507 | -640.865 | -218.954 |
| 70    | -642.141 | -220.242 | -637.488 | -227.726 |
| 71    | -640.117 | -230.368 | -630.552 | -245.754 |
| 72    | -634.681 | -249.899 | -623.839 | -267.339 |
| 73    | -629.494 | -273.026 | -614.263 | -297.524 |
| 74    | -621.367 | -304.667 | -603.568 | -333.298 |
| 75    | -611.823 | -341.558 | -593.845 | -370.477 |
| 76    | -602.708 | -379.350 | -587.260 | -404.198 |
| 77    | -599.534 | -406.652 | -604.635 | -398.446 |
| 78    | -618.981 | -399.691 | -727.485 | -225.162 |
| 79    | -665.160 | -230.000 | -662.101 | -233.916 |
| 80    | -673.525 | -232.135 | -553.172 | -386.184 |
| 81    | -571.735 | -395.168 | -693.532 | -239.272 |
| 82    | -683.919 | -223.827 | -596.209 | -336.094 |
| 83    | -666.599 | -337.578 | -638.645 | -382.542 |
| 84    | -641.308 | -369.413 | -628.230 | -390.449 |
| 85    | -626.447 | -375.197 | -625.864 | -376.135 |
| 86    | -615.761 | -258.739 | -628.068 | -238.944 |
| 87    | -628.351 | -239.247 | -636.984 | -225.361 |
| 88    | -636.608 | -224.939 | -640.239 | -219.099 |
| 89    | -640.505 | -219.362 | -641.276 | -218.122 |
| 90    | -642.584 | -219.442 | -638.319 | -226.302 |
| 91    | -640.998 | -228.956 | -631.785 | -243.776 |
| 92    | -635.958 | -247.942 | -625.764 | -264.338 |
| 93    | -631.467 | -270.031 | -616.800 | -293.624 |
| 94    | -623.932 | -300.786 | -606.723 | -328.467 |
| 95    | -614.981 | -336.760 | -597.616 | -364.692 |
| 96    | -606.473 | -373.575 | -591.291 | -397.995 |
| 97    | -603.269 | -400.864 | -609.137 | -391.427 |
| 98    | -623.428 | -392.623 | -732.669 | -216.909 |
| 99    | -670.029 | -223.629 | -669.029 | -224.909 |
| 100   | -680.380 | -223.066 | -565.155 | -370.550 |
| 101   | -583.680 | -379.501 | -699.894 | -230.751 |
| 102   | -690.317 | -215.354 | -600.052 | -330.891 |
| 103   | -670.724 | -330.853 | -641.537 | -377.800 |
| 104   | -644.252 | -364.736 | -629.917 | -387.794 |
| 105   | -628.149 | -372.544 | -625.979 | -376.035 |
| 106   | -615.542 | -259.111 | -625.977 | -242.326 |
| 107   | -626.224 | -242.552 | -633.003 | -231.649 |
| 108   | -632.553 | -231.176 | -634.060 | -228.752 |
| 109   | -634.248 | -228.947 | -632.468 | -231.810 |

COMBINACION 30 G1 + G2 + 0.9 PRETD + 0.60 SCMAX-EC1 + 0.2 TEMP

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| 110   | -633.707 | -233.045 | -627.348 | -243.273  |
| 111   | -629.960 | -245.842 | -620.200 | -261.541  |
| 112   | -624.306 | -265.648 | -612.205 | -285.113  |
| 113   | -617.859 | -290.760 | -601.223 | -317.520  |
| 114   | -608.327 | -324.664 | -589.072 | -355.636  |
| 115   | -597.346 | -363.928 | -577.878 | -395.242  |
| 116   | -586.786 | -404.181 | -569.474 | -432.027  |
| 117   | -580.065 | -437.418 | -582.443 | -433.592  |
| 118   | -596.991 | -434.868 | -704.162 | -262.482  |
| 119   | -643.157 | -258.449 | -638.220 | -264.769  |
| 120   | -649.825 | -263.047 | -528.984 | -417.720  |
| 121   | -547.611 | -426.748 | -675.310 | -263.296  |
| 122   | -665.612 | -247.753 | -583.783 | -352.491  |
| 123   | -653.460 | -358.845 | -631.762 | -393.746  |
| 124   | -634.409 | -380.448 | -627.532 | -391.510  |
| 125   | -625.799 | -376.234 | -630.343 | -368.925  |
| 126   | -619.046 | -254.923 | -634.115 | -230.685  |
| 127   | -634.536 | -231.109 | -645.858 | -212.897  |
| 128   | -645.643 | -212.661 | -651.723 | -202.882  |
| 129   | -652.168 | -203.338 | -652.065 | -203.503  |
| 130   | -653.564 | -204.996 | -650.295 | -210.255  |
| 131   | -653.141 | -213.092 | -651.292 | -216.068  |
| 132   | -655.606 | -220.402 | -648.253 | -232.231  |
| 133   | -654.049 | -238.072 | -642.354 | -256.884  |
| 134   | -649.547 | -264.098 | -635.490 | -286.709  |
| 135   | -643.736 | -294.960 | -629.709 | -317.524  |
| 136   | -638.420 | -326.287 | -626.678 | -345.174  |
| 137   | -637.529 | -349.123 | -637.511 | -349.152  |
| 138   | -652.383 | -348.148 | -766.969 | -163.835  |
| 139   | -700.032 | -185.191 | -702.360 | -182.211  |
| 140   | -710.614 | -183.221 | -609.595 | -312.523  |
| 141   | -620.195 | -318.145 | -704.122 | -210.720  |
| 142   | -689.471 | -194.077 | -599.939 | -308.677  |
| 143   | -666.809 | -305.605 | -615.202 | -388.616  |
| 144   | -617.028 | -377.826 | -589.070 | -422.796  |
| 145   | -589.682 | -408.741 | -575.826 | -431.030  |
| 146   | -664.688 | -157.014 | -604.886 | -253.207  |
| 147   | -637.887 | -286.193 | -600.681 | -346.038  |
| 148   | -599.729 | -345.109 | -572.131 | -389.501  |
| 149   | -571.027 | -388.432 | -551.929 | -419.152  |
| 150   | -551.688 | -418.964 | -538.993 | -439.385  |
| 151   | -540.575 | -440.951 | -539.402 | -442.837  |
| 152   | -538.749 | -442.180 | -538.247 | -442.986  |
| 153   | -536.403 | -441.126 | -526.313 | -457.356  |
| 154   | -524.607 | -455.628 | -503.932 | -488.884  |
| 155   | -502.352 | -487.285 | -473.072 | -534.382  |
| 156   | -471.608 | -532.937 | -431.957 | -596.716  |
| 157   | -430.652 | -595.393 | -379.833 | -677.135  |
| 158   | -378.740 | -676.084 | -316.705 | -775.867  |
| 159   | -315.791 | -774.986 | -242.643 | -892.645  |
| 160   | -242.041 | -892.092 | -154.201 | -1033.384 |

COMBINACION 31 G1 + G2 + 0.9 PRETD + SCMIN-EC1

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 1     | -131.544 | -875.923  | -171.781 | -811.201  |
| 2     | -173.528 | -836.342  | -202.606 | -789.569  |
| 3     | -203.440 | -790.391  | -225.373 | -755.112  |
| 4     | -226.462 | -756.199  | -241.313 | -732.312  |
| 5     | -242.565 | -733.584  | -250.422 | -720.947  |
| 6     | -251.796 | -722.302  | -252.749 | -720.769  |
| 7     | -254.168 | -722.202  | -248.328 | -731.596  |
| 8     | -249.791 | -733.040  | -237.247 | -753.217  |
| 9     | -238.714 | -754.703  | -219.562 | -785.510  |
| 10    | -221.055 | -787.003  | -198.199 | -823.768  |
| 11    | -201.533 | -827.104  | -182.108 | -858.349  |
| 12    | -186.694 | -862.929  | -171.560 | -887.273  |
| 13    | -177.303 | -893.008  | -167.764 | -908.351  |
| 14    | -174.458 | -915.083  | -171.997 | -919.041  |
| 15    | -179.340 | -926.372  | -185.560 | -916.367  |
| 16    | -192.960 | -923.755  | -209.091 | -897.807  |
| 17    | -215.687 | -904.475  | -241.512 | -862.937  |
| 18    | -242.947 | -878.529  | -314.782 | -762.983  |
| 19    | -262.983 | -646.738  | -181.497 | -751.037  |
| 20    | -184.869 | -762.327  | 0.336    | -999.383  |
| 21    | -8.868   | -1014.281 | -265.872 | -685.323  |
| 22    | -252.234 | -676.974  | -290.418 | -628.101  |
| 23    | -330.520 | -750.426  | -377.402 | -675.015  |
| 24    | -369.920 | -680.731  | -385.030 | -656.427  |
| 25    | -372.983 | -662.244  | -376.329 | -656.862  |
| 26    | -358.593 | -677.759  | -346.231 | -697.642  |
| 27    | -345.832 | -697.230  | -336.445 | -712.329  |
| 28    | -336.084 | -711.956  | -321.164 | -735.954  |
| 29    | -321.373 | -736.133  | -308.072 | -757.527  |
| 30    | -309.259 | -758.685  | -295.440 | -780.913  |
| 31    | -297.935 | -783.387  | -282.243 | -808.628  |
| 32    | -286.201 | -812.593  | -272.339 | -834.890  |
| 33    | -277.814 | -840.373  | -267.006 | -857.757  |
| 34    | -273.929 | -864.691  | -268.052 | -874.144  |
| 35    | -276.122 | -882.227  | -274.717 | -884.488  |
| 36    | -283.426 | -893.210  | -289.394 | -883.610  |
| 37    | -295.603 | -895.551  | -303.432 | -882.957  |
| 38    | -306.986 | -901.486  | -378.140 | -787.036  |
| 39    | -318.045 | -674.444  | -232.220 | -784.298  |
| 40    | -232.398 | -797.201  | -3.472   | -1090.219 |
| 41    | -13.822  | -1109.960 | -259.836 | -795.070  |
| 42    | -245.202 | -785.983  | -266.329 | -758.941  |
| 43    | -307.934 | -914.729  | -336.228 | -869.217  |
| 44    | -326.920 | -874.903  | -330.693 | -868.834  |
| 45    | -318.714 | -869.650  | -314.615 | -876.242  |
| 46    | -291.026 | -780.318  | -284.873 | -790.214  |
| 47    | -285.123 | -790.438  | -277.008 | -803.492  |
| 48    | -276.588 | -803.080  | -268.768 | -815.659  |
| 49    | -269.029 | -815.928  | -262.620 | -826.238  |
| 50    | -263.951 | -827.556  | -258.426 | -836.444  |
| 51    | -261.109 | -839.159  | -251.759 | -854.197  |
| 52    | -255.964 | -858.403  | -248.402 | -870.567  |
| 53    | -254.128 | -876.333  | -249.646 | -883.544  |
| 54    | -256.842 | -890.727  | -257.360 | -889.894  |

COMBINACION 31 G1 + G2 + 0.9 PRETD + SCMIN-EC1

TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| 55    | -265.694 | -898.198  | -271.660 | -888.601  |
| 56    | -280.582 | -897.507  | -291.745 | -879.552  |
| 57    | -296.966 | -893.417  | -306.942 | -877.370  |
| 58    | -308.784 | -898.697  | -383.038 | -779.258  |
| 59    | -322.449 | -668.558  | -238.173 | -776.428  |
| 60    | -238.094 | -789.214  | -10.790  | -1080.156 |
| 61    | -21.046  | -1099.661 | -266.484 | -785.508  |
| 62    | -251.912 | -776.471  | -272.785 | -749.753  |
| 63    | -314.938 | -903.113  | -342.522 | -858.745  |
| 64    | -333.378 | -864.813  | -336.382 | -859.982  |
| 65    | -324.501 | -861.097  | -319.611 | -868.963  |
| 66    | -296.063 | -773.250  | -287.647 | -786.787  |
| 67    | -287.937 | -787.079  | -277.738 | -803.484  |
| 68    | -277.333 | -803.071  | -269.365 | -815.888  |
| 69    | -269.600 | -816.135  | -263.105 | -826.584  |
| 70    | -264.384 | -827.867  | -258.888 | -836.708  |
| 71    | -261.513 | -839.355  | -252.121 | -854.462  |
| 72    | -256.251 | -858.607  | -248.635 | -870.856  |
| 73    | -254.293 | -876.538  | -249.752 | -883.844  |
| 74    | -256.867 | -890.968  | -257.317 | -890.244  |
| 75    | -265.571 | -898.507  | -271.329 | -889.245  |
| 76    | -280.199 | -898.107  | -290.778 | -881.091  |
| 77    | -295.638 | -895.470  | -304.094 | -881.870  |
| 78    | -305.728 | -903.562  | -378.670 | -786.234  |
| 79    | -318.323 | -673.941  | -232.682 | -783.558  |
| 80    | -232.664 | -796.425  | -3.967   | -1089.150 |
| 81    | -14.312  | -1108.652 | -260.334 | -793.752  |
| 82    | -245.717 | -784.712  | -267.161 | -757.265  |
| 83    | -308.942 | -912.872  | -337.196 | -867.426  |
| 84    | -327.990 | -873.387  | -331.719 | -867.390  |
| 85    | -319.790 | -868.456  | -315.623 | -875.160  |
| 86    | -292.220 | -779.156  | -283.847 | -792.624  |
| 87    | -284.133 | -792.925  | -275.098 | -807.457  |
| 88    | -274.710 | -807.055  | -267.874 | -818.051  |
| 89    | -268.139 | -818.315  | -262.791 | -826.918  |
| 90    | -264.095 | -828.244  | -259.730 | -835.267  |
| 91    | -262.413 | -837.913  | -254.160 | -851.187  |
| 92    | -258.330 | -855.359  | -251.851 | -865.780  |
| 93    | -257.551 | -871.479  | -254.145 | -876.956  |
| 94    | -261.283 | -884.110  | -262.902 | -881.505  |
| 95    | -271.163 | -889.794  | -276.956 | -880.476  |
| 96    | -285.815 | -889.355  | -297.368 | -870.773  |
| 97    | -302.102 | -885.294  | -311.269 | -870.549  |
| 98    | -314.168 | -890.071  | -386.465 | -773.781  |
| 99    | -325.690 | -664.374  | -242.123 | -771.336  |
| 100   | -242.023 | -784.149  | -18.389  | -1070.394 |
| 101   | -28.696  | -1089.864 | -268.396 | -783.055  |
| 102   | -253.800 | -774.082  | -271.912 | -750.899  |
| 103   | -314.034 | -904.591  | -340.266 | -862.398  |
| 104   | -331.111 | -868.426  | -332.815 | -865.685  |
| 105   | -320.901 | -866.755  | -314.729 | -876.682  |
| 106   | -291.889 | -779.709  | -282.769 | -794.378  |
| 107   | -283.014 | -794.608  | -273.357 | -810.140  |
| 108   | -272.908 | -809.666  | -265.502 | -821.580  |
| 109   | -265.695 | -821.767  | -259.769 | -831.299  |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1      | TS_2     | TI_2      |
|-------|----------|-----------|----------|-----------|
| ===== |          |           |          |           |
| 110   | -261.004 | -832.539  | -256.016 | -840.563  |
| 111   | -258.623 | -843.141  | -249.823 | -857.295  |
| 112   | -253.928 | -861.404  | -246.807 | -872.858  |
| 113   | -252.463 | -878.502  | -248.381 | -885.068  |
| 114   | -255.490 | -892.205  | -256.379 | -890.776  |
| 115   | -264.656 | -899.061  | -265.804 | -897.214  |
| 116   | -274.719 | -906.142  | -285.079 | -889.479  |
| 117   | -289.806 | -904.300  | -297.718 | -891.574  |
| 118   | -302.230 | -908.993  | -372.040 | -796.703  |
| 119   | -312.112 | -682.176  | -226.197 | -792.145  |
| 120   | -226.297 | -805.149  | 2.867    | -1098.473 |
| 121   | -7.490   | -1118.086 | -255.260 | -800.948  |
| 122   | -240.522 | -791.856  | -263.629 | -762.279  |
| 123   | -305.043 | -919.277  | -334.790 | -871.428  |
| 124   | -325.427 | -877.446  | -331.326 | -867.958  |
| 125   | -319.403 | -869.075  | -317.450 | -872.216  |
| 126   | -296.829 | -773.212  | -297.007 | -772.925  |
| 127   | -297.430 | -773.346  | -296.379 | -775.037  |
| 128   | -296.157 | -774.812  | -297.161 | -773.197  |
| 129   | -297.608 | -773.649  | -300.075 | -769.681  |
| 130   | -301.568 | -771.185  | -305.086 | -765.526  |
| 131   | -307.935 | -768.360  | -309.608 | -765.669  |
| 132   | -313.922 | -770.004  | -315.883 | -766.849  |
| 133   | -321.687 | -772.678  | -326.902 | -764.290  |
| 134   | -334.103 | -771.492  | -344.521 | -754.735  |
| 135   | -352.769 | -762.982  | -370.636 | -734.243  |
| 136   | -379.357 | -742.991  | -402.398 | -705.929  |
| 137   | -405.479 | -722.378  | -419.207 | -700.295  |
| 138   | -417.037 | -726.703  | -478.940 | -627.133  |
| 139   | -415.103 | -549.892  | -338.113 | -648.437  |
| 140   | -337.013 | -661.419  | -125.967 | -931.552  |
| 141   | -130.223 | -945.294  | -304.503 | -722.221  |
| 142   | -287.317 | -708.823  | -280.134 | -718.016  |
| 143   | -322.659 | -859.173  | -315.386 | -870.873  |
| 144   | -307.737 | -875.322  | -288.741 | -905.877  |
| 145   | -278.308 | -909.588  | -254.709 | -947.548  |
| 146   | -342.830 | -674.725  | -276.108 | -782.048  |
| 147   | -309.106 | -815.039  | -269.018 | -879.521  |
| 148   | -268.064 | -878.595  | -241.448 | -921.406  |
| 149   | -240.346 | -920.336  | -225.840 | -943.668  |
| 150   | -225.599 | -943.481  | -221.576 | -949.952  |
| 151   | -223.156 | -951.522  | -234.847 | -932.716  |
| 152   | -234.194 | -932.058  | -250.619 | -905.639  |
| 153   | -248.775 | -903.778  | -259.389 | -886.705  |
| 154   | -257.682 | -884.978  | -262.434 | -877.335  |
| 155   | -260.855 | -875.735  | -259.695 | -877.601  |
| 156   | -258.237 | -876.146  | -251.092 | -887.638  |
| 157   | -249.784 | -886.320  | -236.520 | -907.656  |
| 158   | -235.433 | -906.595  | -216.096 | -937.697  |
| 159   | -215.189 | -936.805  | -189.706 | -977.794  |
| 160   | -189.113 | -977.227  | -154.192 | -1033.397 |



## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 1     | -131.546 | -875.920 | -171.776 | -811.209 |
| 2     | -179.334 | -827.003 | -214.218 | -770.891 |
| 3     | -215.051 | -771.714 | -242.793 | -727.091 |
| 4     | -243.882 | -728.179 | -264.537 | -694.956 |
| 5     | -265.790 | -696.228 | -279.451 | -674.254 |
| 6     | -280.824 | -675.610 | -287.586 | -664.734 |
| 7     | -289.005 | -666.167 | -288.973 | -666.218 |
| 8     | -290.436 | -667.663 | -283.694 | -678.508 |
| 9     | -285.162 | -679.993 | -271.806 | -701.476 |
| 10    | -273.298 | -702.970 | -256.238 | -730.411 |
| 11    | -259.574 | -733.746 | -245.944 | -755.670 |
| 12    | -250.529 | -760.250 | -241.192 | -775.269 |
| 13    | -246.936 | -781.004 | -243.194 | -787.021 |
| 14    | -249.888 | -793.753 | -253.224 | -788.388 |
| 15    | -260.565 | -795.721 | -272.579 | -776.397 |
| 16    | -279.978 | -783.785 | -301.908 | -748.512 |
| 17    | -308.512 | -755.167 | -340.314 | -704.012 |
| 18    | -344.370 | -715.390 | -439.471 | -562.419 |
| 19    | -384.096 | -491.716 | -333.143 | -556.935 |
| 20    | -338.188 | -566.084 | -188.229 | -758.026 |
| 21    | -198.645 | -771.372 | -406.203 | -505.703 |
| 22    | -393.689 | -495.916 | -387.926 | -503.294 |
| 23    | -435.472 | -581.610 | -452.814 | -553.716 |
| 24    | -447.775 | -555.501 | -448.398 | -554.499 |
| 25    | -439.659 | -554.996 | -434.669 | -563.022 |
| 26    | -420.666 | -577.914 | -406.174 | -601.224 |
| 27    | -405.774 | -600.811 | -394.328 | -619.222 |
| 28    | -393.967 | -618.850 | -380.157 | -641.063 |
| 29    | -380.365 | -641.243 | -368.175 | -660.851 |
| 30    | -369.361 | -662.010 | -357.310 | -681.395 |
| 31    | -359.805 | -683.869 | -347.101 | -704.302 |
| 32    | -351.059 | -708.268 | -340.183 | -725.763 |
| 33    | -345.658 | -731.245 | -337.842 | -743.818 |
| 34    | -344.765 | -750.751 | -341.886 | -755.381 |
| 35    | -349.956 | -763.465 | -352.632 | -759.160 |
| 36    | -361.342 | -767.881 | -372.200 | -750.417 |
| 37    | -379.472 | -760.648 | -396.214 | -733.718 |
| 38    | -402.452 | -747.929 | -497.501 | -595.041 |
| 39    | -435.228 | -524.454 | -387.642 | -585.362 |
| 40    | -390.508 | -594.825 | -206.762 | -830.014 |
| 41    | -219.071 | -847.247 | -414.948 | -596.531 |
| 42    | -401.493 | -585.935 | -377.039 | -617.236 |
| 43    | -426.944 | -723.299 | -427.054 | -723.124 |
| 44    | -420.523 | -724.341 | -409.932 | -741.377 |
| 45    | -400.321 | -738.383 | -386.611 | -760.436 |
| 46    | -367.300 | -657.630 | -357.689 | -673.090 |
| 47    | -357.938 | -673.315 | -348.601 | -688.334 |
| 48    | -348.181 | -687.923 | -339.892 | -701.255 |
| 49    | -340.154 | -701.523 | -333.272 | -712.592 |
| 50    | -334.603 | -713.913 | -328.637 | -723.509 |
| 51    | -331.320 | -726.223 | -323.478 | -738.837 |
| 52    | -327.682 | -743.043 | -321.623 | -752.790 |
| 53    | -327.349 | -758.557 | -324.367 | -763.354 |
| 54    | -331.562 | -770.539 | -333.581 | -767.291 |

## TENSIONES CON AXIL FINAL

| Barra | TS_1     | TI_1     | TS_2     | TI_2     |
|-------|----------|----------|----------|----------|
| 55    | -341.915 | -775.595 | -350.122 | -762.394 |
| 56    | -359.045 | -771.300 | -374.186 | -746.946 |
| 57    | -381.001 | -758.246 | -400.503 | -726.876 |
| 58    | -405.732 | -742.754 | -504.097 | -584.534 |
| 59    | -441.309 | -516.420 | -395.985 | -574.433 |
| 60    | -398.624 | -583.741 | -217.195 | -815.964 |
| 61    | -229.409 | -832.964 | -424.559 | -583.177 |
| 62    | -411.166 | -572.631 | -386.240 | -604.535 |
| 63    | -436.846 | -707.024 | -436.078 | -708.259 |
| 64    | -429.751 | -709.796 | -418.193 | -728.387 |
| 65    | -408.720 | -725.631 | -394.015 | -749.285 |
| 66    | -374.776 | -646.640 | -363.286 | -665.120 |
| 67    | -363.579 | -665.410 | -352.493 | -683.241 |
| 68    | -352.088 | -682.827 | -343.232 | -697.073 |
| 69    | -343.467 | -697.320 | -336.087 | -709.192 |
| 70    | -337.365 | -710.477 | -330.983 | -720.743 |
| 71    | -333.609 | -723.388 | -325.324 | -736.715 |
| 72    | -329.454 | -740.859 | -322.944 | -751.330 |
| 73    | -328.602 | -757.013 | -325.164 | -762.543 |
| 74    | -332.278 | -769.669 | -333.834 | -767.166 |
| 75    | -342.089 | -775.428 | -349.727 | -763.143 |
| 76    | -358.596 | -772.004 | -372.930 | -748.949 |
| 77    | -379.551 | -760.496 | -397.738 | -731.242 |
| 78    | -402.850 | -747.339 | -500.060 | -590.977 |
| 79    | -437.508 | -521.388 | -391.023 | -580.887 |
| 80    | -393.726 | -590.270 | -211.117 | -824.004 |
| 81    | -223.408 | -841.015 | -419.146 | -590.478 |
| 82    | -405.714 | -579.922 | -381.335 | -611.125 |
| 83    | -431.605 | -715.568 | -431.509 | -715.722 |
| 84    | -425.117 | -717.159 | -414.273 | -734.600 |
| 85    | -404.751 | -731.797 | -390.759 | -754.303 |
| 86    | -371.583 | -651.500 | -360.380 | -669.521 |
| 87    | -360.666 | -669.821 | -350.523 | -686.135 |
| 88    | -350.137 | -685.730 | -342.194 | -698.507 |
| 89    | -342.460 | -698.771 | -335.999 | -709.163 |
| 90    | -337.305 | -710.487 | -331.822 | -719.306 |
| 91    | -334.504 | -721.955 | -327.117 | -733.836 |
| 92    | -331.287 | -738.007 | -325.685 | -747.018 |
| 93    | -331.385 | -752.716 | -328.862 | -756.774 |
| 94    | -336.000 | -763.928 | -338.502 | -759.903 |
| 95    | -346.763 | -768.191 | -354.682 | -755.452 |
| 96    | -363.542 | -764.331 | -378.719 | -739.918 |
| 97    | -385.261 | -751.532 | -404.160 | -721.134 |
| 98    | -410.008 | -735.912 | -507.102 | -579.735 |
| 99    | -444.152 | -512.745 | -399.726 | -569.609 |
| 100   | -402.350 | -578.936 | -224.792 | -806.204 |
| 101   | -237.045 | -823.183 | -426.667 | -580.473 |
| 102   | -413.262 | -569.976 | -385.773 | -605.160 |
| 103   | -436.363 | -707.824 | -434.467 | -710.875 |
| 104   | -428.126 | -712.377 | -415.469 | -732.736 |
| 105   | -405.961 | -729.936 | -390.178 | -755.322 |
| 106   | -371.281 | -652.005 | -358.976 | -671.798 |
| 107   | -359.221 | -672.029 | -348.069 | -689.966 |
| 108   | -347.619 | -689.494 | -338.713 | -703.819 |
| 109   | -338.905 | -704.008 | -331.477 | -715.956 |

## TENSIONES CON AXIL FINAL

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| Barra | TS_1     | TI_1     | TS_2     | TI_2      |
|-------|----------|----------|----------|-----------|
| ===== | =====    | =====    | =====    | =====     |
| 110   | -332.713 | -717.195 | -326.226 | -727.630  |
| 111   | -328.834 | -730.206 | -320.484 | -743.636  |
| 112   | -324.590 | -747.744 | -317.947 | -758.429  |
| 113   | -323.602 | -764.074 | -319.997 | -769.873  |
| 114   | -327.107 | -777.009 | -328.468 | -774.820  |
| 115   | -336.746 | -783.105 | -341.155 | -776.013  |
| 116   | -350.069 | -784.942 | -363.798 | -762.858  |
| 117   | -370.390 | -774.680 | -387.824 | -746.638  |
| 118   | -394.720 | -760.223 | -489.677 | -607.485  |
| 119   | -427.748 | -534.166 | -380.783 | -594.280  |
| 120   | -383.615 | -603.788 | -200.380 | -838.323  |
| 121   | -212.700 | -855.423 | -411.107 | -601.468  |
| 122   | -397.564 | -590.846 | -375.792 | -618.714  |
| 123   | -425.615 | -725.335 | -428.151 | -721.257  |
| 124   | -421.636 | -722.695 | -413.828 | -735.253  |
| 125   | -404.320 | -732.485 | -393.366 | -750.105  |
| 126   | -375.709 | -646.333 | -370.916 | -654.042  |
| 127   | -371.339 | -654.464 | -367.251 | -661.039  |
| 128   | -367.029 | -660.814 | -365.047 | -664.001  |
| 129   | -365.494 | -664.455 | -364.975 | -665.289  |
| 130   | -366.469 | -666.790 | -366.998 | -665.940  |
| 131   | -369.846 | -668.776 | -369.741 | -668.943  |
| 132   | -374.056 | -673.278 | -374.900 | -671.920  |
| 133   | -380.703 | -677.751 | -384.800 | -671.160  |
| 134   | -392.000 | -678.365 | -401.302 | -663.403  |
| 135   | -409.551 | -671.650 | -426.299 | -644.710  |
| 136   | -435.019 | -653.458 | -458.711 | -615.350  |
| 137   | -464.262 | -627.824 | -487.504 | -590.440  |
| 138   | -490.203 | -609.015 | -582.758 | -460.141  |
| 139   | -516.590 | -419.992 | -476.726 | -471.017  |
| 140   | -478.603 | -480.189 | -312.823 | -692.382  |
| 141   | -319.095 | -703.543 | -455.295 | -529.212  |
| 142   | -438.914 | -514.783 | -396.628 | -568.908  |
| 143   | -446.847 | -659.416 | -415.826 | -709.314  |
| 144   | -410.422 | -710.153 | -380.125 | -758.885  |
| 145   | -372.312 | -758.383 | -342.652 | -806.091  |
| 146   | -430.949 | -532.985 | -358.352 | -649.758  |
| 147   | -391.351 | -682.748 | -345.392 | -756.673  |
| 148   | -344.438 | -755.746 | -311.956 | -807.995  |
| 149   | -310.853 | -806.924 | -290.476 | -839.701  |
| 150   | -290.235 | -839.513 | -280.344 | -855.424  |
| 151   | -281.924 | -856.993 | -287.741 | -847.636  |
| 152   | -287.088 | -846.978 | -297.638 | -830.008  |
| 153   | -295.794 | -828.147 | -300.539 | -820.515  |
| 154   | -298.832 | -818.788 | -297.707 | -820.598  |
| 155   | -296.128 | -818.997 | -289.090 | -830.318  |
| 156   | -287.632 | -828.864 | -274.607 | -849.815  |
| 157   | -273.298 | -848.498 | -254.156 | -879.288  |
| 158   | -253.069 | -878.226 | -227.853 | -918.787  |
| 159   | -226.945 | -917.895 | -195.585 | -968.339  |
| 160   | -194.992 | -967.771 | -154.195 | -1033.394 |



COMBINACION 33 1.35 (G1+G2)+1.5 (SCMAX-IPF)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 1     | 8.544     | 793.843   | -1358.095 | -2056.088  | -737.891  | 1005.867 |
| 2     | 2710.635  | 1084.684  | -246.101  | -5082.277  | -938.804  | 220.543  |
| 3     | 5082.334  | 938.826   | -220.465  | -7124.246  | -792.957  | 194.617  |
| 4     | 7124.219  | 792.923   | -194.107  | -8835.998  | -648.522  | 168.441  |
| 5     | 8835.963  | 648.521   | -168.422  | -10218.362 | -508.815  | 142.937  |
| 6     | 10218.441 | 508.832   | -141.425  | -11268.543 | -369.369  | 115.830  |
| 7     | 11268.538 | 369.279   | -115.815  | -11989.040 | -225.672  | 89.580   |
| 8     | 11989.160 | 225.651   | -86.037   | -12379.902 | -81.102   | 59.757   |
| 9     | 12379.803 | 81.015    | -61.973   | -12440.080 | 63.192    | 35.675   |
| 10    | 12440.023 | -63.408   | -31.515   | -12170.409 | 134.189   | 5.678    |
| 11    | 12170.495 | -134.141  | -6.122    | -11569.807 | 202.129   | -19.557  |
| 12    | 11569.823 | -202.198  | 21.515    | -10638.566 | 271.685   | -47.485  |
| 13    | 10638.584 | -271.433  | 47.488    | -9379.663  | 339.051   | -73.475  |
| 14    | 9379.539  | -339.342  | 74.957    | -7789.294  | 403.658   | -100.914 |
| 15    | 7789.255  | -403.540  | 101.912   | -5871.306  | 457.900   | -126.544 |
| 16    | 5871.342  | -457.964  | 125.749   | -3620.665  | 512.699   | -150.417 |
| 17    | 3621.180  | -504.681  | 150.877   | -1093.732  | 513.490   | -171.120 |
| 18    | 1298.389  | -285.738  | 149.920   | 1076.119   | 342.378   | -161.942 |
| 19    | -909.293  | -151.682  | 146.222   | 3042.367   | 783.518   | -167.762 |
| 20    | -2905.943 | -612.233  | 153.808   | 5146.591   | 1271.109  | -175.107 |
| 21    | -5046.190 | 1179.199  | -225.048  | 2437.271   | -487.976  | 205.422  |
| 22    | -2344.541 | 562.693   | -211.081  | 66.219     | 36.490    | 183.872  |
| 23    | 157.360   | 170.917   | -201.274  | -2477.569  | -177.936  | 180.614  |
| 24    | 2669.097  | 348.150   | -196.475  | -5116.628  | -280.314  | 173.450  |
| 25    | 5376.090  | 494.387   | -195.955  | -7794.832  | -353.760  | 165.007  |
| 26    | 8009.932  | 569.569   | -169.204  | -10351.346 | -461.226  | 137.625  |
| 27    | 10351.479 | 461.227   | -135.035  | -12186.772 | -355.967  | 103.675  |
| 28    | 12186.758 | 355.981   | -103.749  | -13513.785 | -242.234  | 71.316   |
| 29    | 13513.889 | 242.189   | -69.453   | -14328.467 | -128.494  | 36.433   |
| 30    | 14328.539 | 128.492   | -32.825   | -14632.798 | -21.125   | 0.688    |
| 31    | 14632.861 | 21.272    | -2.637    | -14426.670 | 84.561    | -29.778  |
| 32    | 14426.638 | -84.660   | 35.354    | -13709.056 | 193.719   | -68.496  |
| 33    | 13709.087 | -193.562  | 68.563    | -12477.918 | 299.252   | -100.900 |
| 34    | 12477.973 | -299.153  | 100.947   | -10735.904 | 395.356   | -132.925 |
| 35    | 10735.824 | -395.216  | 135.406   | -8482.682  | 487.527   | -167.281 |
| 36    | 8482.689  | -487.538  | 169.393   | -5718.633  | 582.703   | -200.894 |
| 37    | 5801.767  | -451.814  | 163.179   | -2837.651  | 490.550   | -188.450 |
| 38    | 3036.619  | -317.720  | 200.637   | -128.608   | 264.422   | -217.377 |
| 39    | 390.575   | -48.666   | 196.128   | 2280.807   | 684.444   | -223.158 |
| 40    | -2061.513 | -478.020  | 206.021   | 4750.839   | 1318.476  | -232.330 |
| 41    | -4591.811 | 1184.158  | -223.317  | 2114.931   | -421.134  | 204.063  |
| 42    | -2017.670 | 495.684   | -209.551  | -235.365   | 141.766   | 182.345  |
| 43    | 476.995   | 65.067    | -200.093  | -2724.170  | 7.395     | 172.068  |
| 44    | 2942.177  | 209.394   | -192.171  | -5337.941  | -255.159  | 176.114  |
| 45    | 5523.774  | 420.576   | -194.041  | -7502.858  | -349.439  | 162.986  |
| 46    | 8237.719  | 563.415   | -167.131  | -10559.151 | -453.922  | 135.639  |
| 47    | 10559.221 | 454.016   | -134.260  | -12374.833 | -348.326  | 102.930  |
| 48    | 12374.716 | 348.486   | -101.534  | -13681.891 | -234.294  | 68.949   |
| 49    | 13681.941 | 233.989   | -67.006   | -14476.264 | -119.857  | 34.424   |
| 50    | 14476.183 | 119.900   | -34.409   | -14760.000 | -12.130   | 1.983    |
| 51    | 14759.896 | 11.934    | 1.637     | -14532.604 | 94.188    | -34.071  |
| 52    | 14532.602 | -94.239   | 34.078    | -13794.062 | 203.424   | -66.973  |
| 53    | 13793.766 | -203.496  | 70.308    | -12541.070 | 309.229   | -103.316 |
| 54    | 12540.990 | -309.359  | 105.031   | -10776.476 | 405.515   | -136.983 |

COMBINACION 33 1.35 (G1+G2)+1.5 (SCMAX-IPF)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| 55    | 10776.639 | -405.506  | 138.073  | -8501.236  | 497.612   | -169.436 |
| 56    | 8501.340  | -497.648  | 169.496  | -5714.802  | 592.620   | -201.067 |
| 57    | 5839.232  | -399.815  | 194.081  | -2992.932  | 438.149   | -219.531 |
| 58    | 3175.868  | -272.914  | 201.576  | -390.230   | 215.799   | -218.341 |
| 59    | 656.412   | 0.780     | 198.709  | 1903.057   | 635.127   | -225.782 |
| 60    | -1681.420 | -428.347  | 209.032  | 4257.952   | 1271.088  | -235.229 |
| 61    | -4097.649 | 1172.846  | -223.619 | 1651.884   | -407.609  | 204.439  |
| 62    | -1554.100 | 482.147   | -209.149 | -667.393   | 155.543   | 181.890  |
| 63    | 910.756   | 51.287    | -199.400 | -3126.317  | 21.611    | 171.376  |
| 64    | 3347.323  | 195.062   | -191.269 | -5684.601  | -241.642  | 175.163  |
| 65    | 5873.393  | 406.916   | -193.052 | -7822.660  | -335.697  | 162.088  |
| 66    | 8559.867  | 548.077   | -168.107 | -10847.883 | -438.536  | 136.616  |
| 67    | 10848.058 | 438.429   | -133.566 | -12629.725 | -332.830  | 102.249  |
| 68    | 12629.756 | 332.876   | -102.272 | -13902.568 | -218.763  | 69.926   |
| 69    | 13902.527 | 218.762   | -68.320  | -14662.959 | -104.844  | 35.522   |
| 70    | 14662.858 | 104.835   | -33.506  | -14913.111 | 2.802     | 0.810    |
| 71    | 14913.104 | -2.730    | 3.027    | -14652.779 | 108.777   | -35.512  |
| 72    | 14652.737 | -108.899  | 35.495   | -13881.083 | 218.039   | -68.208  |
| 73    | 13880.955 | -218.040  | 70.015   | -12594.977 | 323.806   | -102.998 |
| 74    | 12594.774 | -323.760  | 105.971  | -10797.684 | 419.927   | -137.954 |
| 75    | 10797.698 | -419.940  | 137.804  | -8490.191  | 512.026   | -169.219 |
| 76    | 8490.214  | -511.989  | 170.516  | -5670.546  | 607.106   | -202.249 |
| 77    | 5808.074  | -398.997  | 194.312  | -2964.617  | 437.177   | -219.626 |
| 78    | 3148.076  | -271.920  | 201.115  | -365.999   | 214.550   | -217.808 |
| 79    | 632.645   | 2.104     | 198.790  | 1924.015   | 633.751   | -225.899 |
| 80    | -1702.177 | -426.948  | 209.063  | 4275.803   | 1269.882  | -235.287 |
| 81    | -4115.318 | 1176.633  | -225.071 | 1661.207   | -411.171  | 205.902  |
| 82    | -1563.473 | 485.749   | -211.252 | -666.207   | 151.916   | 184.032  |
| 83    | 909.635   | 54.857    | -201.747 | -3133.501  | 17.832    | 173.706  |
| 84    | 3354.490  | 198.820   | -192.875 | -5698.630  | -245.506  | 176.732  |
| 85    | 5887.239  | 410.825   | -195.258 | -7845.198  | -339.544  | 164.181  |
| 86    | 8575.995  | 547.600   | -165.360 | -10862.499 | -438.125  | 134.137  |
| 87    | 10862.497 | 438.122   | -135.430 | -12643.230 | -332.516  | 104.129  |
| 88    | 12643.523 | 332.545   | -100.698 | -13915.499 | -218.374  | 67.792   |
| 89    | 13915.534 | 218.339   | -64.122  | -14674.837 | -104.307  | 31.319   |
| 90    | 14674.804 | 104.048   | -31.243  | -14923.219 | 3.633     | -0.710   |
| 91    | 14923.267 | -3.874    | 0.763    | -14660.201 | 109.906   | -33.436  |
| 92    | 14660.277 | -109.608  | 39.061   | -13886.941 | 218.716   | -72.021  |
| 93    | 13886.931 | -218.563  | 70.145   | -12600.135 | 324.242   | -102.551 |
| 94    | 12600.010 | -324.214  | 105.648  | -10802.029 | 420.269   | -137.744 |
| 95    | 10801.937 | -420.138  | 139.197  | -8492.808  | 512.318   | -170.795 |
| 96    | 8492.744  | -512.362  | 171.749  | -5673.031  | 607.341   | -203.315 |
| 97    | 5814.216  | -394.963  | 194.466  | -2979.179  | 433.301   | -219.812 |
| 98    | 3162.702  | -268.007  | 202.392  | -389.497   | 210.897   | -219.054 |
| 99    | 656.425   | 5.700     | 198.244  | 1871.026   | 611.794   | -225.326 |
| 100   | -1649.297 | -405.014  | 209.249  | 4152.554   | 1229.466  | -235.529 |
| 101   | -3992.127 | 1138.353  | -223.161 | 1603.566   | -391.367  | 204.017  |
| 102   | -1505.908 | 465.911   | -210.208 | -699.691   | 153.451   | 182.996  |
| 103   | 943.160   | 53.337    | -200.138 | -3163.449  | 19.456    | 172.077  |
| 104   | 3384.336  | 197.160   | -191.839 | -5724.877  | -243.718  | 175.692  |
| 105   | 5913.621  | 408.948   | -193.592 | -7867.548  | -337.737  | 162.557  |
| 106   | 8576.147  | 530.557   | -166.102 | -10824.671 | -421.052  | 134.692  |
| 107   | 10824.713 | 420.921   | -133.319 | -12566.375 | -315.396  | 102.001  |
| 108   | 12566.420 | 315.386   | -100.253 | -13799.559 | -201.204  | 67.847   |
| 109   | 13799.467 | 201.188   | -67.910  | -14519.982 | -87.150   | 35.078   |

## ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| 110   | 14520.029 | 87.058    | -31.276  | -14730.180 | 20.646    | -1.062   |
| 111   | 14730.412 | -20.641   | 1.137    | -14429.768 | 126.802   | -33.563  |
| 112   | 14429.840 | -127.006  | 37.169   | -13617.567 | 236.251   | -70.037  |
| 113   | 13617.527 | -236.224  | 70.073   | -12291.270 | 342.075   | -102.764 |
| 114   | 12291.178 | -342.276  | 105.702  | -10453.451 | 438.465   | -137.868 |
| 115   | 10453.448 | -438.373  | 139.230  | -8104.322  | 530.616   | -170.804 |
| 116   | 8104.165  | -530.600  | 171.513  | -5244.402  | 625.503   | -203.031 |
| 117   | 5390.119  | -411.521  | 193.607  | -2519.870  | 449.497   | -218.887 |
| 118   | 2705.926  | -284.107  | 201.389  | 101.128    | 226.249   | -218.205 |
| 119   | 168.348   | -9.458    | 198.952  | 2414.985   | 1255.327  | -225.988 |
| 120   | -2191.349 | -1048.506 | 207.747  | 4791.756   | 1281.795  | -233.978 |
| 121   | -4630.871 | 1232.450  | -221.685 | 2051.276   | -466.635  | 202.484  |
| 122   | -1953.190 | 541.120   | -208.631 | -401.937   | 96.317    | 181.437  |
| 123   | 647.020   | 110.147   | -198.739 | -2995.490  | -37.589   | 170.714  |
| 124   | 3218.787  | 253.407   | -191.226 | -5685.974  | -299.386  | 175.047  |
| 125   | 5875.622  | 472.179   | -163.173 | -7976.110  | -400.147  | 132.003  |
| 126   | 8583.387  | 531.357   | -163.285 | -10835.061 | -421.796  | 132.021  |
| 127   | 10835.001 | 421.865   | -132.311 | -12579.924 | -316.341  | 100.906  |
| 128   | 12580.036 | 316.311   | -97.328  | -13816.922 | -202.236  | 64.743   |
| 129   | 13816.856 | 202.239   | -64.759  | -14541.020 | -88.393   | 32.186   |
| 130   | 14541.123 | 88.284    | -30.520  | -14754.636 | 19.055    | -2.111   |
| 131   | 14754.588 | -19.110   | 6.130    | -14456.973 | 124.864   | -38.597  |
| 132   | 14456.922 | -124.868  | 38.231   | -13648.500 | 233.503   | -70.895  |
| 133   | 13648.201 | -233.599  | 72.620   | -12325.555 | 338.857   | -105.441 |
| 134   | 12325.412 | -338.801  | 107.064  | -10491.349 | 434.581   | -139.026 |
| 135   | 10491.384 | -434.675  | 140.143  | -8146.311  | 526.572   | -171.844 |
| 136   | 8146.185  | -526.535  | 173.550  | -5290.412  | 621.572   | -205.167 |
| 137   | 5483.665  | -405.648  | 196.101  | -2631.166  | 444.060   | -221.414 |
| 138   | 2853.538  | -229.900  | 199.384  | -189.469   | 173.237   | -216.199 |
| 139   | 381.204   | -2.911    | 200.971  | 2186.243   | 1248.295  | -228.013 |
| 140   | -1942.997 | -1040.875 | 210.449  | 4332.938   | 1274.313  | -236.698 |
| 141   | -4167.021 | 1196.137  | -166.669 | 2691.075   | -1069.830 | 151.346  |
| 142   | -2624.471 | 1130.411  | -155.347 | 1871.406   | -446.510  | 133.709  |
| 143   | -1699.644 | 617.775   | -148.709 | 407.055    | 100.841   | 126.434  |
| 144   | -230.534  | 89.721    | -141.489 | -2161.428  | 171.819   | 118.701  |
| 145   | 2366.803  | 55.883    | -139.697 | -4820.443  | -256.451  | 127.153  |
| 146   | 6350.027  | 264.481   | -125.880 | -8235.447  | -170.742  | 100.623  |
| 147   | 8235.564  | 170.930   | -100.645 | -9793.837  | -144.003  | 75.183   |
| 148   | 9793.770  | 144.142   | -73.751  | -11022.740 | -118.177  | 47.810   |
| 149   | 11022.588 | 118.095   | -46.090  | -11923.148 | -90.503   | 19.934   |
| 150   | 11922.963 | 90.523    | -19.903  | -12492.980 | -74.300   | -5.506   |
| 151   | 12493.031 | 74.111    | 7.316    | -12731.931 | -46.165   | -33.872  |
| 152   | 12731.901 | 46.137    | 35.391   | -12640.428 | 91.969    | -61.839  |
| 153   | 12640.496 | -91.797   | 61.837   | -12219.012 | 230.275   | -88.022  |
| 154   | 12219.143 | -230.592  | 87.977   | -11466.672 | 368.399   | -114.409 |
| 155   | 11466.727 | -368.507  | 117.100  | -10385.440 | 496.330   | -142.871 |
| 156   | 10385.353 | -496.255  | 144.001  | -8971.195  | 635.616   | -170.009 |
| 157   | 8971.182  | -635.702  | 169.242  | -7226.895  | 775.186   | -195.131 |
| 158   | 7226.783  | -775.126  | 195.475  | -5151.479  | 914.814   | -221.500 |
| 159   | 5151.367  | -914.732  | 221.312  | -2746.346  | 1054.360  | -247.107 |
| 160   | 2746.194  | -1054.372 | 246.303  | -10.039    | 629.423   | -590.733 |

COMBINACION 34 1.35 (G1+G2)+1.5 (SCMIN-IPF)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 1     | 8.373      | 835.073   | 893.099  | -1374.453 | -378.902  | 170.249  |
| 2     | 1179.828   | 272.482   | -170.423 | -2172.261 | -213.307  | 152.697  |
| 3     | 2172.316   | 213.322   | -153.668 | -2986.026 | -154.189  | 135.789  |
| 4     | 2986.035   | 154.280   | -136.422 | -3620.853 | -95.375   | 118.346  |
| 5     | 3620.760   | 95.369    | -118.383 | -4076.677 | -36.714   | 100.328  |
| 6     | 4076.742   | 36.633    | -101.057 | -4353.616 | 21.771    | 82.887   |
| 7     | 4353.551   | -21.887   | -82.827  | -4451.593 | 79.994    | 64.568   |
| 8     | 4451.664   | -79.662   | -65.855  | -4370.928 | 137.462   | 47.496   |
| 9     | 4370.857   | -137.383  | -46.791  | -4060.138 | 229.507   | 29.718   |
| 10    | 4060.126   | -229.451  | -31.629  | -3555.677 | 226.068   | 12.803   |
| 11    | 3555.655   | -226.118  | -12.642  | -2859.943 | 218.679   | -6.124   |
| 12    | 2859.965   | -218.898  | 4.909    | -1972.928 | 210.574   | -23.737  |
| 13    | 1972.982   | -210.266  | 23.633   | -895.410  | 198.674   | -42.303  |
| 14    | 895.218    | -198.722  | 40.727   | 373.418   | 183.802   | -59.126  |
| 15    | -373.365   | -183.793  | 57.753   | 1832.826  | 164.181   | -75.911  |
| 16    | -1832.764  | -164.220  | 77.377   | 3483.897  | 143.475   | -94.938  |
| 17    | -3484.727  | -151.528  | 91.207   | 5341.150  | 130.227   | -108.597 |
| 18    | -5545.714  | -358.002  | 131.024  | 8003.047  | 470.926   | -148.137 |
| 19    | -8169.977  | -661.606  | 162.913  | 11168.202 | 1236.754  | -179.070 |
| 20    | -11304.773 | -1408.042 | 190.830  | 14923.980 | 1847.107  | -195.002 |
| 21    | -15024.071 | 2277.267  | -302.139 | 9700.822  | -1642.690 | 285.427  |
| 22    | -9793.389  | 1568.021  | -281.020 | 5369.067  | -883.961  | 241.324  |
| 23    | -5592.425  | 676.479   | -225.504 | 2090.699  | -670.973  | 204.814  |
| 24    | -2282.198  | 500.754   | -188.947 | -519.727  | -466.263  | 167.450  |
| 25    | 260.278    | 252.226   | -144.960 | -2248.798 | -213.561  | 123.165  |
| 26    | 1879.117   | -2.310    | -112.072 | -3043.055 | 10.869    | 90.020   |
| 27    | 3043.095   | -10.904   | -91.095  | -3927.508 | 18.968    | 68.520   |
| 28    | 3927.560   | -18.968   | -68.554  | -4532.431 | 26.951    | 45.643   |
| 29    | 4532.576   | -27.006   | -46.281  | -4857.779 | 34.810    | 23.362   |
| 30    | 4857.910   | -34.819   | -24.643  | -4903.617 | 41.861    | 1.496    |
| 31    | 4903.732   | -41.768   | -0.738   | -4669.988 | 47.204    | -22.411  |
| 32    | 4669.958   | -47.122   | 20.005   | -4156.839 | 50.108    | -43.040  |
| 33    | 4156.796   | -50.200   | 43.050   | -3298.076 | 124.088   | -68.079  |
| 34    | 3298.015   | -124.301  | 68.010   | -2050.711 | 127.536   | -91.435  |
| 35    | 2050.641   | -127.466  | 89.393   | -505.106  | 126.778   | -112.325 |
| 36    | 505.016    | -126.893  | 110.153  | 1338.905  | 125.290   | -133.005 |
| 37    | -1421.886  | -256.193  | 171.169  | 3859.773  | 250.281   | -193.320 |
| 38    | -4059.040  | -423.016  | 178.697  | 7183.764  | 423.681   | -199.928 |
| 39    | -7445.667  | -639.437  | 221.779  | 11365.543 | 1202.441  | -242.201 |
| 40    | -11585.134 | -1408.922 | 256.649  | 16290.154 | 2001.618  | -263.804 |
| 41    | -16451.367 | 2320.014  | -296.607 | 11140.761 | -1629.304 | 281.115  |
| 42    | -11237.848 | 1554.735  | -277.079 | 6855.954  | -836.842  | 237.096  |
| 43    | -7097.430  | 629.970   | -220.602 | 3488.532  | -637.788  | 199.942  |
| 44    | -3706.441  | 421.030   | -180.477 | 902.426   | -400.571  | 159.039  |
| 45    | -1088.292  | 235.092   | -141.103 | -587.220  | -265.929  | 119.231  |
| 46    | 652.028    | 51.970    | -108.796 | -1931.682 | -42.226   | 86.678   |
| 47    | 1931.841   | 42.242    | -87.628  | -2932.003 | -33.763   | 65.099   |
| 48    | 2931.985   | 33.775    | -65.785  | -3652.567 | -25.350   | 42.984   |
| 49    | 3652.545   | 25.249    | -43.909  | -4093.632 | -17.019   | 20.916   |
| 50    | 4093.718   | 17.280    | -20.872  | -4255.697 | -9.877    | -2.243   |
| 51    | 4255.541   | 9.840     | 0.498    | -4138.035 | -4.132    | -23.604  |
| 52    | 4138.027   | 4.287     | 23.516   | -3741.329 | -1.181    | -46.612  |
| 53    | 3741.157   | 1.184     | 44.721   | -3020.865 | 76.344    | -69.609  |
| 54    | 3020.954   | -76.467   | 68.528   | -1882.083 | 79.611    | -91.968  |

COMBINACION 34 1.35 (G1+G2)+1.5 (SCMIN-IPF)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 55    | 1882.221   | -79.534   | 91.021   | -445.299  | 78.658    | -114.099 |
| 56    | 445.374    | -78.574   | 114.093  | 1289.575  | 76.810    | -136.802 |
| 57    | -1414.278  | -269.512  | 142.829  | 3882.362  | 263.597   | -165.074 |
| 58    | -4065.357  | -428.803  | 183.212  | 7203.253  | 429.768   | -204.520 |
| 59    | -7469.615  | -646.440  | 223.571  | 11404.492 | 1209.582  | -243.671 |
| 60    | -11626.418 | -1416.360 | 257.943  | 16346.934 | 2009.003  | -265.288 |
| 61    | -16507.273 | 2321.113  | -293.759 | 11193.809 | -1630.519 | 278.199  |
| 62    | -11291.279 | 1555.973  | -275.840 | 6915.754  | -838.030  | 236.105  |
| 63    | -7158.955  | 631.229   | -219.751 | 3547.926  | -638.614  | 199.101  |
| 64    | -3768.886  | 421.878   | -179.725 | 962.596   | -401.219  | 158.286  |
| 65    | -1151.379  | 235.864   | -140.370 | -526.780  | -266.674  | 118.410  |
| 66    | 589.187    | 54.365    | -108.890 | -1875.219 | -44.648   | 86.820   |
| 67    | 1875.186   | 44.598    | -88.590  | -2881.724 | -36.238   | 66.104   |
| 68    | 2881.755   | 36.370    | -66.104  | -3608.838 | -28.029   | 43.203   |
| 69    | 3608.779   | 27.893    | -43.909  | -4056.241 | -19.814   | 20.912   |
| 70    | 4056.217   | 19.877    | -21.932  | -4224.322 | -12.565   | -1.141   |
| 71    | 4224.167   | 12.610    | -0.738   | -4112.776 | -6.954    | -22.440  |
| 72    | 4112.683   | 6.986     | 22.387   | -3721.824 | -3.908    | -45.535  |
| 73    | 3721.715   | 3.960     | 44.452   | -3008.300 | 73.777    | -69.358  |
| 74    | 3008.283   | -73.906   | 67.304   | -1875.061 | 77.085    | -90.794  |
| 75    | 1875.009   | -77.184   | 91.057   | -443.392  | 76.320    | -114.144 |
| 76    | 443.420    | -76.276   | 112.612  | 1286.615  | 74.620    | -135.301 |
| 77    | -1424.219  | -282.679  | 142.408  | 3921.333  | 276.664   | -164.766 |
| 78    | -4104.735  | -442.005  | 184.002  | 7272.300  | 442.877   | -205.272 |
| 79    | -7539.136  | -659.501  | 223.124  | 11503.523 | 1222.597  | -243.090 |
| 80    | -11725.673 | -1429.385 | 257.326  | 16475.656 | 2022.135  | -264.653 |
| 81    | -16635.805 | 2324.717  | -296.804 | 11314.320 | -1633.993 | 281.121  |
| 82    | -11411.894 | 1559.453  | -277.107 | 7028.063  | -841.638  | 237.151  |
| 83    | -7271.383  | 634.849   | -220.392 | 3652.422  | -642.411  | 199.868  |
| 84    | -3873.141  | 425.753   | -181.967 | 1058.370  | -405.149  | 160.560  |
| 85    | -1246.984  | 239.827   | -141.772 | -439.894  | -270.582  | 119.917  |
| 86    | 508.678    | 62.576    | -109.432 | -1812.977 | -52.878   | 87.307   |
| 87    | 1812.907   | 52.766    | -86.479  | -2837.495 | -44.359   | 63.845   |
| 88    | 2837.543   | 44.361    | -65.590  | -3582.504 | -35.997   | 42.995   |
| 89    | 3582.513   | 36.184    | -44.789  | -4048.398 | -28.066   | 21.822   |
| 90    | 4048.299   | 27.996    | -21.789  | -4234.672 | -20.690   | -1.408   |
| 91    | 4234.870   | 20.830    | 1.423    | -4141.939 | -15.172   | -24.515  |
| 92    | 4141.899   | 15.129    | 21.621   | -3769.319 | -12.030   | -44.738  |
| 93    | 3769.309   | 11.911    | 45.805   | -3074.107 | 65.756    | -70.745  |
| 94    | 3074.029   | -65.738   | 68.821   | -1959.017 | 68.843    | -92.141  |
| 95    | 1958.891   | -68.897   | 90.989   | -545.368  | 68.088    | -114.060 |
| 96    | 545.277    | -68.161   | 113.094  | 1166.482  | 66.433    | -135.856 |
| 97    | -1307.841  | -278.802  | 144.279  | 3796.753  | 272.898   | -166.459 |
| 98    | -3980.419  | -438.161  | 182.992  | 7139.513  | 439.254   | -204.367 |
| 99    | -7406.432  | -655.903  | 225.285  | 11341.230 | 1200.659  | -245.382 |
| 100   | -11563.410 | -1407.453 | 257.672  | 16243.025 | 1981.743  | -264.726 |
| 101   | -16403.172 | 2272.213  | -296.397 | 11179.254 | -1599.939 | 280.610  |
| 102   | -11276.929 | 1525.413  | -274.402 | 6949.916  | -825.922  | 234.270  |
| 103   | -7193.113  | 619.115   | -219.181 | 3609.677  | -626.574  | 198.696  |
| 104   | -3830.416  | 409.928   | -179.609 | 1050.869  | -389.261  | 158.193  |
| 105   | -1239.506  | 223.999   | -140.243 | -411.895  | -254.790  | 118.403  |
| 106   | 502.859    | 62.025    | -108.415 | -1805.991 | -52.333   | 86.350   |
| 107   | 1806.081   | 52.273    | -87.111  | -2829.544 | -43.958   | 64.597   |
| 108   | 2829.660   | 44.154    | -65.485  | -3574.016 | -35.803   | 42.606   |
| 109   | 3574.051   | 35.874    | -42.644  | -4039.061 | -27.700   | 19.623   |

COMBINACION 34 1.35(G1+G2)+1.5(SCMIN-IPF)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

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| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| ===== |            |           |          |           |           |          |
| 110   | 4039.040   | 27.438    | -21.337  | -4224.005 | -20.052   | -1.681   |
| 111   | 4224.134   | 20.156    | 1.687    | -4129.760 | -14.421   | -24.815  |
| 112   | 4129.742   | 14.669    | 22.957   | -3756.401 | -11.506   | -46.005  |
| 113   | 3756.453   | 11.584    | 45.969   | -3065.106 | 66.000    | -70.893  |
| 114   | 3064.977   | -66.026   | 68.953   | -1950.219 | 69.236    | -92.315  |
| 115   | 1950.168   | -69.201   | 91.135   | -537.058  | 68.437    | -114.199 |
| 116   | 537.027    | -68.425   | 113.264  | 1174.276  | 66.641    | -136.152 |
| 117   | -1320.137  | -280.578  | 145.536  | 3811.969  | 274.396   | -167.812 |
| 118   | -3998.217  | -439.892  | 184.346  | 7160.700  | 440.372   | -205.370 |
| 119   | -7430.422  | -657.142  | 223.225  | 11390.203 | 1830.249  | -243.571 |
| 120   | -11613.835 | -2037.067 | 261.769  | 16359.549 | 2020.672  | -269.025 |
| 121   | -16520.129 | 2312.552  | -294.189 | 11227.660 | -1461.723 | 258.571  |
| 122   | -11325.754 | 1387.233  | -252.455 | 6976.586  | -830.055  | 232.654  |
| 123   | -7221.444  | 623.571   | -217.573 | 3627.566  | -631.264  | 196.940  |
| 124   | -3850.844  | 415.491   | -176.419 | 1059.150  | -394.827  | 155.009  |
| 125   | -1248.748  | 221.872   | -167.124 | -402.236  | -251.929  | 145.352  |
| 126   | 585.830    | 120.939   | -107.642 | -2022.958 | -111.180  | 85.472   |
| 127   | 2022.976   | 111.058   | -85.279  | -3180.224 | -102.760  | 62.713   |
| 128   | 3180.249   | 102.747   | -64.360  | -4058.253 | -94.486   | 41.578   |
| 129   | 4058.255   | 94.486    | -41.560  | -4656.583 | -86.553   | 18.504   |
| 130   | 4656.546   | 86.608    | -19.169  | -4975.480 | -79.627   | -3.846   |
| 131   | 4975.566   | 79.744    | 2.420    | -5015.232 | -74.433   | -25.577  |
| 132   | 5015.138   | 74.496    | 25.660   | -4775.404 | -71.909   | -48.788  |
| 133   | 4775.308   | 71.855    | 48.114   | -4255.987 | -72.689   | -71.126  |
| 134   | 4255.980   | 72.663    | 70.404   | -3357.576 | 2.328     | -95.867  |
| 135   | 3357.568   | -2.275    | 95.247   | -2090.400 | 1.191     | -118.342 |
| 136   | 2090.278   | -1.187    | 117.129  | -524.837  | -0.496    | -139.959 |
| 137   | 331.536    | -215.522  | 149.072  | 2019.114  | 210.109   | -171.392 |
| 138   | -2241.501  | -424.252  | 192.992  | 5372.265  | 426.716   | -214.253 |
| 139   | -5564.106  | -596.969  | 229.350  | 9387.052  | 1769.608  | -249.718 |
| 140   | -9630.490  | -1977.063 | 266.431  | 14048.049 | 1962.103  | -274.442 |
| 141   | -14213.398 | -2122.301 | -223.383 | 10999.406 | -1922.762 | 194.219  |
| 142   | -11065.859 | 1862.179  | -191.685 | 8937.650  | -1242.497 | 175.683  |
| 143   | -9109.607  | 1071.225  | -159.231 | 6943.225  | -416.803  | 142.810  |
| 144   | -7119.502  | 226.130   | -130.231 | 4424.050  | -28.825   | 113.523  |
| 145   | -4629.389  | -198.739  | -92.460  | 2774.974  | 79.952    | 75.146   |
| 146   | -1272.940  | -88.082   | -73.975  | -64.861   | 95.159    | 56.676   |
| 147   | 64.873     | -95.245   | -56.717  | -1223.491 | 37.286    | 39.012   |
| 148   | 1223.370   | -37.184   | -40.133  | -2203.340 | -22.004   | 22.282   |
| 149   | 2203.231   | 22.038    | -23.637  | -3004.499 | -81.149   | 5.503    |
| 150   | 3004.261   | 80.981    | -5.486   | -3626.077 | -140.218  | -12.888  |
| 151   | 3626.134   | 140.287   | 11.694   | -4069.444 | -197.823  | -30.094  |
| 152   | 4069.463   | 197.890   | 29.031   | -4333.737 | -146.472  | -47.467  |
| 153   | 4333.809   | 146.426   | 47.426   | -4419.114 | -94.670   | -65.927  |
| 154   | 4419.206   | 94.724    | 65.997   | -4325.749 | -42.678   | -84.368  |
| 155   | 4325.852   | 42.725    | 82.668   | -4053.760 | 9.622     | -100.940 |
| 156   | 4053.757   | -9.543    | 99.989   | -3602.909 | 62.191    | -118.254 |
| 157   | 3602.960   | -62.232   | 119.265  | -2973.260 | 115.014   | -137.500 |
| 158   | 2973.152   | -114.998  | 136.427  | -2164.355 | 167.972   | -154.440 |
| 159   | 2164.286   | -167.917  | 153.369  | -1176.758 | 220.859   | -171.289 |
| 160   | 1176.648   | -220.917  | 169.966  | -9.966    | 602.533   | 182.861  |

COMBINACION 35 1.35 (G1+G2)+1.5 (SCMAX-EC1)+ MHIPER-PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|------------|-----------|----------|
| 1     | 8.519     | 729.801   | -1030.994 | -2343.173  | -895.590  | 112.801  |
| 2     | 2475.529  | 967.393   | -80.599   | -4630.093  | -817.346  | 53.957   |
| 3     | 4630.349  | 817.364   | -54.401   | -6480.308  | -687.756  | 55.830   |
| 4     | 6480.437  | 687.777   | -55.873   | -8022.463  | -563.015  | 103.271  |
| 5     | 8022.405  | 563.008   | -103.283  | -9254.893  | -434.025  | 74.435   |
| 6     | 9255.091  | 434.016   | -73.983   | -10186.406 | -310.151  | 25.731   |
| 7     | 10186.368 | 310.020   | -25.690   | -10803.682 | -186.215  | 71.975   |
| 8     | 10803.914 | 186.360   | -70.647   | -11119.539 | -42.973   | 23.844   |
| 9     | 11119.396 | 42.950    | -24.748   | -11130.896 | 89.162    | 44.935   |
| 10    | 11130.914 | -89.275   | -43.415   | -10842.796 | 135.842   | 20.874   |
| 11    | 10842.841 | -135.809  | -21.062   | -10246.326 | 179.995   | -6.019   |
| 12    | 10246.315 | -180.153  | 6.696     | -9353.678  | 254.688   | -34.164  |
| 13    | 9353.714  | -254.393  | 34.126    | -8166.027  | 294.129   | -6.320   |
| 14    | 8165.783  | -294.340  | 6.694     | -6677.729  | 330.105   | 23.814   |
| 15    | 6677.642  | -330.036  | -23.605   | -4911.474  | 281.803   | -103.171 |
| 16    | 4911.513  | -281.860  | 102.678   | -2975.465  | 342.098   | -125.788 |
| 17    | 2975.819  | -336.273  | 126.069   | -781.135   | 360.374   | -146.511 |
| 18    | 929.855   | -194.878  | 134.749   | 1234.449   | 334.367   | -153.148 |
| 19    | -1113.232 | -195.790  | 144.697   | 3129.108   | 645.935   | -351.679 |
| 20    | -3075.831 | -579.086  | 200.664   | 5221.579   | 1237.780  | -299.071 |
| 21    | -5182.238 | 1231.739  | -233.659  | 2542.802   | -501.544  | 194.103  |
| 22    | -2501.347 | 559.224   | -207.388  | 83.283     | -60.685   | 187.668  |
| 23    | 79.211    | 211.385   | -196.824  | -2492.548  | -175.714  | 174.322  |
| 24    | 2631.729  | 299.413   | -182.995  | -5138.609  | -343.188  | -235.803 |
| 25    | 5239.635  | 426.734   | 21.139    | -7537.622  | -297.197  | 9.821    |
| 26    | 7574.633  | 381.439   | -57.378   | -9536.044  | -311.750  | 93.517   |
| 27    | 9536.330  | 311.725   | -92.326   | -11028.311 | -223.669  | 94.235   |
| 28    | 11028.317 | 223.694   | -94.295   | -12046.878 | -108.515  | 55.957   |
| 29    | 12047.043 | 108.473   | -55.126   | -12586.845 | -11.951   | 67.884   |
| 30    | 12586.953 | 11.934    | -66.306   | -12791.747 | -44.864   | -49.539  |
| 31    | 12791.807 | 44.979    | 48.710    | -12655.553 | 40.686    | -47.552  |
| 32    | 12655.451 | -40.702   | 49.851    | -12050.048 | 132.202   | -37.047  |
| 33    | 12050.059 | -132.135  | 37.087    | -10968.021 | 220.440   | -21.675  |
| 34    | 10968.012 | -220.450  | 21.679    | -9412.291  | 314.442   | -73.098  |
| 35    | 9412.009  | -314.344  | 73.937    | -7385.344  | 383.714   | -86.525  |
| 36    | 7385.071  | -383.755  | 87.202    | -4914.770  | 381.208   | -167.356 |
| 37    | 4975.196  | -285.969  | 140.430   | -2376.972  | 335.302   | -165.973 |
| 38    | 2521.213  | -209.836  | 178.320   | 220.755    | 303.741   | -205.598 |
| 39    | -30.387   | -146.962  | 193.792   | 2759.781   | 659.962   | -211.005 |
| 40    | -2600.459 | -509.965  | 202.023   | 5336.994   | 1322.873  | -225.147 |
| 41    | -5221.663 | 1208.538  | -221.943  | 2670.292   | -463.522  | 202.777  |
| 42    | -2599.594 | 517.695   | -205.554  | 172.126    | -2.001    | 188.120  |
| 43    | 3.480     | 152.294   | -197.592  | -2421.629  | -95.960   | 172.681  |
| 44    | 2580.055  | 253.491   | -183.645  | -4960.504  | -301.822  | -193.955 |
| 45    | 5032.831  | 366.346   | 24.339    | -6920.936  | -306.296  | 6.486    |
| 46    | 7451.743  | 389.846   | -54.185   | -9425.843  | -319.014  | 90.637   |
| 47    | 9426.041  | 319.082   | -90.101   | -10930.933 | -230.661  | 92.014   |
| 48    | 10930.906 | 230.763   | -91.420   | -11962.002 | -115.099  | 52.699   |
| 49    | 11962.082 | 114.868   | -51.899   | -12571.912 | -72.088   | 28.999   |
| 50    | 12571.856 | 72.170    | -28.982   | -12787.852 | 1.293     | 1.451    |
| 51    | 12787.724 | -1.455    | 1.193     | -12589.585 | 30.870    | -65.610  |
| 52    | 12589.562 | -30.855   | 65.588    | -12000.381 | 125.433   | -36.170  |
| 53    | 12000.037 | -125.482  | 37.441    | -10935.311 | 214.109   | -23.621  |
| 54    | 10935.225 | -214.231  | 24.277    | -9394.553  | 306.148   | -89.956  |

COMBINACION 35 1.35 (G1+G2)+1.5 (SCMAX-EC1)+ MHIPER-PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| 55    | 9394.635  | -306.105  | 90.299   | -7382.233  | 377.610   | -87.676  |
| 56    | 7382.313  | -377.606  | 87.719   | -4917.538  | 383.614   | -167.915 |
| 57    | 5007.911  | -243.498  | 163.659  | -2505.177  | 292.776   | -189.315 |
| 58    | 2638.080  | -172.709  | 179.352  | 20.288     | 266.867   | -206.506 |
| 59    | 173.114   | -109.500  | 195.970  | 2470.751   | 622.547   | -213.303 |
| 60    | -2309.732 | -472.288  | 204.628  | 4960.455   | 1284.763  | -227.719 |
| 61    | -4843.971 | 1197.692  | -222.011 | 2298.074   | -452.627  | 202.847  |
| 62    | -2226.981 | 506.786   | -205.020 | -158.913   | 8.620     | 187.505  |
| 63    | 335.780   | 141.683   | -196.791 | -2729.619  | -84.909   | 171.876  |
| 64    | 2890.227  | 242.344   | -182.675 | -5178.404  | -292.844  | -195.280 |
| 65    | 5308.496  | 240.590   | -164.600 | -7120.701  | -297.173  | 5.426    |
| 66    | 7652.290  | 380.122   | -54.655  | -9605.449  | -309.265  | 91.032   |
| 67    | 9605.739  | 309.166   | -89.728  | -11089.359 | -220.776  | 91.639   |
| 68    | 11089.404 | 220.849   | -91.670  | -12100.430 | -133.765  | 58.465   |
| 69    | 12100.428 | 133.761   | -57.274  | -12725.240 | -59.734   | 29.874   |
| 70    | 12725.172 | 59.746    | -28.424  | -12913.465 | 13.597    | 0.659    |
| 71    | 12913.421 | -13.505   | 2.132    | -12665.053 | 85.212    | -29.721  |
| 72    | 12664.962 | -85.310   | 29.693   | -12052.306 | 132.155   | -52.180  |
| 73    | 12052.128 | -132.135  | 52.839   | -10966.811 | 223.116   | -23.785  |
| 74    | 10966.521 | -223.140  | 24.845   | -9405.902  | 315.004   | -90.496  |
| 75    | 9405.897  | -315.033  | 90.494   | -7373.656  | 386.520   | -87.920  |
| 76    | 7373.514  | -386.502  | 88.273   | -4880.383  | 395.615   | -168.710 |
| 77    | 4980.327  | -244.380  | 163.768  | -2476.258  | 293.525   | -189.311 |
| 78    | 2609.577  | -173.442  | 178.970  | 50.233     | 267.518   | -206.125 |
| 79    | 143.506   | -110.081  | 196.068  | 2501.832   | 623.076   | -213.444 |
| 80    | -2340.671 | -472.798  | 204.694  | 4992.707   | 1273.605  | -227.504 |
| 81    | -4876.052 | 1213.183  | -223.794 | 2320.833   | -456.111  | 204.381  |
| 82    | -2249.792 | 510.307   | -207.044 | -143.236   | 5.044     | 189.587  |
| 83    | 320.139   | 145.209   | -199.021 | -2722.123  | -88.633   | 174.059  |
| 84    | 2882.740  | 246.061   | -184.355 | -5171.954  | -124.276  | 156.357  |
| 85    | 5309.034  | 244.405   | -166.718 | -7111.909  | -300.852  | 7.021    |
| 86    | 7641.200  | 382.108   | -52.706  | -9598.607  | -311.284  | 89.721   |
| 87    | 9598.487  | 311.238   | -90.241  | -11086.649 | -222.847  | 92.325   |
| 88    | 11086.984 | 222.883   | -90.879  | -12108.793 | -134.483  | 56.695   |
| 89    | 12108.805 | 134.484   | -53.991  | -12734.970 | -60.331   | 26.580   |
| 90    | 12734.928 | 60.063    | -26.491  | -12923.946 | 13.308    | -0.659   |
| 91    | 12924.043 | -13.480   | 0.697    | -12675.641 | 85.157    | -28.398  |
| 92    | 12675.715 | -84.922   | 32.514   | -12069.918 | 130.300   | -54.495  |
| 93    | 12069.999 | -130.257  | 53.776   | -10989.191 | 221.141   | -23.567  |
| 94    | 10988.974 | -221.099  | 24.738   | -9432.920  | 312.891   | -90.785  |
| 95    | 9432.709  | -312.834  | 91.302   | -7404.541  | 384.370   | -89.135  |
| 96    | 7404.376  | -384.419  | 89.450   | -4907.026  | 447.625   | -9.721   |
| 97    | 5000.570  | -240.482  | 164.135  | -2504.731  | 289.752   | -189.726 |
| 98    | 2638.064  | -169.647  | 180.100  | 13.234     | 263.963   | -207.306 |
| 99    | 180.732   | -106.575  | 195.846  | 2436.509   | 601.252   | -213.135 |
| 100   | -2275.432 | -450.991  | 204.975  | 4856.332   | 1233.269  | -227.798 |
| 101   | -4739.725 | 1173.078  | -221.986 | 2254.117   | -434.498  | 202.585  |
| 102   | -2183.155 | 488.670   | -205.890 | -181.664   | 8.386     | 188.435  |
| 103   | 358.616   | 141.876   | -197.463 | -2752.935  | -85.195   | 172.520  |
| 104   | 2913.468  | 242.591   | -183.231 | -5195.040  | -120.719  | 155.219  |
| 105   | 5332.219  | 240.803   | -165.153 | -7118.589  | -295.133  | 5.519    |
| 106   | 7639.082  | 370.421   | -52.744  | -9570.481  | -299.622  | 89.296   |
| 107   | 9570.613  | 299.526   | -88.711  | -11031.998 | -211.185  | 90.639   |
| 108   | 11032.115 | 211.244   | -89.900  | -12019.765 | -95.676   | 51.577   |
| 109   | 12019.709 | 95.669    | -51.622  | -12601.119 | -45.578   | 29.308   |

COMBINACION 35 1.35 (G1+G2)+1.5 (SCMAX-EC1)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|------------|-----------|----------|
| ===== |           |           |          |            |           |          |
| 110   | 12601.181 | 45.454    | -26.507  | -12757.238 | 27.953    | -0.937   |
| 111   | 12757.475 | -27.901   | 0.991    | -12514.684 | 50.144    | -66.459  |
| 112   | 12514.670 | -50.194   | 67.863   | -11882.117 | 142.494   | -53.683  |
| 113   | 11882.121 | -142.445  | 53.694   | -10774.264 | 233.517   | -24.049  |
| 114   | 10774.021 | -233.648  | 25.108   | -9190.562  | 325.609   | -91.220  |
| 115   | 9190.421  | -325.540  | 91.654   | -7134.729  | 397.149   | -89.483  |
| 116   | 7134.510  | -397.139  | 89.646   | -4609.507  | 460.234   | -9.703   |
| 117   | 4666.429  | -376.690  | -41.876  | -2109.017  | 303.819   | -188.958 |
| 118   | 2244.197  | -183.644  | 179.263  | 438.044    | 277.317   | -206.564 |
| 119   | -242.252  | -119.780  | 196.303  | 2928.253   | 1243.337  | -213.564 |
| 120   | -2765.745 | -1093.045 | 203.765  | 5420.865   | 1283.571  | -226.618 |
| 121   | -5303.925 | 1259.432  | -220.604 | 2644.653   | -502.045  | 201.171  |
| 122   | -2573.376 | 556.170   | -204.441 | 75.933     | -40.954   | 187.001  |
| 123   | 102.189   | 190.981   | -196.167 | -2607.505  | -134.484  | 171.296  |
| 124   | 2769.779  | 291.306   | -182.527 | -5160.785  | -169.407  | 154.504  |
| 125   | 5298.602  | 294.824   | -142.267 | -7182.054  | -333.047  | -0.938   |
| 126   | 7668.251  | 387.832   | -50.779  | -9641.154  | -317.256  | 87.899   |
| 127   | 9641.129  | 317.288   | -88.017  | -11144.084 | -231.758  | 74.768   |
| 128   | 11144.288 | 231.730   | -73.201  | -12175.621 | -113.814  | 49.706   |
| 129   | 12175.567 | 113.806   | -49.705  | -12729.603 | -17.476   | 63.585   |
| 130   | 12729.680 | 17.406    | -62.869  | -12890.961 | -50.197   | -54.079  |
| 131   | 12890.990 | 50.232    | 55.841   | -12768.744 | 32.758    | -70.909  |
| 132   | 12768.658 | -32.738   | 70.732   | -12174.342 | 126.750   | -40.774  |
| 133   | 12174.064 | -126.829  | 41.519   | -11103.668 | 215.053   | -27.299  |
| 134   | 11103.504 | -215.047  | 27.984   | -9557.719  | 306.571   | -93.653  |
| 135   | 9557.663  | -306.596  | 94.113   | -7540.418  | 377.890   | -92.221  |
| 136   | 7540.056  | -377.853  | 92.912   | -5053.885  | 441.051   | -13.245  |
| 137   | 5129.379  | -356.784  | -38.190  | -2417.856  | 291.470   | -191.559 |
| 138   | 2579.438  | -135.847  | 179.460  | -3.613     | 231.432   | -206.713 |
| 139   | 142.922   | -107.655  | 198.597  | 2419.999   | 1118.161  | -447.094 |
| 140   | -2325.039 | -1037.223 | 257.621  | 4651.681   | 1242.623  | -375.937 |
| 141   | -4586.740 | 1228.706  | -187.344 | 3089.806   | -1081.491 | 151.348  |
| 142   | -3063.783 | 1105.134  | -202.396 | 2301.422   | -563.484  | 139.999  |
| 143   | -2176.625 | 687.930   | -148.145 | 785.139    | 18.905    | 128.202  |
| 144   | -656.837  | 119.549   | -136.281 | -1769.262  | 164.123   | 113.503  |
| 145   | 1918.509  | 1.383     | -125.185 | -4122.435  | -66.949   | 104.370  |
| 146   | 5648.236  | 72.738    | -102.865 | -7265.724  | -48.541   | 84.480   |
| 147   | 7265.825  | 48.722    | -84.508  | -8598.749  | -52.499   | 63.224   |
| 148   | 8598.655  | 52.607    | -62.187  | -9651.594  | -24.592   | 38.134   |
| 149   | 9651.426  | 24.550    | -36.965  | -10430.729 | -28.851   | 15.188   |
| 150   | 10430.521 | 28.774    | -15.125  | -10923.869 | -32.812   | -6.909   |
| 151   | 10923.965 | 32.711    | 8.146    | -11129.593 | -39.133   | -30.286  |
| 152   | 11129.572 | 39.124    | 31.290   | -11050.055 | 100.012   | -55.634  |
| 153   | 11050.119 | -99.878   | 55.620   | -10692.488 | 170.864   | -74.945  |
| 154   | 10692.600 | -171.115  | 74.921   | -10033.947 | 279.302   | -97.104  |
| 155   | 10033.998 | -279.388  | 98.878   | -9124.285  | 381.644   | -65.737  |
| 156   | 9124.106  | -381.563  | 65.875   | -7921.630  | 506.678   | -39.717  |
| 157   | 7921.786  | -506.746  | 39.806   | -6410.043  | 634.466   | -18.735  |
| 158   | 6409.755  | -634.425  | 18.382   | -4586.331  | 778.223   | -45.655  |
| 159   | 4586.062  | -778.152  | 45.031   | -2455.589  | 906.137   | -24.080  |
| 160   | 2455.231  | -906.166  | 23.012   | -10.070    | 725.755   | -964.078 |



COMBINACION 36 1.35 (G1+G2)+1.5 (SCMIN-EC1)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | 8.455     | 519.427   | -187.873 | -1443.342 | -417.181  | 170.256  |
| 2     | 1388.736  | 388.556   | -169.826 | -2590.069 | -329.381  | 152.097  |
| 3     | 2590.117  | 329.397   | -152.880 | -3612.826 | -270.264  | 134.999  |
| 4     | 3612.822  | 270.320   | -135.416 | -4456.457 | -211.416  | 117.342  |
| 5     | 4456.383  | 211.409   | -117.365 | -5121.142 | -152.754  | 99.311   |
| 6     | 5121.207  | 152.713   | -99.570  | -5607.057 | -94.308   | 81.402   |
| 7     | 5607.008  | 94.186    | -81.352  | -5914.022 | -36.078   | 63.094   |
| 8     | 5914.102  | 36.310    | -63.251  | -6042.121 | 21.490    | 44.892   |
| 9     | 6042.038  | -21.468   | -44.922  | -5991.484 | 78.941    | 26.615   |
| 10    | 5991.457  | -78.975   | -26.885  | -5761.709 | 69.967    | 8.557    |
| 11    | 5761.723  | -69.977   | -8.570   | -5353.318 | 56.909    | -9.709   |
| 12    | 5353.337  | -57.079   | 9.500    | -4765.791 | 41.259    | -27.685  |
| 13    | 4765.830  | -40.966   | 27.614   | -3999.743 | 21.876    | -45.677  |
| 14    | 3999.571  | -22.016   | 45.281   | -3054.326 | -0.406    | -63.159  |
| 15    | 3054.351  | 0.445     | 62.803   | -1930.231 | -25.682   | -80.422  |
| 16    | 1930.285  | 25.639    | 80.790   | -627.355  | -52.007   | -98.152  |
| 17    | 627.181   | 51.564    | 96.959   | 855.510   | -80.366   | -113.934 |
| 18    | -866.479  | 68.090    | 114.419  | 2549.961  | 37.329    | -130.864 |
| 19    | -2558.979 | -47.591   | 130.987  | 4446.990  | 615.237   | -146.908 |
| 20    | -4454.399 | -624.455  | 146.745  | 6659.262  | 1219.121  | -162.450 |
| 21    | -6664.526 | 1351.170  | -224.226 | 3673.593  | -655.624  | 204.575  |
| 22    | -3678.510 | 651.625   | -204.524 | 1109.760  | -132.710  | 184.340  |
| 23    | -1121.692 | 121.508   | -184.311 | -1131.264 | -115.996  | 163.381  |
| 24    | 1120.972  | 106.837   | -163.282 | -3036.544 | -72.348   | 141.790  |
| 25    | 3022.585  | 60.847    | -141.612 | -4580.483 | -22.185   | 119.626  |
| 26    | 4487.438  | 10.534    | -116.204 | -5680.258 | -1.976    | 93.792   |
| 27    | 5680.325  | 1.950     | -93.567  | -6593.647 | 6.118     | 70.818   |
| 28    | 6593.677  | -6.102    | -70.873  | -7227.467 | 14.087    | 47.886   |
| 29    | 7227.593  | -14.140   | -47.758  | -7581.748 | 21.943    | 24.646   |
| 30    | 7581.845  | -21.951   | -24.451  | -7656.502 | 28.993    | 1.241    |
| 31    | 7656.586  | -28.889   | -1.302   | -7451.834 | 34.328    | -21.928  |
| 32    | 7451.800  | -34.300   | 21.995   | -6967.524 | 37.282    | -45.166  |
| 33    | 6967.505  | -37.284   | 45.198   | -6203.720 | 36.920    | -68.234  |
| 34    | 6203.691  | -37.015   | 68.205   | -5160.304 | 32.743    | -91.046  |
| 35    | 5160.224  | -32.650   | 90.725   | -3837.394 | 24.459    | -113.226 |
| 36    | 3837.343  | -24.533   | 112.884  | -2234.947 | 13.556    | -134.921 |
| 37    | 2230.550  | -21.087   | 135.325  | -331.616  | 5.803     | -156.881 |
| 38    | 321.863   | -14.567   | 156.344  | 1876.535  | 7.734     | -177.107 |
| 39    | -1890.609 | -19.352   | 177.215  | 4405.699  | 574.861   | -197.181 |
| 40    | -4417.632 | -585.992  | 197.094  | 7259.620  | 1330.098  | -216.610 |
| 41    | -7269.090 | 1370.054  | -221.253 | 4342.734  | -618.799  | 201.747  |
| 42    | -4347.891 | 614.781   | -201.789 | 1736.600  | -57.589   | 181.685  |
| 43    | -1749.534 | 46.432    | -181.818 | -546.040  | -54.251   | 160.884  |
| 44    | 534.346   | 42.596    | -160.902 | -2486.943 | -22.136   | 139.353  |
| 45    | 2476.928  | 13.206    | -139.194 | -3653.233 | -44.051   | 117.102  |
| 46    | 4035.025  | 32.537    | -113.976 | -5270.974 | -22.803   | 91.542   |
| 47    | 5271.084  | 22.845    | -91.603  | -6227.571 | -14.373   | 68.892   |
| 48    | 6227.504  | 14.441    | -68.853  | -6904.597 | -6.012    | 45.888   |
| 49    | 6904.602  | 5.827     | -45.863  | -7301.956 | 2.411     | 22.777   |
| 50    | 7301.980  | -2.227    | -22.748  | -7420.041 | 9.640     | -0.482   |
| 51    | 7419.899  | -9.738    | 0.441    | -7258.312 | 15.462    | -23.676  |
| 52    | 7258.305  | -15.389   | 23.630   | -6817.305 | 18.502    | -46.798  |
| 53    | 6817.098  | -18.530   | 46.647   | -6096.531 | 18.160    | -69.719  |
| 54    | 6096.556  | -18.280   | 69.631   | -5096.136 | 13.925    | -92.453  |

COMBINACION 36 1.35 (G1+G2)+1.5 (SCMIN-EC1)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 55    | 5096.279  | -13.876   | 92.291   | -3816.439 | 5.503     | -114.720 |
| 56    | 3816.519  | -5.468    | 114.742  | -2257.269 | -5.673    | -136.798 |
| 57    | 2250.435  | -4.665    | 136.560  | -388.363  | -10.628   | -158.129 |
| 58    | 378.485   | 1.753     | 158.330  | 1783.380  | -8.283    | -179.093 |
| 59    | -1797.790 | -3.419    | 179.347  | 4276.400  | 559.064   | -199.301 |
| 60    | -4288.459 | -570.193  | 199.301  | 7093.854  | 1313.900  | -218.820 |
| 61    | -7102.493 | 1364.897  | -220.439 | 4187.227  | -614.117  | 200.926  |
| 62    | -4192.346 | 610.099   | -200.923 | 1592.702  | -52.661   | 180.814  |
| 63    | -1605.725 | 41.547    | -180.910 | -678.236  | -48.924   | 159.990  |
| 64    | 666.362   | 37.227    | -159.957 | -2607.305 | -16.553   | 138.405  |
| 65    | 2597.156  | 7.639     | -138.235 | -3761.857 | -38.434   | 116.155  |
| 66    | 4143.494  | 27.050    | -114.331 | -5368.041 | -17.328   | 91.935   |
| 67    | 5368.087  | 17.257    | -91.859  | -6313.094 | -8.895    | 69.163   |
| 68    | 6313.131  | 8.986     | -69.180  | -6978.604 | -0.644    | 46.222   |
| 69    | 6978.555  | 0.565     | -46.159  | -7364.559 | 7.514     | 23.023   |
| 70    | 7364.510  | -7.479    | -23.060  | -7471.049 | 14.791    | -0.219   |
| 71    | 7470.966  | -14.738   | 0.180    | -7298.061 | 20.393    | -23.463  |
| 72    | 7297.989  | -20.408   | 23.427   | -6845.486 | 23.489    | -46.613  |
| 73    | 6845.366  | -23.458   | 46.491   | -6113.296 | 23.132    | -69.589  |
| 74    | 6113.205  | -23.197   | 69.319   | -5101.568 | 18.873    | -92.166  |
| 75    | 5101.539  | -18.926   | 92.268   | -3810.318 | 10.563    | -114.751 |
| 76    | 3810.342  | -10.536   | 114.437  | -2239.539 | -0.496    | -136.528 |
| 77    | 2232.114  | -10.675   | 136.384  | -356.688  | -4.714    | -157.939 |
| 78    | 346.844   | -4.226    | 158.295  | 1828.124  | -2.398    | -179.074 |
| 79    | -1842.559 | -9.243    | 179.378  | 4334.457  | 564.837   | -199.343 |
| 80    | -4346.539 | -575.963  | 199.285  | 7165.151  | 1319.808  | -218.802 |
| 81    | -7173.636 | 1368.398  | -222.208 | 4250.559  | -617.449  | 202.697  |
| 82    | -4255.745 | 613.456   | -202.702 | 1648.327  | -56.068   | 182.593  |
| 83    | -1661.387 | 44.927    | -182.666 | -630.405  | -52.488   | 161.756  |
| 84    | 618.632   | 40.826    | -161.898 | -2567.453 | -20.218   | 140.332  |
| 85    | 2557.301  | 11.315    | -140.060 | -3729.951 | -42.068   | 117.997  |
| 86    | 4111.908  | 30.917    | -113.532 | -5344.974 | -21.217   | 91.172   |
| 87    | 5344.918  | 21.139    | -91.151  | -6298.369 | -12.736   | 68.424   |
| 88    | 6298.497  | 12.758    | -68.339  | -6972.351 | -4.385    | 45.406   |
| 89    | 6972.368  | 4.484     | -45.359  | -7366.905 | 3.651     | 22.226   |
| 90    | 7366.832  | -3.798    | -22.177  | -7481.663 | 11.114    | -1.018   |
| 91    | 7481.803  | -11.131   | 1.046    | -7316.950 | 16.783    | -24.279  |
| 92    | 7316.967  | -16.691   | 24.152   | -6872.799 | 19.779    | -47.385  |
| 93    | 6872.804  | -19.797   | 47.459   | -6149.108 | 19.400    | -70.437  |
| 94    | 6149.027  | -19.365   | 70.285   | -5145.834 | 14.968    | -93.032  |
| 95    | 5145.716  | -14.957   | 92.880   | -3862.979 | 6.644     | -115.384 |
| 96    | 3862.899  | -6.698    | 115.242  | -2300.656 | -4.406    | -137.307 |
| 97    | 2292.968  | -7.027    | 137.386  | -425.441  | -8.253    | -158.936 |
| 98    | 415.501   | -0.636    | 158.857  | 1751.285  | -5.768    | -179.646 |
| 99    | -1765.641 | -5.907    | 179.766  | 4228.960  | 543.166   | -199.723 |
| 100   | -4241.096 | -554.301  | 199.711  | 6989.958  | 1279.646  | -219.227 |
| 101   | -6998.461 | 1323.065  | -220.720 | 4156.759  | -590.610  | 201.209  |
| 102   | -4162.022 | 586.608   | -201.193 | 1594.585  | -47.499   | 181.084  |
| 103   | -1607.570 | 36.353    | -181.293 | -664.779  | -43.810   | 160.374  |
| 104   | 652.962   | 32.143    | -160.378 | -2582.321 | -11.470   | 138.816  |
| 105   | 2572.210  | 2.563     | -138.653 | -3725.307 | -33.353   | 116.581  |
| 106   | 4108.449  | 22.999    | -113.413 | -5323.759 | -13.306   | 91.033   |
| 107   | 5323.813  | 13.221    | -90.981  | -6259.429 | -4.898    | 68.283   |
| 108   | 6259.506  | 5.008     | -68.239  | -6915.760 | 3.357     | 45.270   |
| 109   | 6915.751  | -3.334    | -45.309  | -7292.555 | 11.505    | 22.154   |

COMBINACION 36 1.35(G1+G2)+1.5(SCMIN-EC1)+ MHIPER-PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 110   | 7292.573  | -11.696   | -22.089  | -7389.511 | 19.077    | -1.069   |
| 111   | 7389.682  | -18.998   | 1.098    | -7207.206 | 24.748    | -24.322  |
| 112   | 7207.212  | -24.682   | 24.224   | -6745.325 | 27.858    | -47.374  |
| 113   | 6745.353  | -27.801   | 47.367   | -6004.017 | 27.532    | -70.367  |
| 114   | 6003.905  | -27.615   | 70.129   | -4983.062 | 23.325    | -92.928  |
| 115   | 4983.023  | -23.275   | 92.717   | -3682.639 | 15.011    | -115.207 |
| 116   | 3682.562  | -14.996   | 114.979  | -2102.683 | 3.833     | -137.075 |
| 117   | 2094.769  | -15.347   | 137.320  | -209.462  | -0.210    | -158.867 |
| 118   | 199.361   | -8.736    | 158.747  | 1985.433  | 1.717     | -179.522 |
| 119   | -2000.049 | -13.375   | 179.724  | 4501.893  | 1178.981  | -199.683 |
| 120   | -4513.929 | -1190.116 | 199.742  | 7342.675  | 1324.239  | -219.260 |
| 121   | -7351.206 | 1387.460  | -219.170 | 4385.162  | -636.231  | 199.657  |
| 122   | -4390.445 | 632.224   | -199.638 | 1740.051  | -75.045   | 179.548  |
| 123   | -1753.139 | 63.919    | -179.831 | -581.596  | -71.613   | 158.912  |
| 124   | 569.583   | 60.024    | -158.777 | -2561.528 | -39.359   | 137.236  |
| 125   | 2551.335  | 30.458    | -137.204 | -3771.546 | -60.520   | 115.078  |
| 126   | 4154.456  | 53.065    | -111.993 | -5438.849 | -43.323   | 89.620   |
| 127   | 5438.849  | 43.294    | -89.613  | -6443.700 | -35.006   | 66.881   |
| 128   | 6443.732  | 34.984    | -66.706  | -7169.224 | -26.723   | 43.740   |
| 129   | 7169.190  | 26.717    | -43.732  | -7615.028 | -18.776   | 20.616   |
| 130   | 7615.036  | 18.763    | -20.559  | -7781.341 | -11.773   | -2.644   |
| 131   | 7781.390  | 11.832    | 2.872    | -7668.163 | -6.514    | -26.144  |
| 132   | 7668.086  | 6.557     | 26.090   | -7275.505 | -3.963    | -49.256  |
| 133   | 7275.336  | 3.890     | 49.325   | -6603.088 | -4.724    | -72.409  |
| 134   | 6603.039  | 4.722     | 72.452   | -5651.172 | -9.462    | -95.247  |
| 135   | 5651.190  | 9.464     | 95.246   | -4419.806 | -18.046   | -117.778 |
| 136   | 4419.688  | 18.070    | 117.752  | -2908.823 | -29.127   | -139.814 |
| 137   | 2898.378  | 17.456    | 140.093  | -1081.715 | -32.245   | -161.644 |
| 138   | 1069.749  | 20.724    | 161.813  | 1052.129  | -25.762   | -182.600 |
| 139   | -1062.501 | 16.630    | 182.987  | 3495.713  | 1148.509  | -202.944 |
| 140   | -3508.898 | -1159.694 | 203.237  | 6075.904  | 1293.828  | -222.765 |
| 141   | -6084.595 | 1264.927  | -165.008 | 4453.689  | -1154.203 | 149.400  |
| 142   | -4457.208 | 1150.942  | -149.261 | 3609.389  | -531.257  | 133.245  |
| 143   | -3618.730 | 522.037   | -133.087 | 2440.671  | 132.389   | 116.481  |
| 144   | -2450.061 | -142.697  | -116.859 | 418.825   | 340.000   | 99.791   |
| 145   | -429.864  | -352.182  | -99.605  | -1148.420 | 233.386   | 82.157   |
| 146   | 2663.472  | -233.885  | -80.938  | -3738.795 | 240.941   | 63.472   |
| 147   | 3738.841  | -240.916  | -63.502  | -4635.249 | 182.957   | 45.662   |
| 148   | 4635.141  | -182.843  | -45.801  | -5353.021 | 123.674   | 27.680   |
| 149   | 5352.889  | -123.679  | -27.966  | -5891.866 | 64.553    | 9.709    |
| 150   | 5891.643  | -64.666   | -9.683   | -6251.331 | 5.414     | -8.807   |
| 151   | 6251.394  | -5.427    | 8.486    | -6432.304 | -52.087   | -27.095  |
| 152   | 6432.306  | 52.121    | 26.731   | -6434.170 | -0.703    | -45.254  |
| 153   | 6434.244  | 0.734     | 45.219   | -6257.337 | 51.025    | -63.712  |
| 154   | 6257.432  | -51.093   | 63.754   | -5901.468 | 103.167   | -82.252  |
| 155   | 5901.563  | -103.169  | 81.515   | -5366.893 | 155.525   | -99.961  |
| 156   | 5366.867  | -155.440  | 99.438   | -4653.354 | 208.087   | -117.718 |
| 157   | 4653.377  | -208.144  | 118.379  | -3761.092 | 260.927   | -136.605 |
| 158   | 3760.983  | -260.894  | 135.795  | -2689.529 | 313.868   | -153.868 |
| 159   | 2689.450  | -313.806  | 152.954  | -1439.385 | 366.743   | -170.902 |
| 160   | 1439.266  | -366.790  | 169.666  | -10.001   | 454.865   | -187.423 |

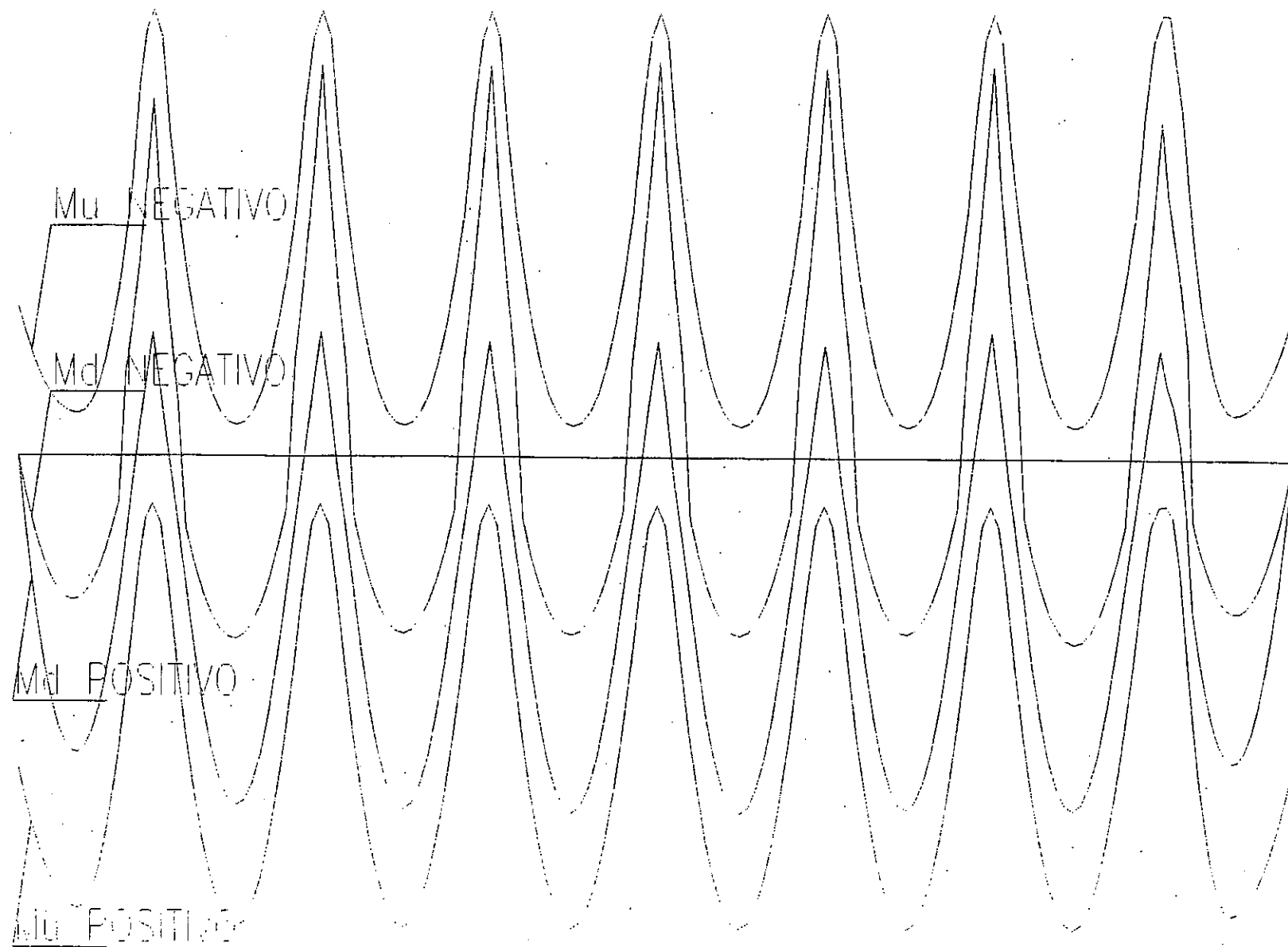


RESPUESTA SECCIONAL A FLEXION (mT)

| Isec | Sx(is) | Mu,pos   | Mu,neg    | Mcr,pos  | Mcr,neg   | Mdec,pos | Mdec,neg  | Isec | Sx(is) | Mu,pos   | Mu,neg    | Mcr,pos  | Mcr,neg   | Mdec,pos | Mdec,neg  |
|------|--------|----------|-----------|----------|-----------|----------|-----------|------|--------|----------|-----------|----------|-----------|----------|-----------|
| 1    | 0.00   | 13071.29 | -6253.46  | 8468.13  | -4390.63  | 6691.68  | -1591.35  | 61   | 126.00 | 2003.32  | -18717.91 | 1720.80  | -13894.20 | -591.63  | -10888.82 |
| 2    | 1.80   | 14265.75 | -5280.66  | 9366.30  | -3766.40  | 7581.47  | -964.03   | 62   | 128.25 | 2847.76  | -17627.91 | 2426.49  | -12866.20 | 117.11   | -9873.02  |
| 3    | 3.60   | 15343.66 | -4386.92  | 10058.70 | -3157.65  | 8265.26  | -351.04   | 63   | 130.50 | 5594.38  | -13375.37 | 4253.77  | -9924.94  | 2506.89  | -7103.86  |
| 4    | 5.40   | 16284.81 | -3639.08  | 10678.49 | -2626.80  | 8876.88  | 184.56    | 64   | 132.75 | 8785.57  | -10305.79 | 6465.80  | -7616.59  | 4712.11  | -4814.02  |
| 5    | 7.20   | 17086.85 | -3033.22  | 11220.72 | -2173.38  | 9411.65  | 642.77    | 65   | 135.00 | 11630.46 | -7717.54  | 8363.20  | -5657.40  | 6596.61  | -2859.76  |
| 6    | 9.00   | 17747.57 | -2560.08  | 11680.49 | -1797.87  | 9864.93  | 1022.75   | 66   | 137.25 | 13977.20 | -5550.23  | 9264.86  | -3950.98  | 7482.29  | -1149.55  |
| 7    | 10.80  | 18256.34 | -2213.25  | 12047.18 | -1506.41  | 10226.44 | 1317.97   | 67   | 139.50 | 16015.59 | -3867.21  | 10568.87 | -2783.67  | 8769.74  | 26.18     |
| 8    | 12.60  | 18630.57 | -1968.94  | 12328.97 | -1289.92  | 10504.31 | 1537.38   | 68   | 141.75 | 17622.22 | -2650.63  | 11605.98 | -1868.76  | 9791.69  | 950.98    |
| 9    | 14.40  | 18860.46 | -1824.72  | 12516.76 | -1154.78  | 10689.66 | 1674.38   | 69   | 144.00 | 18769.95 | -1870.11  | 12370.11 | -1215.61  | 10543.88 | 1612.87   |
| 10   | 16.20  | 18936.87 | -1780.89  | 12602.30 | -1107.30  | 10774.41 | 1722.47   | 70   | 146.25 | 19471.46 | -1436.14  | 12867.47 | -812.74   | 11033.53 | 2021.75   |
| 11   | 18.00  | 18763.24 | -1904.01  | 12561.15 | -1199.33  | 10735.22 | 1628.93   | 71   | 148.50 | 19704.30 | -1304.23  | 13082.48 | -671.18   | 11245.96 | 2165.37   |
| 12   | 19.80  | 18222.41 | -2282.77  | 12295.23 | -1505.97  | 10475.14 | 1317.92   | 72   | 150.75 | 19485.94 | -1445.12  | 13022.92 | -784.25   | 11188.99 | 2050.24   |
| 13   | 21.60  | 17298.68 | -2965.83  | 11787.02 | -2046.03  | 9976.38  | 771.19    | 73   | 153.00 | 18799.73 | -1893.16  | 12671.96 | -1169.44  | 10845.73 | 1659.05   |
| 14   | 23.40  | 16013.82 | -3982.98  | 11042.42 | -2819.99  | 9243.84  | -10.47    | 74   | 155.25 | 17667.38 | -2695.69  | 12036.92 | -1826.90  | 10222.63 | 992.83    |
| 15   | 25.20  | 14358.08 | -5368.45  | 10041.68 | -3852.28  | 8256.85  | -1049.91  | 75   | 157.50 | 16077.88 | -3934.85  | 11098.12 | -2782.09  | 9298.99  | 27.76     |
| 16   | 27.00  | 12359.15 | -7065.42  | 8788.42  | -5147.01  | 7017.47  | -2348.99  | 76   | 159.75 | 14060.35 | -5615.94  | 9859.73  | -4042.37  | 8077.16  | -1240.95  |
| 17   | 28.80  | 10022.36 | -9150.90  | 7269.21  | -6723.41  | 5510.65  | -324.28   | 77   | 162.00 | 11620.72 | -7710.49  | 8305.70  | -5632.47  | 6539.11  | -2834.83  |
| 18   | 30.60  | 7376.78  | -11637.27 | 5497.98  | -8615.49  | 3748.33  | -5806.53  | 78   | 164.25 | 8780.83  | -10302.05 | 6446.54  | -7596.92  | 4692.85  | -4794.35  |
| 19   | 32.40  | 4506.37  | -15721.24 | 3654.50  | -11446.69 | 1348.38  | -8472.45  | 79   | 166.50 | 5588.48  | -14524.76 | 4418.10  | -10571.10 | 2112.57  | -7606.87  |
| 20   | 34.20  | 2583.82  | -17958.61 | 2215.13  | -13162.08 | -95.09   | -10165.30 | 80   | 168.75 | 2841.88  | -17623.48 | 2425.99  | -12824.12 | 116.61   | -9830.94  |
| 21   | 36.00  | 2012.11  | -18726.17 | 1716.12  | -13980.40 | -596.32  | -10975.03 | 81   | 171.00 | 2003.69  | -18718.25 | 1720.61  | -13897.77 | -591.83  | -10892.40 |
| 22   | 38.25  | 2858.07  | -17635.48 | 2427.35  | -12938.46 | 117.97   | -9945.28  | 82   | 173.25 | 2848.16  | -17628.21 | 2426.53  | -12869.00 | 117.14   | -9875.82  |
| 23   | 40.50  | 5603.11  | -13382.31 | 4271.09  | -9974.04  | 2524.22  | -7152.96  | 83   | 175.50 | 5594.48  | -13375.45 | 4253.97  | -9925.52  | 2507.09  | -7104.43  |
| 24   | 42.75  | 8794.93  | -10312.71 | 6504.09  | -7655.71  | 4750.40  | -4853.15  | 84   | 177.75 | 8785.51  | -10305.73 | 6465.50  | -7616.28  | 4711.81  | -4813.72  |
| 25   | 45.00  | 11641.94 | -7725.45  | 8431.68  | -5687.09  | 6665.09  | -2889.45  | 85   | 180.00 | 11630.28 | -7717.41  | 8362.12  | -5656.93  | 6595.53  | -2859.29  |
| 26   | 47.25  | 13981.57 | -5554.73  | 9295.36  | -3955.66  | 7512.79  | -1154.24  | 86   | 182.25 | 13976.97 | -5550.00  | 9263.27  | -3950.73  | 7480.70  | -1149.31  |
| 27   | 49.50  | 16018.35 | -3870.41  | 10591.83 | -2783.60  | 8792.70  | 26.25     | 87   | 184.50 | 16015.37 | -3866.95  | 10567.01 | -2783.68  | 8767.88  | 26.17     |
| 28   | 51.75  | 17625.05 | -2653.57  | 11632.53 | -1866.18  | 9818.24  | 953.55    | 88   | 186.75 | 17622.01 | -2650.43  | 11604.10 | -1868.94  | 9789.81  | 950.79    |
| 29   | 54.00  | 18772.66 | -1872.33  | 12397.72 | -1211.39  | 10571.50 | 1617.10   | 89   | 189.00 | 18769.81 | -1870.00  | 12368.61 | -1215.84  | 10542.39 | 1612.64   |
| 30   | 56.25  | 19473.92 | -1437.76  | 12893.84 | -807.91   | 11059.90 | 2026.58   | 90   | 191.25 | 19471.38 | -1436.10  | 12866.69 | -812.88   | 11032.75 | 2021.61   |
| 31   | 58.50  | 19706.44 | -1305.36  | 13105.83 | -666.68   | 11269.31 | 2169.87   | 91   | 193.50 | 19704.30 | -1304.23  | 13082.48 | -671.18   | 11245.96 | 2165.37   |
| 32   | 60.75  | 19487.71 | -1446.14  | 13041.95 | -780.77   | 11208.01 | 2053.72   | 92   | 195.75 | 19486.04 | -1445.17  | 13023.81 | -784.09   | 11189.87 | 2050.40   |
| 33   | 63.00  | 18801.08 | -1894.17  | 12686.03 | -1167.29  | 10859.81 | 1661.20   | 93   | 198.00 | 18799.87 | -1893.27  | 12673.45 | -1169.21  | 10847.23 | 1659.27   |
| 34   | 65.25  | 17668.32 | -2696.57  | 12046.04 | -1826.02  | 10231.75 | 993.71    | 94   | 200.25 | 17667.57 | -2695.86  | 12038.80 | -1826.72  | 10224.52 | 993.01    |
| 35   | 67.50  | 16078.45 | -3935.40  | 11103.00 | -2782.08  | 9303.87  | 27.77     | 95   | 202.50 | 16078.12 | -3935.08  | 11100.16 | -2782.08  | 9301.03  | 27.76     |
| 36   | 69.75  | 14060.59 | -5616.09  | 9861.55  | -4042.65  | 8078.98  | -1241.23  | 96   | 204.75 | 14060.58 | -5616.08  | 9861.47  | -4042.64  | 8078.90  | -1241.22  |
| 37   | 72.00  | 11620.74 | -7710.50  | 8305.82  | -5632.52  | 6539.23  | -2834.88  | 97   | 207.00 | 11620.89 | -7710.62  | 8306.72  | -5632.91  | 6540.13  | -2835.28  |
| 38   | 74.25  | 8780.79  | -10302.01 | 6446.37  | -7596.74  | 4692.68  | -4794.18  | 98   | 209.25 | 8780.91  | -10302.11 | 6446.84  | -7597.22  | 4693.15  | -4794.65  |
| 39   | 76.50  | 5588.66  | -14524.90 | 4418.38  | -10572.13 | 2112.86  | -7607.89  | 99   | 211.50 | 5588.31  | -14524.63 | 4417.83  | -10570.14 | 2112.31  | -7605.91  |
| 40   | 78.75  | 2842.43  | -17623.90 | 2426.04  | -12828.06 | 116.66   | -9834.88  | 100  | 213.75 | 2841.50  | -17623.21 | 2425.96  | -12821.50 | 116.58   | -9828.32  |
| 41   | 81.00  | 2004.37  | -18718.89 | 1720.25  | -13904.36 | -592.19  | -10898.99 | 101  | 216.00 | 2003.31  | -18717.90 | 1720.81  | -13894.10 | -591.63  | -10888.73 |
| 42   | 83.25  | 2848.92  | -17628.79 | 2426.59  | -12874.51 | 117.21   | -9881.33  | 102  | 218.25 | 2847.80  | -17627.94 | 2426.50  | -12866.46 | 117.11   | -9873.28  |
| 43   | 85.50  | 5594.70  | -13375.62 | 4254.39  | -9926.73  | 2507.52  | -7105.64  | 103  | 220.50 | 5594.41  | -13375.39 | 4253.81  | -9925.07  | 2506.94  | -7103.98  |
| 44   | 87.75  | 8785.34  | -10305.60 | 6464.82  | -7615.59  | 4711.13  | -4813.02  | 104  | 222.75 | 8785.55  | -10305.77 | 6465.71  | -7616.50  | 4712.02  | -4813.94  |
| 45   | 90.00  | 11629.85 | -7717.10  | 8359.59  | -5655.83  | 6593.00  | -2858.19  | 105  | 225.00 | 11630.35 | -7717.46  | 8362.54  | -5657.11  | 6595.95  | -2859.47  |
| 46   | 92.25  | 13976.31 | -5549.32  | 9258.65  | -3950.02  | 7476.09  | -1148.60  | 106  | 227.25 | 13976.98 | -5550.01  | 9263.35  | -3950.75  | 7480.78  | -1149.32  |
| 47   | 94.50  | 16014.61 | -3866.07  | 10560.71 | -2783.69  | 8761.58  | 26.15     | 107  | 229.50 | 16015.28 | -3866.84  | 10566.21 | -2783.68  | 8767.08  | 26.17     |
| 48   | 96.75  | 17621.21 | -2649.63  | 11596.67 | -1869.66  | 9782.38  | 950.07    | 108  | 231.75 | 17621.77 | -2650.19  | 11601.92 | -1869.15  | 9787.63  | 950.58    |
| 49   | 99.00  | 18769.01 | -1869.38  | 12360.51 | -1217.08  | 10534.29 | 1611.40   | 109  | 234.00 | 18769.41 | -1869.68  | 12364.56 | -1216.46  | 10538.34 | 1612.02   |
| 50   | 101.25 | 19470.62 | -1435.64  | 12858.57 | -814.37   | 11024.63 | 2020.12   | 110  | 236.25 | 19470.84 | -1435.76  | 12860.79 | -813.96   | 11026.85 | 2020.53   |
| 51   | 103.50 | 19703.61 | -1303.86  | 13074.93 | -672.63   | 11238.40 | 2163.92   | 111  | 238.50 | 19703.58 | -1303.85  | 13074.70 | -672.68   | 11238.18 | 2163.88   |
| 52   | 105.75 | 19485.40 | -1444.80  | 13017.03 | -785.33   | 11183.09 | 2049.16   | 112  | 240.75 | 19485.18 | -1444.68  | 13014.69 | -785.76   | 11180.75 | 2048.73   |
| 53   | 108.00 | 18799.34 | -1892.88  | 12668.01 | -1170.04  | 10841.79 | 1658.44   | 113  | 243.00 | 18798.91 | -1892.57  | 12663.64 | -1170.71  | 10837.42 | 1657.77   |
| 54   | 110.25 | 17667.15 | -2695.47  | 12034.74 | -1827.11  | 10220.45 | 992.62    | 114  | 245.25 | 17666.59 | -2694.86  | 12029.29 | -1827.64  | 10215.01 | 992.09    |
| 55   | 112.50 | 16077.81 | -3934.77  | 11097.41 | -2782.09  | 9298.28  | 27.76     | 115  | 247.50 | 16077.16 | -3934.12  | 11091.74 | -2782.11  | 9292.61  | 27.74     |
| 56   | 114.75 | 14060.36 | -5615.96  | 9859.88  | -4042.40  | 8077.32  | -1240.97  | 116  | 249.75 | 14059.73 | -5615.56  | 9855.11  | -4041.66  | 8072.55  | -1240.24  |
| 57   | 117.00 | 11620.78 | -7710.53  | 8306.06  | -5632.63  | 6539.47  | -2834.99  | 117  | 252.00 | 11620.26 | -7710.16  | 8303.04  | -5631.32  | 6536.45  | -2833.68  |
| 58   | 119.25 | 8780.87  | -10302.08 | 6446.71  | -7597.09  | 4693.02  | -4794.52  | 118  | 254.25 | 8780.67  | -10301.92 | 6445.90  | -7596.26  | 4692.21  | -4793.70  |
| 59   | 121.50 | 5588.36  | -14524.66 | 4417.91  | -10570.41 | 2112.39  | -7606.18  | 119  | 256.50 | 5588.81  | -14525.03 | 4418.65  | -10573.08 | 2113.13  | -7608.85  |
| 60   | 123.75 | 2841.55  | -17623.24 | 2425.97  | -12821.76 | 116.58   | -9828.58  | 120  | 258.75 | 2842.60  | -17624.03 | 2426.06  | -12829.28 | 116.67   | -9836.10  |

| Isec | Sx(is) | Mu,pos   | Mu,neg    | Mcr,pos  | Mcr,neg   | Mdec,pos | Mdec,neg  |
|------|--------|----------|-----------|----------|-----------|----------|-----------|
| 121  | 261.00 | 2004.40  | -18718.90 | 1720.24  | -13904.55 | -592.20  | -10899.18 |
| 122  | 263.25 | 2848.77  | -17628.67 | 2426.58  | -12873.46 | 117.19   | -9880.28  |
| 123  | 265.50 | 5594.61  | -13375.55 | 4254.21  | -9926.22  | 2507.34  | -7105.13  |
| 124  | 267.75 | 8785.44  | -10305.69 | 6465.29  | -7616.07  | 4711.60  | -4813.50  |
| 125  | 270.00 | 11630.28 | -7717.41  | 8362.12  | -5656.93  | 6595.53  | -2859.29  |
| 126  | 272.25 | 13978.24 | -5551.30  | 9272.05  | -3952.08  | 7489.48  | -1150.66  |
| 127  | 274.50 | 16016.89 | -3868.72  | 10579.68 | -2783.64  | 8780.55  | 26.21     |
| 128  | 276.75 | 17623.91 | -2652.42  | 11621.83 | -1867.22  | 9807.54  | 952.52    |
| 129  | 279.00 | 18772.08 | -1871.88  | 12391.75 | -1212.30  | 10565.53 | 1616.18   |
| 130  | 281.25 | 19474.04 | -1437.82  | 12895.07 | -807.68   | 11061.13 | 2026.81   |
| 131  | 283.50 | 19707.31 | -1305.82  | 13115.20 | -664.88   | 11278.68 | 2171.67   |
| 132  | 285.75 | 19489.35 | -1447.10  | 13059.53 | -777.54   | 11225.60 | 2056.95   |
| 133  | 288.00 | 18803.41 | -1895.89  | 12710.23 | -1163.58  | 10884.01 | 1664.90   |
| 134  | 290.25 | 17671.23 | -2699.30  | 12074.27 | -1823.28  | 10259.98 | 996.46    |
| 135  | 292.50 | 16081.72 | -3938.60  | 11131.37 | -2781.99  | 9332.24  | 27.86     |
| 136  | 294.75 | 14063.87 | -5618.09  | 9885.99  | -4046.41  | 8103.43  | -1244.98  |
| 137  | 297.00 | 11623.62 | -7712.60  | 8322.82  | -5639.89  | 6556.23  | -2842.25  |
| 138  | 299.25 | 8782.64  | -10303.48 | 6453.89  | -7604.43  | 4700.20  | -4801.86  |
| 139  | 301.50 | 5588.27  | -14524.59 | 4417.76  | -10569.87 | 2112.23  | -7605.63  |
| 140  | 303.75 | 2840.04  | -17622.12 | 2425.84  | -12811.17 | 116.46   | -9817.99  |
| 141  | 306.00 | 1987.72  | -18704.27 | 1728.48  | -13752.85 | -583.95  | -10747.47 |
| 142  | 307.80 | 1948.93  | -18670.79 | 1747.07  | -13410.76 | -565.37  | -10405.38 |
| 143  | 309.60 | 2452.08  | -16575.23 | 1976.76  | -12144.26 | 228.05   | -9289.60  |
| 144  | 311.40 | 4438.59  | -14465.49 | 3410.52  | -10540.64 | 1664.01  | -7709.52  |
| 145  | 313.20 | 7620.67  | -11332.38 | 5562.16  | -8222.34  | 3811.81  | -5414.91  |
| 146  | 315.00 | 10568.20 | -8621.98  | 7540.41  | -6274.41  | 5779.24  | -3476.18  |
| 147  | 316.80 | 13189.87 | -6459.65  | 9786.89  | -4778.84  | 8011.04  | -1979.73  |
| 148  | 318.60 | 15301.70 | -4720.35  | 11321.49 | -3360.13  | 9529.84  | -554.47   |
| 149  | 320.40 | 16952.17 | -3410.19  | 12531.84 | -2264.33  | 10725.58 | 549.96    |
| 150  | 322.20 | 18139.56 | -2527.44  | 13425.65 | -1480.77  | 11607.71 | 1341.57   |
| 151  | 324.00 | 18857.24 | -2029.37  | 14010.66 | -1004.05  | 12185.22 | 1823.84   |
| 152  | 325.80 | 19082.20 | -1874.82  | 14169.52 | -856.75   | 12341.63 | 1973.01   |
| 153  | 327.60 | 19005.68 | -1921.43  | 14068.19 | -911.77   | 12241.08 | 1917.39   |
| 154  | 329.40 | 18775.62 | -2072.94  | 13852.85 | -1066.89  | 12028.18 | 1760.41   |
| 155  | 331.20 | 18401.11 | -2328.91  | 13532.74 | -1314.95  | 11712.00 | 1509.43   |
| 156  | 333.00 | 17892.68 | -2687.98  | 13117.45 | -1648.89  | 11301.89 | 1171.73   |
| 157  | 334.80 | 17232.58 | -3173.06  | 12597.15 | -2079.38  | 10788.07 | 736.78    |
| 158  | 336.60 | 16431.85 | -3784.49  | 11984.32 | -2599.65  | 10182.70 | 211.70    |
| 159  | 338.40 | 15492.68 | -4529.57  | 11281.27 | -3209.57  | 9487.84  | -402.96   |
| 160  | 340.20 | 14416.56 | -5402.02  | 10494.24 | -3909.83  | 8709.41  | -1107.45  |
| 161  | 342.00 | 13253.87 | -6370.38  | 9680.20  | -4678.87  | 7903.76  | -1879.59  |

## LEYES DE MOMENTOS FLECTORES MAJORADOS

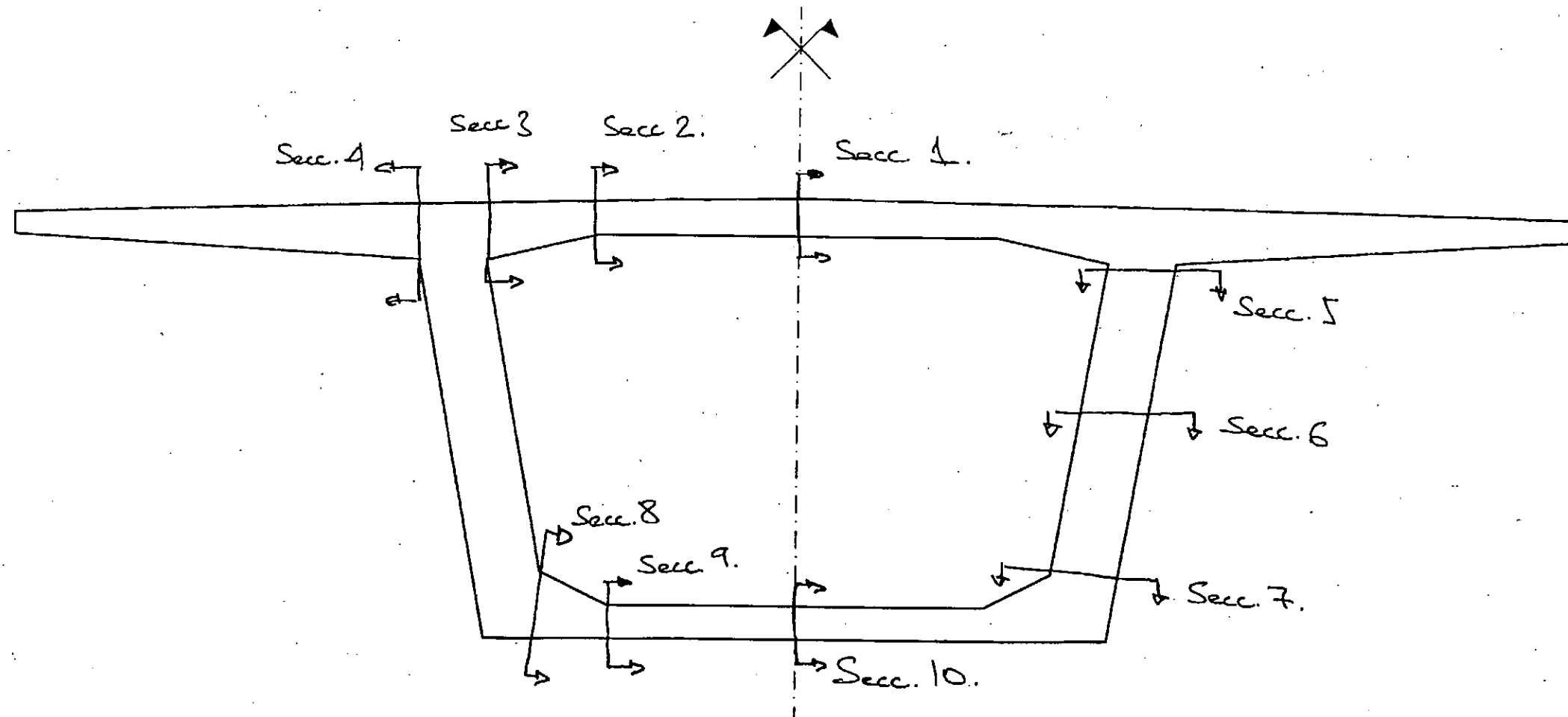


## 6.2. FLEXIÓN TRANSVERSAL

La flexión transversal en el tablero se ha determinado a partir del modelo de cálculo mediante elementos finitos tipo lámina expuesto en el apartado 3.2

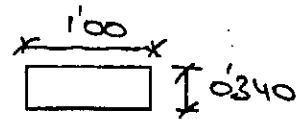
La armadura de flexión calculada debe sumarse a la armadura de rasante del voladizo obtenida a partir del cortante total sobre la sección y de la aplicación de la regla de cosido en el plano de unión del voladizo con el núcleo de la sección transversal.

# SECCIONES OBJETO de ESTUDIO

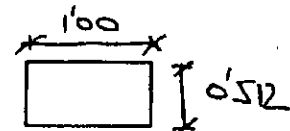


## Dimensiones Secciones Tipo.

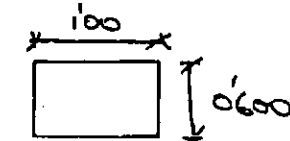
Sección 1



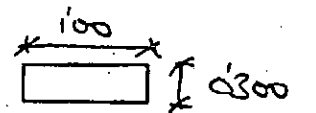
Sección 3



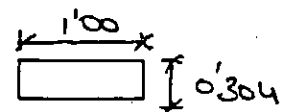
Sección 5, 6 y 7



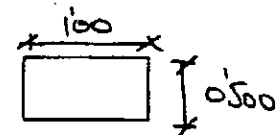
Sección 9



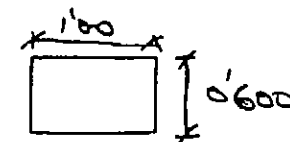
Sección 2



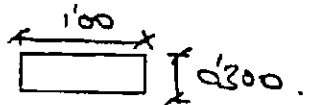
Sección 4



Sección 8



Sección 10



## CARGAS a APLICAR en EL MODELO

# Peso propio

Considerando una densidad del hormigón de  $25 \text{ T/m}^3$ .

# Cargas permanentes:

Impostas y barandillas:  $g_1 = 0.89 \text{ T/m}$   
y por lado

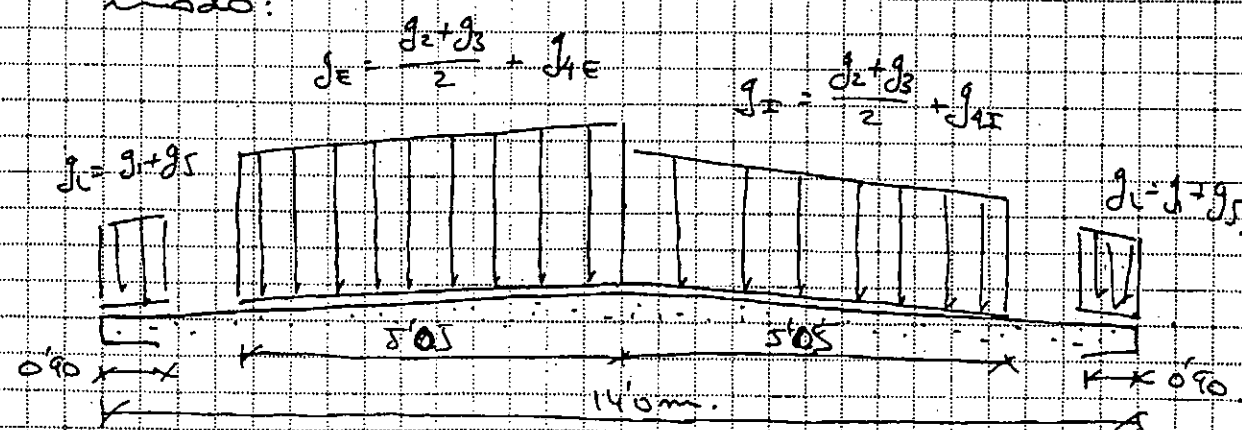
Impermeabilización:  $g_2 = 0.29 \text{ T/m}$

Traviesas y carriles:  $g_3 = 1.28 \text{ T/m}$

Balasto: Via exterior:  $g_{4E} = 5.048 \text{ T/m}$   
Via interior:  $g_{4I} = 4.395 \text{ T/m}$

Paseos:  $g_5 = 0.60 \text{ T/m}$  y por lado.

Estas cargas están repartidas del siguiente modo:



Siendo las cargas a aplicar:

$$g_c = 0.89 + 0.60 = 1.49 \text{ T/m}$$

$$g_L = \frac{1.49}{0.90} = 1.656 \text{ T/m}^2$$

$$g_E = \frac{0.29 + 1.28}{2} + 5.048 = 6.083 \text{ T/m}$$

$$g_E = \frac{6.083}{5.05} = 1.205 \text{ T/m}^2$$

$$g_I = \frac{0.29 + 1.28}{2} + 4.395 = 5.43 \text{ T/m}$$

$$g_I = \frac{5.43}{5.05} = 1.075 \text{ T/m}^2$$

# Sobrecargas:

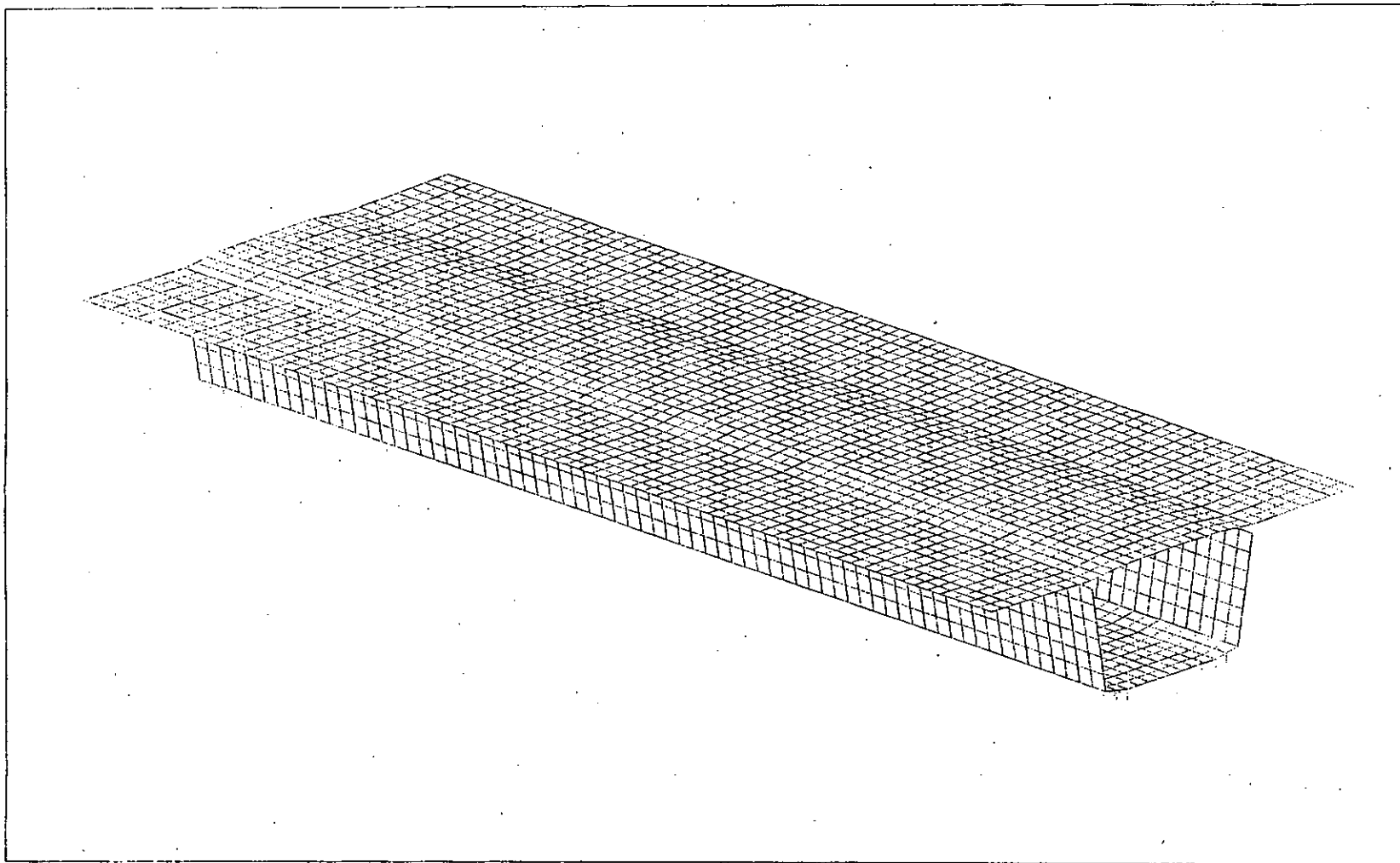
Las sobrecargas que se aplicaran corresponden a los trenes definidos por la IPF y el EC.

Nos fijaremos sobretodo en el tren tipo A de la IPF al ser éste el mas desfavorable en cuanto a flexión transversal.

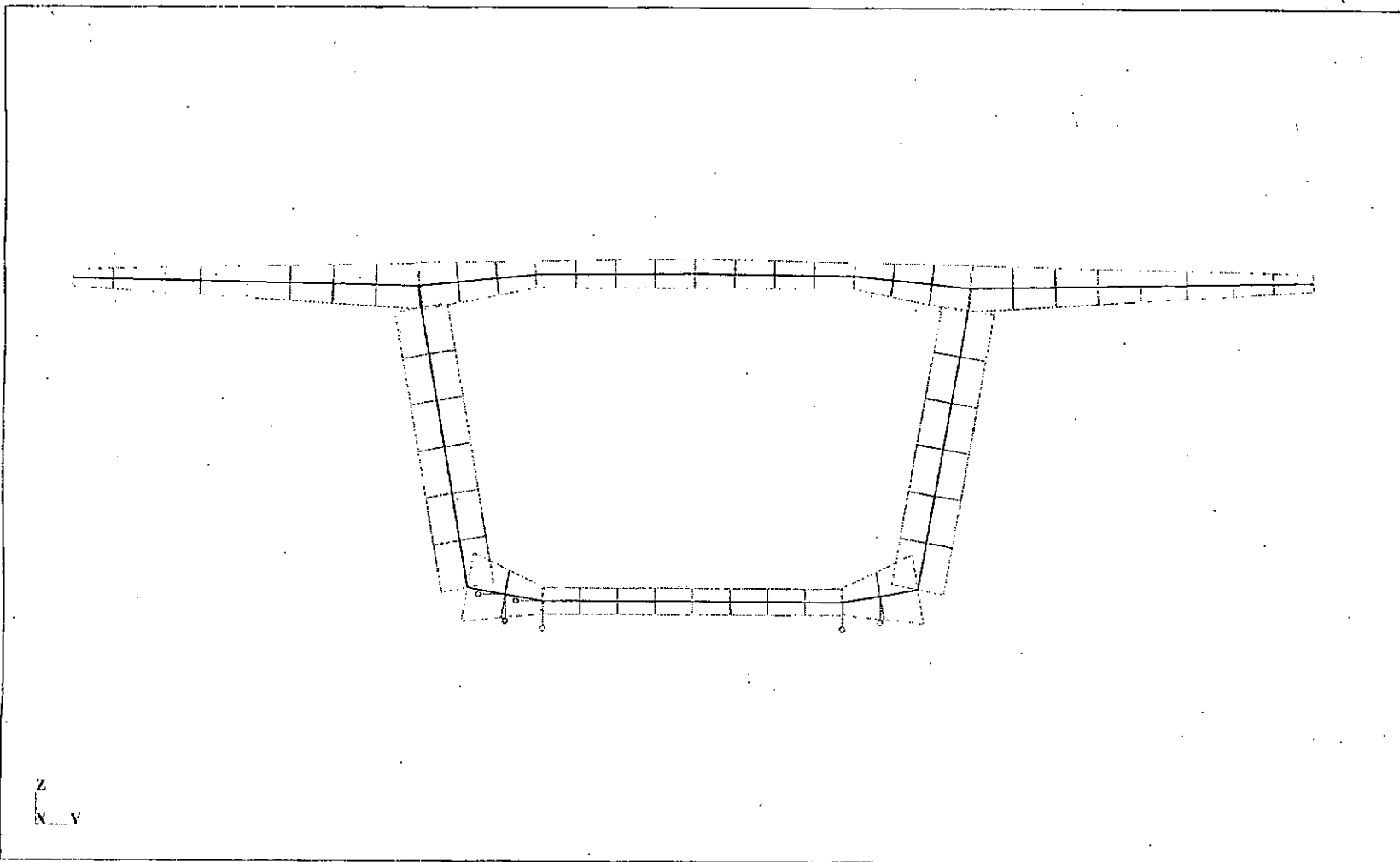




### Modelo de Cálculo

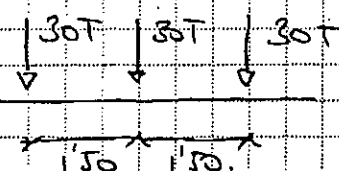


### Modelo de Cálculo. Sección Transversal



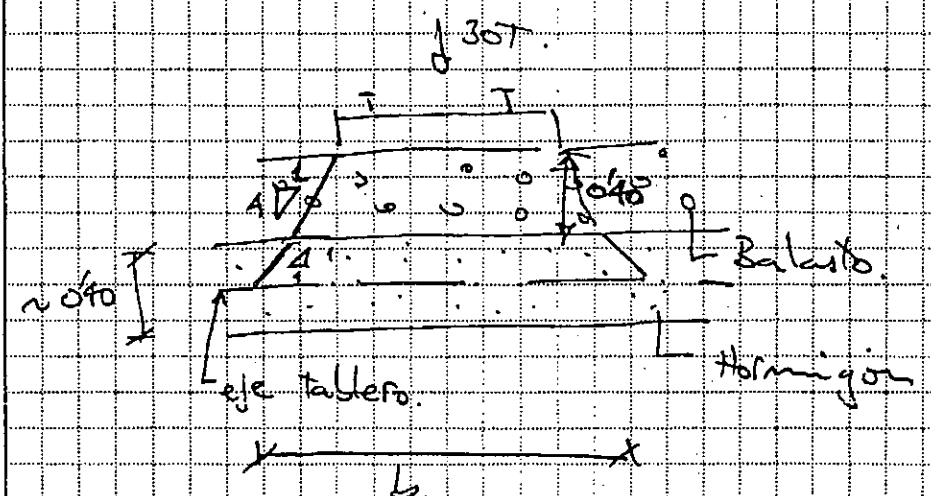
Z  
X...Y

El esquema de cargas del tren tipo A es:



Vamos como al reparto de cargas longitudinal y Transversal de estas cargas.

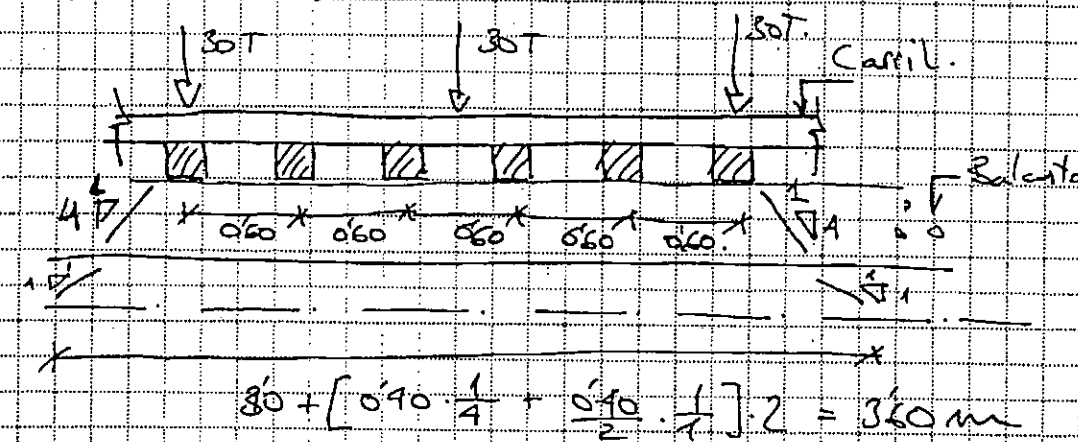
Transversalmente:



$$b = b_{TAW} + \left[ 0.40 \cdot \frac{1}{4} + \frac{0.40}{2} \cdot \frac{1}{1} \right] \cdot 2 = 2.60 + [0.10 + 0.20] \cdot 2 = 3.20 \text{ m}$$

Luego, Transversalmente la carga ocupará un ancho de 3.20m.

Reparto longitudinal:



Luego, la carga debida al tren tipo A de la IPF deberá repartirse en una superficie de 3.20 x 3.60m.

Esta carga deberá mayorarse por el coeficiente de impacto. Coeficiente que tiene en consideración los efectos dinámicos de la carga.

COEF. IMPACTO según EC.1:

$$I_a = \phi_2 = \frac{1.44}{\sqrt{L_\phi - 0.20}} + 0.82$$

$$\text{Con } L_\phi = 3 \cdot L_{\text{vía}} \text{ varía } L_{\text{vía}} = 3.558 = 11.74 \text{ m}$$

Luego:  $I_{ec} = 1.19$



COEF. IMPACTO SEGÚN IPF

$$I_{IPF} = 1 + \frac{114 \cdot \sqrt{L}}{31 - 176 \cdot \sqrt{L} + L} \cdot \frac{1}{100}$$

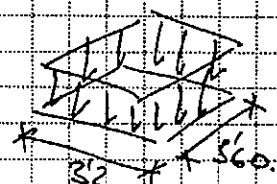
donde  $L$  = luz vano boca - luz entre almas

$$L = 5.58 \text{ m}$$

$$I_{IPF} = 1 + \frac{114 \cdot \sqrt{5.58}}{31 - 176 \cdot \sqrt{5.58} + 5.58} \cdot \frac{1}{100} = 1.595$$

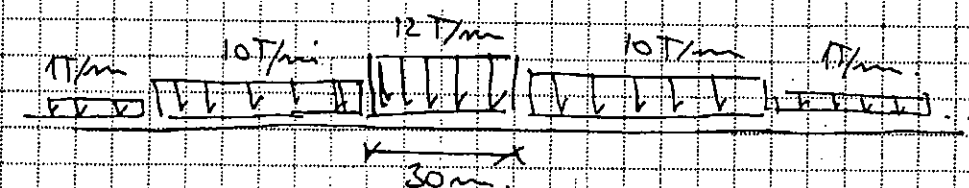
Al Tren Tipo A se le aplicará el coef. de impacto definido por la normativa IPF, luego, este tren pasa a ser una carga:

$$q = \frac{1.595 \cdot 90}{3.20 \cdot 3.20} = 12.46 \text{ T/m}^2$$



Esta carga se puede encontrar en diferentes puntos de la sección según el efecto que tengamos en cuenta. (peralte, ripado..)

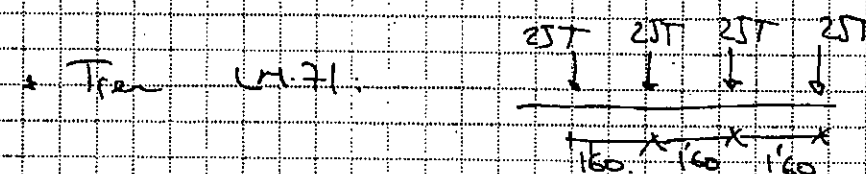
Otra sobrecarga a aplicar según la IPF es el tren Tipo B:



Este Tren tendrá un reparto en la sección transversal de modo que ocupe un ancho de 3.20 m.

$$q_s = \frac{12 \cdot 1.595}{3.20} = 5.98 \text{ T/m}^2$$

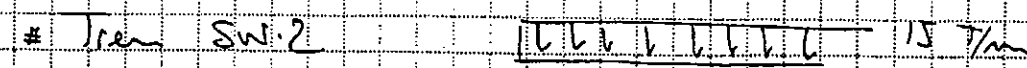
Sobrecargas definidas por EC:



Sobre este se aplicará el coef. de impacto del EC, luego:

$$q_{m.71} = 1.19 \cdot \frac{100}{3.20 \cdot 3.40} = 6.89 \text{ T/m}^2$$

a una superficie de  $3.2 \times 3.40 \text{ m}$

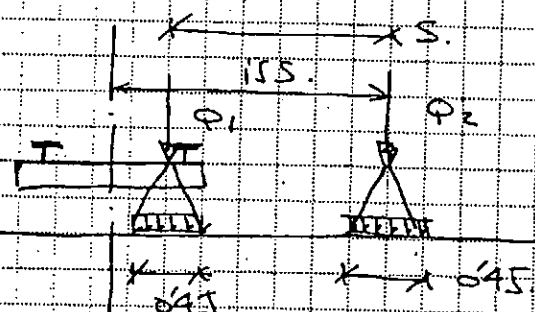


Carga que se repartirá en 3.60 m de ancho

$$q_{sw.2} = \frac{1.19 \cdot 15}{3.60} = 4.958 \text{ T/m}^2$$

# Descarrilamiento

Consiste en una carga de valor 140. UIC 71 aplicada en las siguientes posiciones resp. eje de vía.

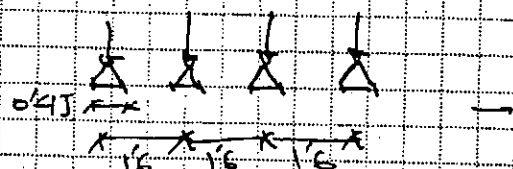


$$S = \text{Sep. vías} = 1.435 \text{ m}$$

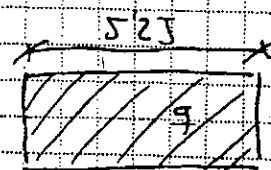
$$Q_1 + Q_2 = 140 \text{ UIC 71} = 140 \cdot 25 \text{ T} = 35 \text{ T}$$

Esta carga se puede encontrar en el lado interior o exterior del tablero vías.

Longitudinalmente, la distribución de la carga es:



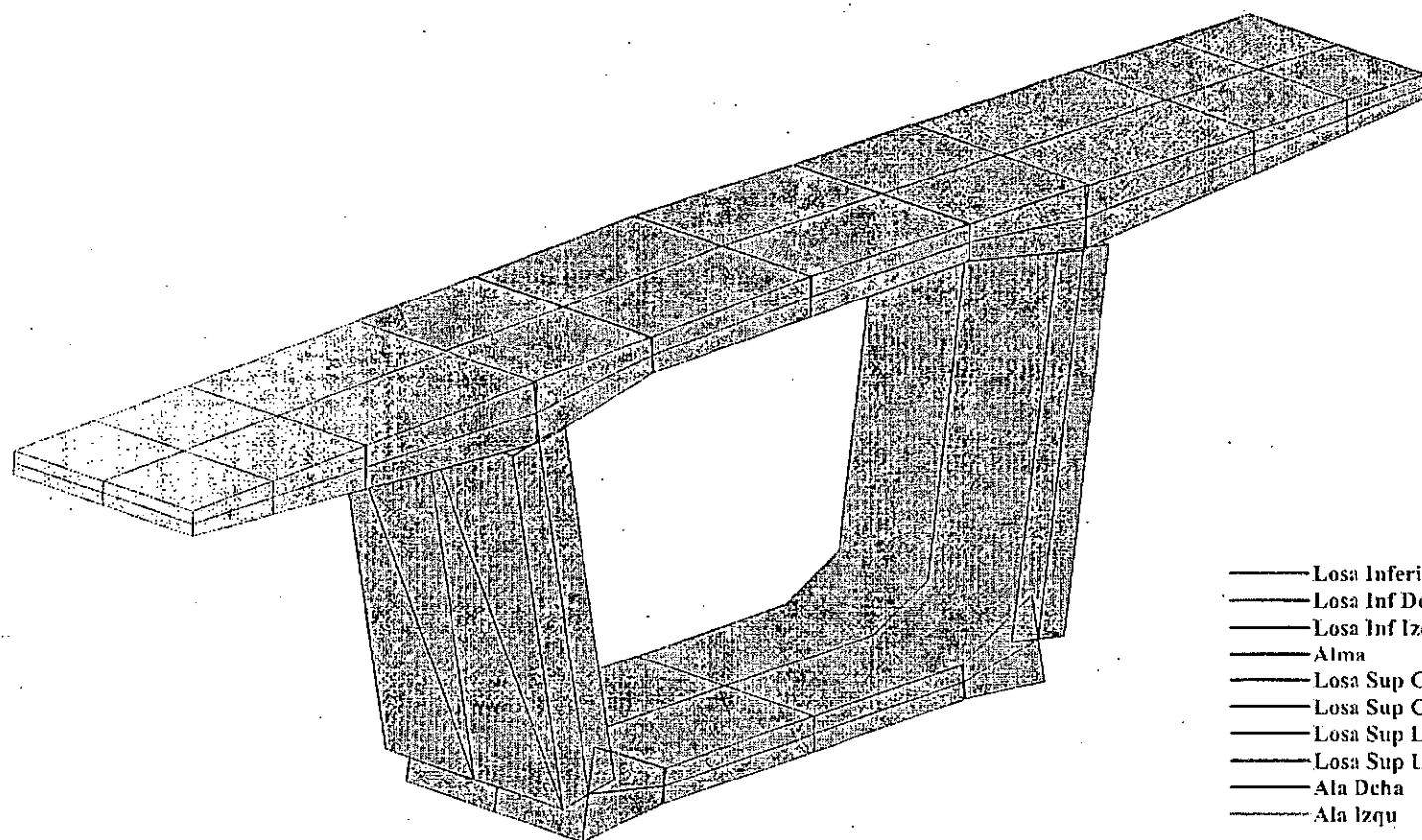
Luego, en planta, la carga que se introducirá en el modelo de cálculo será:



$$q = \frac{140 \cdot 4 \cdot 25}{5.25 \cdot 1.40}$$

$$q = 14.035 \text{ T/m}^2$$

# Modelo de Cálculo. Paneles que Componen el Modelo



- Losa Inferior
- Losa Inf Decha
- Losa Inf Izqu
- Alma
- Losa Sup Centr Decha
- Losa Sup Centr Izqu
- Losa Sup Lat Decha
- Losa Sup Lat Izqu
- Ala Decha
- Ala Izqu

## Paneles que Componen el Modelo de Cálculo

| Panel | Espesor             | Material | Tipo de malla | Superficie (m <sup>2</sup> ) |
|-------|---------------------|----------|---------------|------------------------------|
| 101   | Ala Izqu            | HP - 50  | Coons         | 0.900                        |
| 102   | Ala Dcha            | HP - 50  | Coons         | 0.900                        |
| 103   | Ala Izqu            | HP - 50  | Coons         | 1.050                        |
| 104   | Ala Dcha            | HP - 50  | Coons         | 1.050                        |
| 105   | Ala Izqu            | HP - 50  | Coons         | 1.929                        |
| 106   | Ala Dcha            | HP - 50  | Coons         | 1.929                        |
| 107   | Losa Sup Lat Izqu   | HP - 50  | Coons         | 1.328                        |
| 108   | Losa Sup Lat Dcha   | HP - 50  | Coons         | 1.328                        |
| 109   | Losa Sup Centr Izqu | HP - 50  | Coons         | 1.800                        |
| 110   | Losa Sup Centr Dcha | HP - 50  | Coons         | 1.800                        |
| 111   | Alma                | HP - 50  | Coons         | 3.170                        |
| 112   | Alma                | HP - 50  | Coons         | 3.170                        |
| 113   | Losa Inf Izqu       | HP - 50  | Coons         | 0.865                        |
| 114   | Losa Inf Dcha       | HP - 50  | Coons         | 0.865                        |
| 115   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 116   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 117   | Ala Izqu            | HP - 50  | Coons         | 0.900                        |
| 118   | Ala Dcha            | HP - 50  | Coons         | 0.900                        |
| 119   | Ala Izqu            | HP - 50  | Coons         | 1.050                        |
| 120   | Ala Dcha            | HP - 50  | Coons         | 1.050                        |
| 121   | Ala Izqu            | HP - 50  | Coons         | 1.929                        |
| 122   | Ala Dcha            | HP - 50  | Coons         | 1.929                        |
| 123   | Losa Sup Lat Izqu   | HP - 50  | Coons         | 1.328                        |
| 124   | Losa Sup Lat Dcha   | HP - 50  | Coons         | 1.328                        |
| 125   | Losa Sup Centr Izqu | HP - 50  | Coons         | 1.800                        |
| 126   | Losa Sup Centr Dcha | HP - 50  | Coons         | 1.800                        |
| 127   | Alma                | HP - 50  | Coons         | 3.170                        |
| 128   | Alma                | HP - 50  | Coons         | 3.170                        |
| 129   | Losa Inf Izqu       | HP - 50  | Coons         | 0.865                        |
| 130   | Losa Inf Dcha       | HP - 50  | Coons         | 0.865                        |
| 131   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 132   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 133   | Ala Izqu            | HP - 50  | Coons         | 0.900                        |
| 134   | Ala Dcha            | HP - 50  | Coons         | 0.900                        |
| 135   | Ala Izqu            | HP - 50  | Coons         | 1.050                        |
| 136   | Ala Dcha            | HP - 50  | Coons         | 1.050                        |
| 137   | Ala Izqu            | HP - 50  | Coons         | 1.929                        |
| 138   | Ala Dcha            | HP - 50  | Coons         | 1.929                        |
| 139   | Losa Sup Lat Izqu   | HP - 50  | Coons         | 1.328                        |
| 140   | Losa Sup Lat Dcha   | HP - 50  | Coons         | 1.328                        |
| 141   | Losa Sup Centr Izqu | HP - 50  | Coons         | 1.800                        |
| 142   | Losa Sup Centr Dcha | HP - 50  | Coons         | 1.800                        |
| 143   | Alma                | HP - 50  | Coons         | 3.170                        |
| 144   | Alma                | HP - 50  | Coons         | 3.170                        |
| 145   | Losa Inf Izqu       | HP - 50  | Coons         | 0.865                        |
| 146   | Losa Inf Dcha       | HP - 50  | Coons         | 0.865                        |
| 147   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 148   | Losa Inferior       | HP - 50  | Coons         | 1.696                        |
| 149   | Ala Izqu            | HP - 50  | Coons         | 0.900                        |
| 150   | Ala Dcha            | HP - 50  | Coons         | 0.900                        |
| 151   | Ala Izqu            | HP - 50  | Coons         | 1.050                        |
| 152   | Ala Dcha            | HP - 50  | Coons         | 1.050                        |
| 153   | Ala Izqu            | HP - 50  | Coons         | 1.929                        |
| 154   | Ala Dcha            | HP - 50  | Coons         | 1.929                        |
| 155   | Losa Sup Lat Izqu   | HP - 50  | Coons         | 1.328                        |
| 156   | Losa Sup Lat Dcha   | HP - 50  | Coons         | 1.328                        |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 157 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 158 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 159 | Alma                | HP - 50 | Coons | 3.170 |
| 160 | Alma                | HP - 50 | Coons | 3.170 |
| 161 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 162 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 163 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 164 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 165 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 166 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 167 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 168 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 169 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 170 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 171 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 172 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 173 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 174 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 175 | Alma                | HP - 50 | Coons | 3.170 |
| 176 | Alma                | HP - 50 | Coons | 3.170 |
| 177 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 178 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 179 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 180 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 181 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 182 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 183 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 184 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 185 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 186 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 187 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 188 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 189 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 190 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 191 | Alma                | HP - 50 | Coons | 3.170 |
| 192 | Alma                | HP - 50 | Coons | 3.170 |
| 193 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 194 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 195 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 196 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 197 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 198 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 199 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 200 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 201 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 202 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 203 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 204 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 205 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 206 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 207 | Alma                | HP - 50 | Coons | 3.170 |
| 208 | Alma                | HP - 50 | Coons | 3.170 |
| 209 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 210 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 211 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 212 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 213 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 214 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 215 | Ala Izqu            | HP - 50 | Coons | 1.050 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 216 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 217 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 218 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 219 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 220 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 221 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 222 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 223 | Alma                | HP - 50 | Coons | 3.170 |
| 224 | Alma                | HP - 50 | Coons | 3.170 |
| 225 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 226 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 227 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 228 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 229 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 230 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 231 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 232 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 233 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 234 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 235 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 236 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 237 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 238 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 239 | Alma                | HP - 50 | Coons | 3.170 |
| 240 | Alma                | HP - 50 | Coons | 3.170 |
| 241 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 242 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 243 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 244 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 245 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 246 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 247 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 248 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 249 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 250 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 251 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 252 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 253 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 254 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 255 | Alma                | HP - 50 | Coons | 3.170 |
| 256 | Alma                | HP - 50 | Coons | 3.170 |
| 257 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 258 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 259 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 260 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 261 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 262 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 263 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 264 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 265 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 266 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 267 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 268 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 269 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 270 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 271 | Alma                | HP - 50 | Coons | 3.170 |
| 272 | Alma                | HP - 50 | Coons | 3.170 |
| 273 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 274 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 275 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 276 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 277 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 278 | Ala Dcha            | HP - 50 | Coons | 0.900 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 279 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 280 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 281 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 282 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 283 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 284 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 285 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 286 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 287 | Alma                | HP - 50 | Coons | 3.170 |
| 288 | Alma                | HP - 50 | Coons | 3.170 |
| 289 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 290 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 291 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 292 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 293 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 294 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 295 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 296 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 297 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 298 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 299 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 300 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 301 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 302 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 303 | Alma                | HP - 50 | Coons | 3.170 |
| 304 | Alma                | HP - 50 | Coons | 3.170 |
| 305 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 306 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 307 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 308 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 309 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 310 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 311 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 312 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 313 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 314 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 315 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 316 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 317 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 318 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 319 | Alma                | HP - 50 | Coons | 3.170 |
| 320 | Alma                | HP - 50 | Coons | 3.170 |
| 321 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 322 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 323 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 324 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 325 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 326 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 327 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 328 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 329 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 330 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 331 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 332 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 333 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 334 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 335 | Alma                | HP - 50 | Coons | 3.170 |
| 336 | Alma                | HP - 50 | Coons | 3.170 |
| 337 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 338 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 339 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 340 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 341 | Ala Izqu            | HP - 50 | Coons | 0.900 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 342 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 343 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 344 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 345 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 346 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 347 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 348 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 349 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 350 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 351 | Alma                | HP - 50 | Coons | 3.170 |
| 352 | Alma                | HP - 50 | Coons | 3.170 |
| 353 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 354 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 355 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 356 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 357 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 358 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 359 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 360 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 361 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 362 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 363 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 364 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 365 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 366 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 367 | Alma                | HP - 50 | Coons | 3.170 |
| 368 | Alma                | HP - 50 | Coons | 3.170 |
| 369 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 370 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 371 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 372 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 373 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 374 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 375 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 376 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 377 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 378 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 379 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 380 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 381 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 382 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 383 | Alma                | HP - 50 | Coons | 3.170 |
| 384 | Alma                | HP - 50 | Coons | 3.170 |
| 385 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 386 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 387 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 388 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 389 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 390 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 391 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 392 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 393 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 394 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 395 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 396 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 397 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 398 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 399 | Alma                | HP - 50 | Coons | 3.170 |
| 400 | Alma                | HP - 50 | Coons | 3.170 |
| 401 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 402 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 403 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 404 | Losa Inferior       | HP - 50 | Coons | 1.696 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 405 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 406 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 407 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 408 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 409 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 410 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 411 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 412 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 413 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 414 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 415 | Alma                | HP - 50 | Coons | 3.170 |
| 416 | Alma                | HP - 50 | Coons | 3.170 |
| 417 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 418 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 419 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 420 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 421 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 422 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 423 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 424 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 425 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 426 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 427 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 428 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 429 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 430 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 431 | Alma                | HP - 50 | Coons | 3.170 |
| 432 | Alma                | HP - 50 | Coons | 3.170 |
| 433 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 434 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 435 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 436 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 437 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 438 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 439 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 440 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 441 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 442 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 443 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 444 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 445 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 446 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 447 | Alma                | HP - 50 | Coons | 3.170 |
| 448 | Alma                | HP - 50 | Coons | 3.170 |
| 449 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 450 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 451 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 452 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 453 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 454 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 455 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 456 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 457 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 458 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 459 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 460 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 461 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 462 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 463 | Alma                | HP - 50 | Coons | 3.170 |
| 464 | Alma                | HP - 50 | Coons | 3.170 |
| 465 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 466 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 467 | Losa Inferior       | HP - 50 | Coons | 1.696 |



|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 468 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 469 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 470 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 471 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 472 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 473 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 474 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 475 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 476 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 477 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 478 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 479 | Alma                | HP - 50 | Coons | 3.170 |
| 480 | Alma                | HP - 50 | Coons | 3.170 |
| 481 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 482 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 483 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 484 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 485 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 486 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 487 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 488 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 489 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 490 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 491 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 492 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 493 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 494 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 495 | Alma                | HP - 50 | Coons | 3.170 |
| 496 | Alma                | HP - 50 | Coons | 3.170 |
| 497 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 498 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 499 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 500 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 501 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 502 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 503 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 504 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 505 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 506 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 507 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 508 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 509 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 510 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 511 | Alma                | HP - 50 | Coons | 3.170 |
| 512 | Alma                | HP - 50 | Coons | 3.170 |
| 513 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 514 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 515 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 516 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 517 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 518 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 519 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 520 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 521 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 522 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 523 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 524 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 525 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 526 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 527 | Alma                | HP - 50 | Coons | 3.170 |
| 528 | Alma                | HP - 50 | Coons | 3.170 |
| 529 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 530 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 531 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 532 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 533 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 534 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 535 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 536 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 537 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 538 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 539 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 540 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 541 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 542 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 543 | Alma                | HP - 50 | Coons | 3.170 |
| 544 | Alma                | HP - 50 | Coons | 3.170 |
| 545 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 546 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 547 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 548 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 549 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 550 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 551 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 552 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 553 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 554 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 555 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 556 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 557 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 558 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 559 | Alma                | HP - 50 | Coons | 3.170 |
| 560 | Alma                | HP - 50 | Coons | 3.170 |
| 561 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 562 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 563 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 564 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 565 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 566 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 567 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 568 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 569 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 570 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 571 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 572 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 573 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 574 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 575 | Alma                | HP - 50 | Coons | 3.170 |
| 576 | Alma                | HP - 50 | Coons | 3.170 |
| 577 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 578 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 579 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 580 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 581 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 582 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 583 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 584 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 585 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 586 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 587 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 588 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 589 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 590 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 591 | Alma                | HP - 50 | Coons | 3.170 |
| 592 | Alma                | HP - 50 | Coons | 3.170 |
| 593 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |

|     |                     |         |       |       |
|-----|---------------------|---------|-------|-------|
| 594 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 595 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 596 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 597 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 598 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 599 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 600 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 601 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 602 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 603 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 604 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 605 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 606 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 607 | Alma                | HP - 50 | Coons | 3.170 |
| 608 | Alma                | HP - 50 | Coons | 3.170 |
| 609 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 610 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 611 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 612 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 613 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 614 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 615 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 616 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 617 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 618 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 619 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 620 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 621 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 622 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 623 | Alma                | HP - 50 | Coons | 3.170 |
| 624 | Alma                | HP - 50 | Coons | 3.170 |
| 625 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 626 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 627 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 628 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 629 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 630 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 631 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 632 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 633 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 634 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 635 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 636 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 637 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 638 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 639 | Alma                | HP - 50 | Coons | 3.170 |
| 640 | Alma                | HP - 50 | Coons | 3.170 |
| 641 | Losa Inf Izqu       | HP - 50 | Coons | 0.865 |
| 642 | Losa Inf Dcha       | HP - 50 | Coons | 0.865 |
| 643 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 644 | Losa Inferior       | HP - 50 | Coons | 1.696 |
| 645 | Ala Izqu            | HP - 50 | Coons | 0.900 |
| 646 | Ala Dcha            | HP - 50 | Coons | 0.900 |
| 647 | Ala Izqu            | HP - 50 | Coons | 1.050 |
| 648 | Ala Dcha            | HP - 50 | Coons | 1.050 |
| 649 | Ala Izqu            | HP - 50 | Coons | 1.929 |
| 650 | Ala Dcha            | HP - 50 | Coons | 1.929 |
| 651 | Losa Sup Lat Izqu   | HP - 50 | Coons | 1.328 |
| 652 | Losa Sup Lat Dcha   | HP - 50 | Coons | 1.328 |
| 653 | Losa Sup Centr Izqu | HP - 50 | Coons | 1.800 |
| 654 | Losa Sup Centr Dcha | HP - 50 | Coons | 1.800 |
| 655 | Alma                | HP - 50 | Coons | 3.170 |
| 656 | Alma                | HP - 50 | Coons | 3.170 |

|     |               |         |       |       |
|-----|---------------|---------|-------|-------|
| 657 | Losa Inf Izqu | HP - 50 | Coons | 0.865 |
| 658 | Losa Inf Dcha | HP - 50 | Coons | 0.865 |
| 659 | Losa Inferior | HP - 50 | Coons | 1.696 |
| 660 | Losa Inferior | HP - 50 | Coons | 1.696 |



### Características de los Paneles

| Nombre de espesor   | Lista de paneles                    | Material | Tipo de espesor      | Espesor (m) | G1 (m)    | G2 (m)    | G3 (m)    |
|---------------------|-------------------------------------|----------|----------------------|-------------|-----------|-----------|-----------|
| Ala Dcha            | 102A646CA16 104A648CA16 106A650CA16 | HP - 50  | variable linealmente | No existe   | 0.200     | 0.520     | No existe |
| Ala Izqu            | 101A645CA16 103A647CA16 105A649CA16 | HP - 50  | variable linealmente | No existe   | 0.200     | 0.520     | No existe |
| Losa Sup Lat Dcha   | 108A652CA16                         | HP - 50  | variable linealmente | No existe   | 0.540     | 0.304     | No existe |
| Losa Sup Lat Izqu   | 107A651CA16                         | HP - 50  | variable linealmente | No existe   | 0.540     | 0.304     | No existe |
| Losa Sup Centr Dcha | 110A654CA16                         | HP - 50  | variable linealmente | No existe   | 0.304     | 0.340     | No existe |
| Losa Sup Centr Izqu | 109A653CA16                         | HP - 50  | variable linealmente | No existe   | 0.304     | 0.340     | No existe |
| Alma                | 111A655CA16 112A656CA16             | HP - 50  | constante            | 0.600       | No existe | No existe | No existe |
| Losa Inf Dcha       | 114A658CA16                         | HP - 50  | variable linealmente | No existe   | 0.784     | 0.300     | No existe |
| Losa Inferior       | 115A659CA16 116A660CA16             | HP - 50  | constante            | 0.300       | No existe | No existe | No existe |
| Losa Inf Izqu       | 113A657CA16                         | HP - 50  | variable linealmente | No existe   | 0.784     | 0.300     | No existe |

### Apoyos Aplicados al Modelo de Cálculo

| Nombre del apoyo | Lista de nudos      | Condiciones de apoyo |
|------------------|---------------------|----------------------|
| Libre            | 5521 5522 5524 5525 | UZ                   |
| Libre en X       | 5516 5517 5519 5520 | UY UZ                |
| Fijo             | 3 205A207           | UX UY UZ             |
| Libre en Y       | 208 213 215 216     | UX UZ                |

## Uniones Rígidas Aplicadas al Modelo de Cálculo

| Nombre de la unión | Nudo principal | Lista de los nudos secundarios | Condiciones de la unión |
|--------------------|----------------|--------------------------------|-------------------------|
| Unión Ala-Alma     | 14             | 9                              | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 193            | 93                             | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 20             | 22                             | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 21             | 25                             | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 172            | 81                             | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1              | 8                              | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 342            | 281                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 392            | 394                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 393            | 397                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 327            | 275                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 500            | 439                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 550            | 552                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 551            | 555                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 485            | 433                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 658            | 597                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 708            | 710                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 709            | 713                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 643            | 591                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 816            | 755                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 866            | 868                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 867            | 871                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 801            | 749                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 974            | 913                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1126           | 1060                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1110           | 1054                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 959            | 907                            | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1128           | 1061                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1602           | 1604                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1603           | 1607                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1111           | 1053                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1272           | 1211                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1620           | 1622                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1621           | 1625                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1257           | 1205                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1412           | 1351                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1638           | 1640                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1639           | 1643                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1397           | 1345                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1552           | 1491                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1656           | 1658                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1657           | 1661                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1537           | 1485                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1764           | 1703                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1916           | 1850                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1900           | 1844                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1749           | 1697                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1918           | 1851                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 2392           | 2394                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 2393           | 2397                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 1901           | 1843                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 2062           | 2001                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 2410           | 2412                           | UX UY UZ RX RY RZ       |
| Unión Ala-Alma     | 2411           | 2415                           | UX UY UZ RX RY RZ       |

|                |      |      |                   |
|----------------|------|------|-------------------|
| Unión Ala-Alma | 2047 | 1995 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2202 | 2141 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2428 | 2430 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2429 | 2433 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2187 | 2135 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2342 | 2281 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2446 | 2448 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2447 | 2451 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2327 | 2275 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2554 | 2493 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2706 | 2640 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2690 | 2634 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2539 | 2487 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2708 | 2641 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3182 | 3184 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3183 | 3187 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2691 | 2633 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2852 | 2791 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3200 | 3202 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3201 | 3205 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2837 | 2785 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2992 | 2931 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3218 | 3220 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3219 | 3223 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 2977 | 2925 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3132 | 3071 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3236 | 3238 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3237 | 3241 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3117 | 3065 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3344 | 3283 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3496 | 3430 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3480 | 3424 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3329 | 3277 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3498 | 3431 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3972 | 3974 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3973 | 3977 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3481 | 3423 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3642 | 3581 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3990 | 3992 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3991 | 3995 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3627 | 3575 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3782 | 3721 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4008 | 4010 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4009 | 4013 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3767 | 3715 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3922 | 3861 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4026 | 4028 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4027 | 4031 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 3907 | 3855 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4134 | 4073 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4286 | 4220 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4270 | 4214 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4119 | 4067 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4288 | 4221 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4762 | 4764 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4763 | 4767 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4271 | 4213 | UX UY UZ RX RY RZ |

|                |      |      |                   |
|----------------|------|------|-------------------|
| Unión Ala-Alma | 4432 | 4371 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4780 | 4782 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4781 | 4785 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4417 | 4365 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4572 | 4511 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4798 | 4800 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4799 | 4803 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4557 | 4505 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4712 | 4651 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4816 | 4818 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4817 | 4821 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4697 | 4645 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4924 | 4863 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5076 | 5010 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5060 | 5004 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 4909 | 4857 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5078 | 5011 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5552 | 5554 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5553 | 5557 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5061 | 5003 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5222 | 5161 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5570 | 5572 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5571 | 5575 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5207 | 5155 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5362 | 5301 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5588 | 5590 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5589 | 5593 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5347 | 5295 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5502 | 5441 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5606 | 5608 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5607 | 5611 | UX UY UZ RX RY RZ |
| Unión Ala-Alma | 5487 | 5435 | UX UY UZ RX RY RZ |

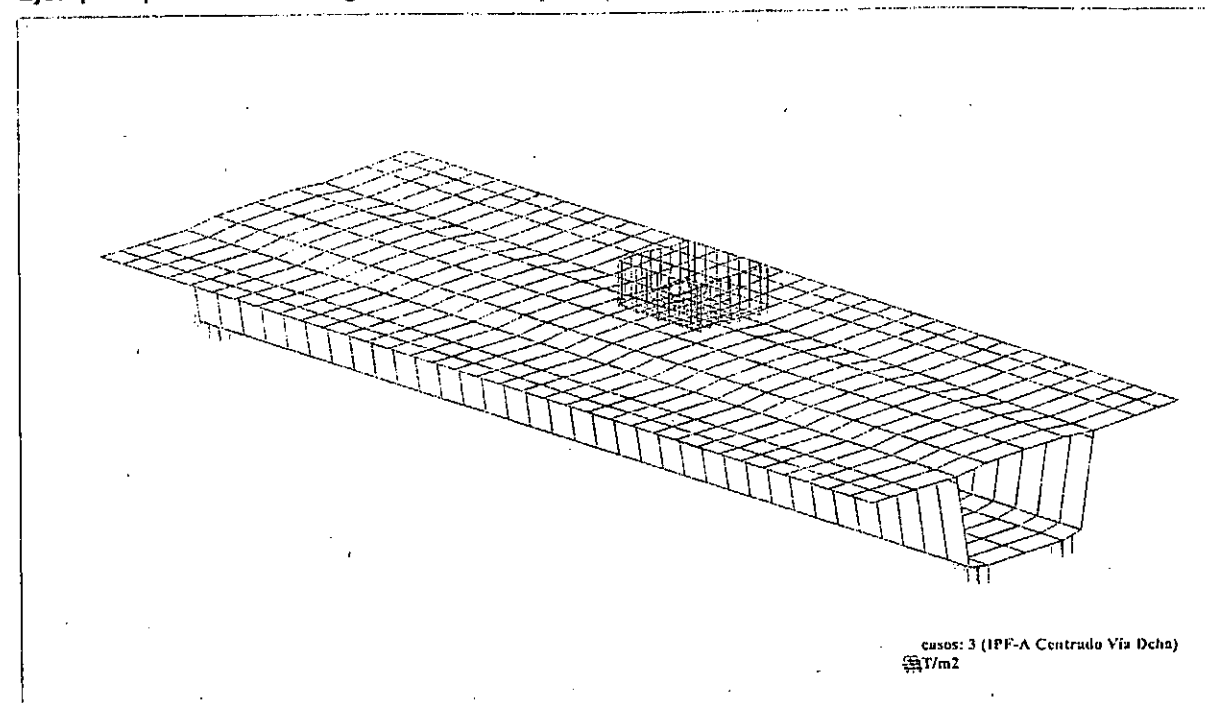
### Cargas Aplicadas al Modelo de Cálculo

| Caso | Nombre del caso               | Tipo de carga                   | Lista                                           | Valores de carga                                                                                         |
|------|-------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1    | Peso Propio                   | peso propio                     | 101A660                                         | PZ Menos                                                                                                 |
| 2    | Cargas Permanentes            | (EF) uniforme                   | 101A645CA16 102A646CA16                         | PZ=-1.652(T/m^2)                                                                                         |
| 2    | Cargas Permanentes            | (EF) uniforme                   | 105A649CA16 107A651CA16 109A653CA16             | PZ=-1.205(T/m^2)                                                                                         |
| 2    | Cargas Permanentes            | (EF) uniforme                   | 106A650CA16 108A652CA16 110A654CA16             | PZ=-1.075(T/m^2)                                                                                         |
| 3    | IPF-A Centrado Vía Dcha       | (EF) superficial 3p (contornos) | 346A410CA16 348A412CA16 350A414CA16             | PZ1=-12.460(T/m^2) P1(15.7, 0.75, 3.8) P2(19.3, 0.75, 3.8) P3(19.3, 3.95, 3.8) P4(15.7, 3.95, 3.8)       |
| 4    | IPF-A Centrado Vía Izqu       | (EF) superficial 3p (contornos) | 345A409CA16 347A411CA16 349A413CA16             | PZ1=-12.460(T/m^2) P1(15.7, -0.75, 3.8) P2(19.3, -0.75, 3.8) P3(19.3, -3.95, 3.8) P4(15.7, -3.95, 3.8)   |
| 5    | IPF-A Ripado+ Vía Dcha        | (EF) superficial 3p (contornos) | 346A410CA16 348A412CA16 350A414CA16             | PZ1=-12.460(T/m^2) P1(15.7, 1.12, 3.8) P2(19.3, 1.12, 3.8) P3(19.3, 4.32, 3.8) P4(15.7, 4.32, 3.8)       |
| 6    | IPF-A Ripado+ Vía Izqu        | (EF) superficial 3p (contornos) | 345A409CA16 347A411CA16 349A413CA16             | PZ1=-12.460(T/m^2) P1(15.7, -0.385, 3.8) P2(19.3, -0.385, 3.8) P3(19.3, -3.59, 3.8) P4(15.7, -3.59, 3.8) |
| 7    | IPF-A Ripado- Vía Dcha        | (EF) superficial 3p (contornos) | 346A410CA16 348A412CA16 350A414CA16             | PZ1=-12.460(T/m^2) P1(15.7, 0.435, 3.8) P2(19.3, 0.435, 3.8) P3(19.3, 3.63, 3.8) P4(15.7, 3.63, 3.8)     |
| 8    | IPF-A Ripado- Vía Izqu        | (EF) superficial 3p (contornos) | 345A409CA16 347A411CA16 349A413CA16             | PZ1=-12.460(T/m^2) P1(15.7, -1.06, 3.8) P2(19.3, -1.06, 3.8) P3(19.3, -4.26, 3.8) P4(15.7, -4.26, 3.8)   |
| 9    | LM-71 Centrado Vía Dcha       | (EF) superficial 3p (contornos) | 330A410CA16 332A412CA16 334A414CA16 458 460 462 | PZ1=-6.890(T/m^2) P1(14.8, 0.75, 3.8) P2(20.2, 0.75, 3.8) P3(20.2, 3.95, 3.8) P4(14.8, 3.95, 3.8)        |
| 10   | LM-71 Centrado Vía Izqu       | (EF) superficial 3p (contornos) | 329A409CA16 331A411CA16 333A413CA16 457 459 461 | PZ1=-6.890(T/m^2) P1(14.8, -0.75, 3.8) P2(20.2, -0.75, 3.8) P3(20.2, -3.95, 3.8) P4(14.8, -3.95, 3.8)    |
| 11   | LM-71 Ripado+ Vía Dcha        | (EF) superficial 3p (contornos) | 330A410CA16 332A412CA16 334A414CA16 458 460 462 | PZ1=-6.890(T/m^2) P1(14.8, 1.19, 3.8) P2(20.2, 1.19, 3.8) P3(20.2, 4.39, 3.8) P4(14.8, 4.39, 3.8)        |
| 12   | LM-71 Ripado+ Vía Izqu        | (EF) superficial 3p (contornos) | 329A409CA16 331A411CA16 333A413CA16 457 459 461 | PZ1=-6.890(T/m^2) P1(14.8, -0.396, 3.8) P2(14.8, -3.6, 3.8) P3(20.2, -3.6, 3.8) P4(20.2, -0.396, 3.8)    |
| 13   | LM-71 Ripado- Vía Dcha        | (EF) superficial 3p (contornos) | 330A410CA16 332A412CA16 334A414CA16 458 460 462 | PZ1=-6.890(T/m^2) P1(14.8, 0.345, 3.8) P2(20.2, 0.345, 3.8) P3(20.2, 3.54, 3.8) P4(14.8, 3.54, 3.8)      |
| 14   | LM-71 Ripado- Vía Izqu        | (EF) superficial 3p (contornos) | 329A409CA16 331A411CA16 333A413CA16 457 459 461 | PZ1=-6.890(T/m^2) P1(14.8, -1.16, 3.8) P2(20.2, -1.16, 3.8) P3(20.2, -4.36, 3.8) P4(14.8, -4.36, 3.8)    |
| 15   | Descarrilamiento Ext Vía Dcha | (EF) superficial 3p (contornos) | 330A410CA16 332A412CA16 458 460                 | PZ1=-14.035(T/m^2) P1(14.9, 2.6, 3.8) P2(20.1, 2.6, 3.8) P3(20.1, 4.5, 3.8) P4(14.9, 4.5, 3.8)           |
| 16   | Descarrilamiento Int Vía Dcha | (EF) superficial 3p (contornos) | 332A412CA16 334A414CA16 460 462                 | PZ1=-14.035(T/m^2) P1(14.9, 0.197, 3.8) P2(20.1, 0.197, 3.8) P3(20.1, 2.1, 3.8) P4(14.9, 2.1, 3.8)       |
| 17   | Descarrilamiento Ext Vía Izqu | (EF) superficial 3p (contornos) | 329A409CA16 331A411CA16 457 459                 | PZ1=-14.035(T/m^2) P1(14.9, -2.6, 3.8) P2(20.1, -2.6, 3.8) P3(20.1, -4.5, 3.8) P4(14.9, -4.5, 3.8)       |
| 18   | Descarrilamiento Int Vía Izqu | (EF) superficial 3p (contornos) | 331A411CA16 333A413CA16 459 461                 | PZ1=-14.035(T/m^2) P1(14.9, -0.197, 3.8) P2(20.1, -0.197, 3.8) P3(20.1, -2.1, 3.8) P4(14.9, -2.1, 3.8)   |
| 19   | Sobrecarga Paseo Dcho         | (EF) uniforme                   | 102A646CA16                                     | PZ=-0.500(T/m^2)                                                                                         |
| 20   | Sobrecarga Paseo Izqu         | (EF) uniforme                   | 101A645CA16                                     | PZ=-0.500(T/m^2)                                                                                         |
| 21   | Sobrecarga Paseo Dcho Concom  | (EF) uniforme                   | 102A646CA16                                     | PZ=-0.250(T/m^2)                                                                                         |
| 22   | Sobrecarga Paseo Izqu Concom  | (EF) uniforme                   | 101A645CA16                                     | PZ=-0.250(T/m^2)                                                                                         |

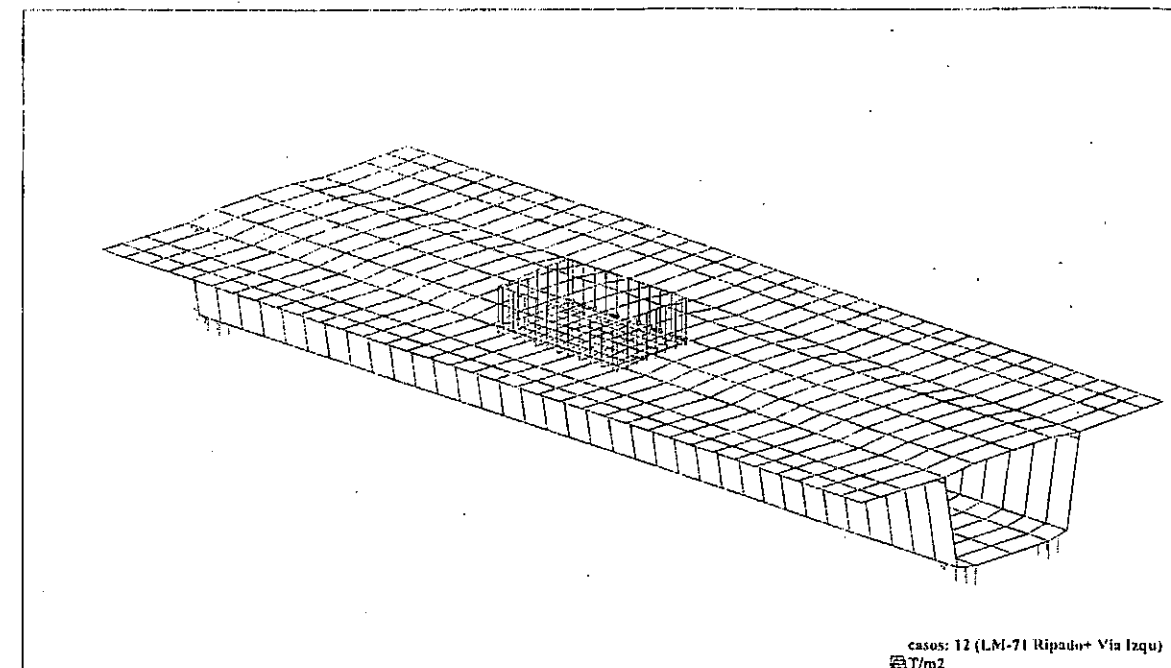
## Combinación de Acciones

| Combinación | Nombre  | Tipo de análisis   | Naturaleza de combinación | Naturaleza de caso | Definición                      |
|-------------|---------|--------------------|---------------------------|--------------------|---------------------------------|
| 101 (C)     | ELU-1   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+20*1.50$            |
| 102 (C)     | ELU-2   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(19+20)*1.50$       |
| 103 (C)     | ELU-3   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(4+22)*1.50$        |
| 104 (C)     | ELU-4   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(3+4+21+22)*1.50$   |
| 105 (C)     | ELU-5   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(6+22)*1.50$        |
| 106 (C)     | ELU-6   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(5+6+21+22)*1.50$   |
| 107 (C)     | ELU-7   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(8+22)*1.50$        |
| 108 (C)     | ELU-8   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(7+8+21+22)*1.50$   |
| 109 (C)     | ELU-9   | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(10+22)*1.50$       |
| 110 (C)     | ELU-10  | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(9+10+21+22)*1.50$  |
| 111 (C)     | ELU-11  | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(12+22)*1.50$       |
| 112 (C)     | ELU-12  | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(11+12+21+22)*1.50$ |
| 113 (C)     | ELU-13  | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(14+22)*1.50$       |
| 114 (C)     | ELU-14  | Combinación lineal | ELU                       | permanente         | $(1+2)*1.35+(13+14+21+22)*1.50$ |
| 151 (C)     | ELU-A1  | Combinación lineal | AKC                       | permanente         | $(1+2+17)*1.00+22*0.50$         |
| 152 (C)     | ELU-A2  | Combinación lineal | AKC                       | permanente         | $(1+2+17+15)*1.00+(21+22)*0.50$ |
| 153 (C)     | ELU-A3  | Combinación lineal | AKC                       | permanente         | $(1+2+17+16)*1.00+(21+22)*0.50$ |
| 154 (C)     | ELU-A4  | Combinación lineal | AKC                       | permanente         | $(1+2+18)*1.00+22*0.50$         |
| 155 (C)     | ELU-A5  | Combinación lineal | AKC                       | permanente         | $(1+2+18+15)*1.00+(21+22)*0.50$ |
| 156 (C)     | ELU-A6  | Combinación lineal | AKC                       | permanente         | $(1+2+18+16)*1.00+(21+22)*0.50$ |
| 201 (C)     | ELS-C1  | Combinación lineal | ELS                       | permanente         | $(1+2+20)*1.00$                 |
| 202 (C)     | ELS-C2  | Combinación lineal | ELS                       | permanente         | $(1+2+19+20)*1.00$              |
| 203 (C)     | ELS-C3  | Combinación lineal | ELS                       | permanente         | $(1+2+4+22)*1.00$               |
| 204 (C)     | ELS-C4  | Combinación lineal | ELS                       | permanente         | $(1+2+3+4+21+22)*1.00$          |
| 205 (C)     | ELS-C5  | Combinación lineal | ELS                       | permanente         | $(1+2+6+22)*1.00$               |
| 206 (C)     | ELS-C6  | Combinación lineal | ELS                       | permanente         | $(1+2+5+6+21+22)*1.00$          |
| 207 (C)     | ELS-C7  | Combinación lineal | ELS                       | permanente         | $(1+2+8+22)*1.00$               |
| 208 (C)     | ELS-C8  | Combinación lineal | ELS                       | permanente         | $(1+2+7+8+21+22)*1.00$          |
| 209 (C)     | ELS-C9  | Combinación lineal | ELS                       | permanente         | $(1+2+10+22)*1.00$              |
| 210 (C)     | ELS-C10 | Combinación lineal | ELS                       | permanente         | $(1+2+9+10+21+22)*1.00$         |
| 211 (C)     | ELS-C11 | Combinación lineal | ELS                       | permanente         | $(1+2+12+22)*1.00$              |
| 212 (C)     | ELS-C12 | Combinación lineal | ELS                       | permanente         | $(1+2+11+12+21+22)*1.00$        |
| 213 (C)     | ELS-C13 | Combinación lineal | ELS                       | permanente         | $(1+2+14+22)*1.00$              |
| 214 (C)     | ELS-C14 | Combinación lineal | ELS                       | permanente         | $(1+2+13+14+21+22)*1.00$        |
| 251 (C)     | ELS-F1  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+20*0.50$            |
| 252 (C)     | ELS-F2  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(19+20)*0.50$       |
| 253 (C)     | ELS-F3  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(4+22)*0.50$        |
| 254 (C)     | ELS-F4  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(3+4+21+22)*0.50$   |
| 255 (C)     | ELS-F5  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(6+22)*0.50$        |
| 256 (C)     | ELS-F6  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(5+6+21+22)*0.50$   |
| 257 (C)     | ELS-F7  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(8+22)*0.50$        |
| 258 (C)     | ELS-F8  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(7+8+21+22)*0.50$   |
| 259 (C)     | ELS-F9  | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(10+22)*0.50$       |
| 260 (C)     | ELS-F10 | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(9+10+21+22)*0.50$  |
| 261 (C)     | ELS-F11 | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(12+22)*0.50$       |
| 262 (C)     | ELS-F12 | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(11+12+21+22)*0.50$ |
| 263 (C)     | ELS-F13 | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(14+22)*0.50$       |
| 264 (C)     | ELS-F14 | Combinación lineal | ELS                       | permanente         | $(1+2)*1.00+(13+14+21+22)*0.50$ |

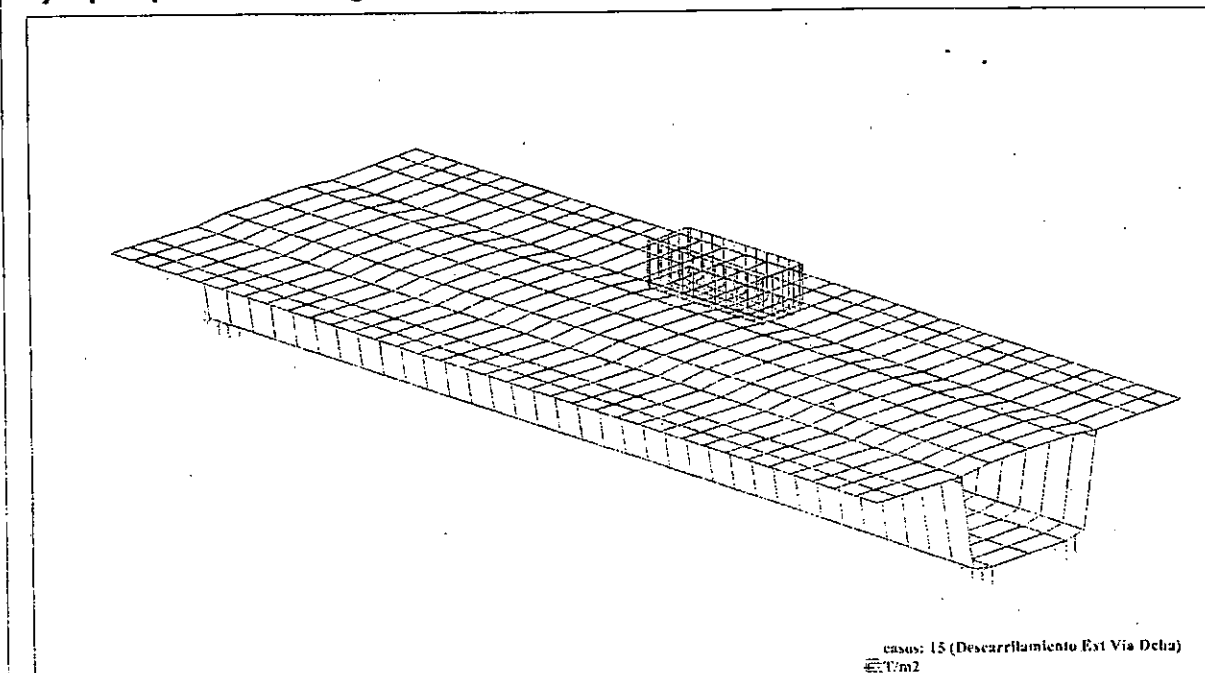
### Ejemplo Aplicación de Cargas. Vehículo Tipo A (IPF)



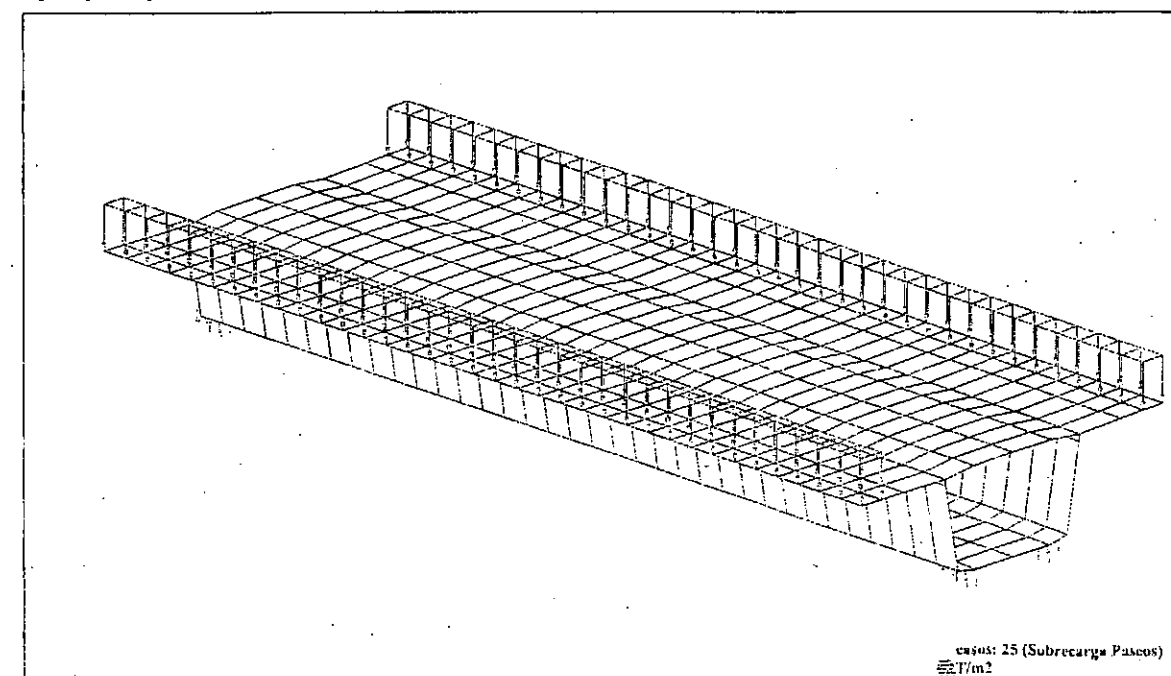
### Ejemplo Aplicación de Cargas. Vehículo LM-71 (EC)



### Ejemplo Aplicación de Cargas. Descarrilamiento



### Ejemplo Aplicación de Cargas. Sobrecarga Paseos





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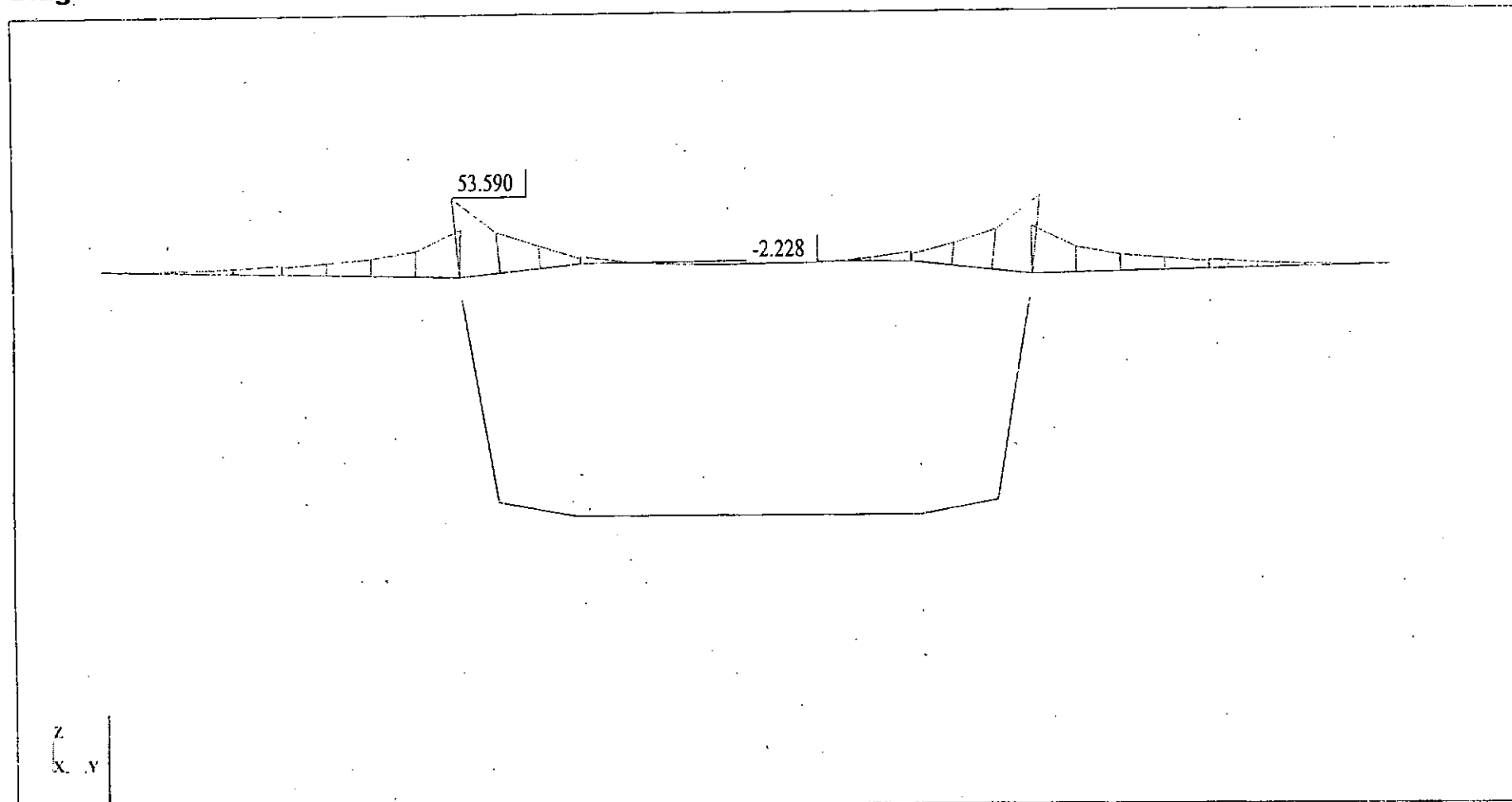
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### Diagrama Flexión Transversal en ELU. Máximos Momentos Negativos



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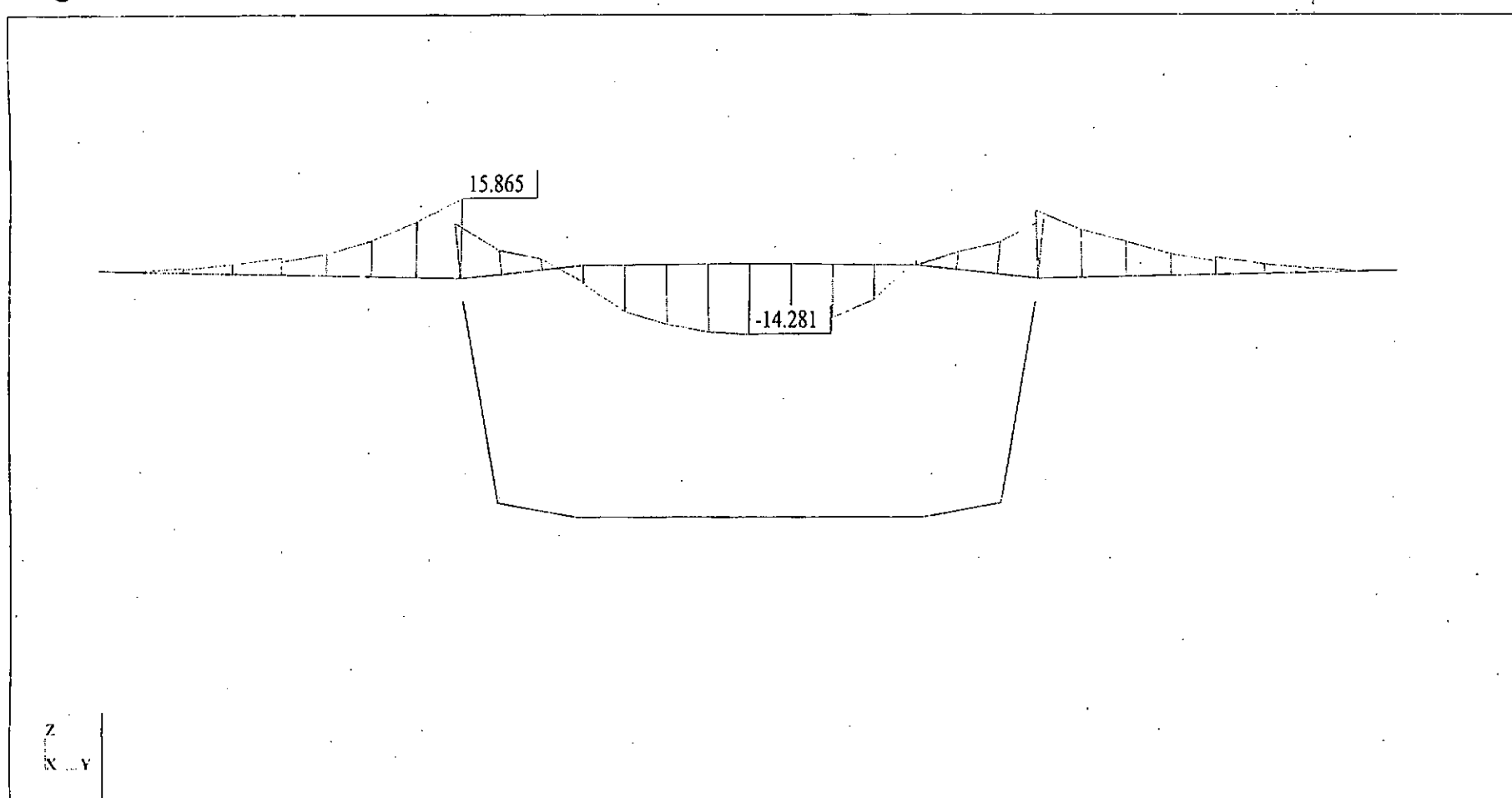
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### Diagrama Flexión Transversal en ELU. Máximos Momentos Positivos



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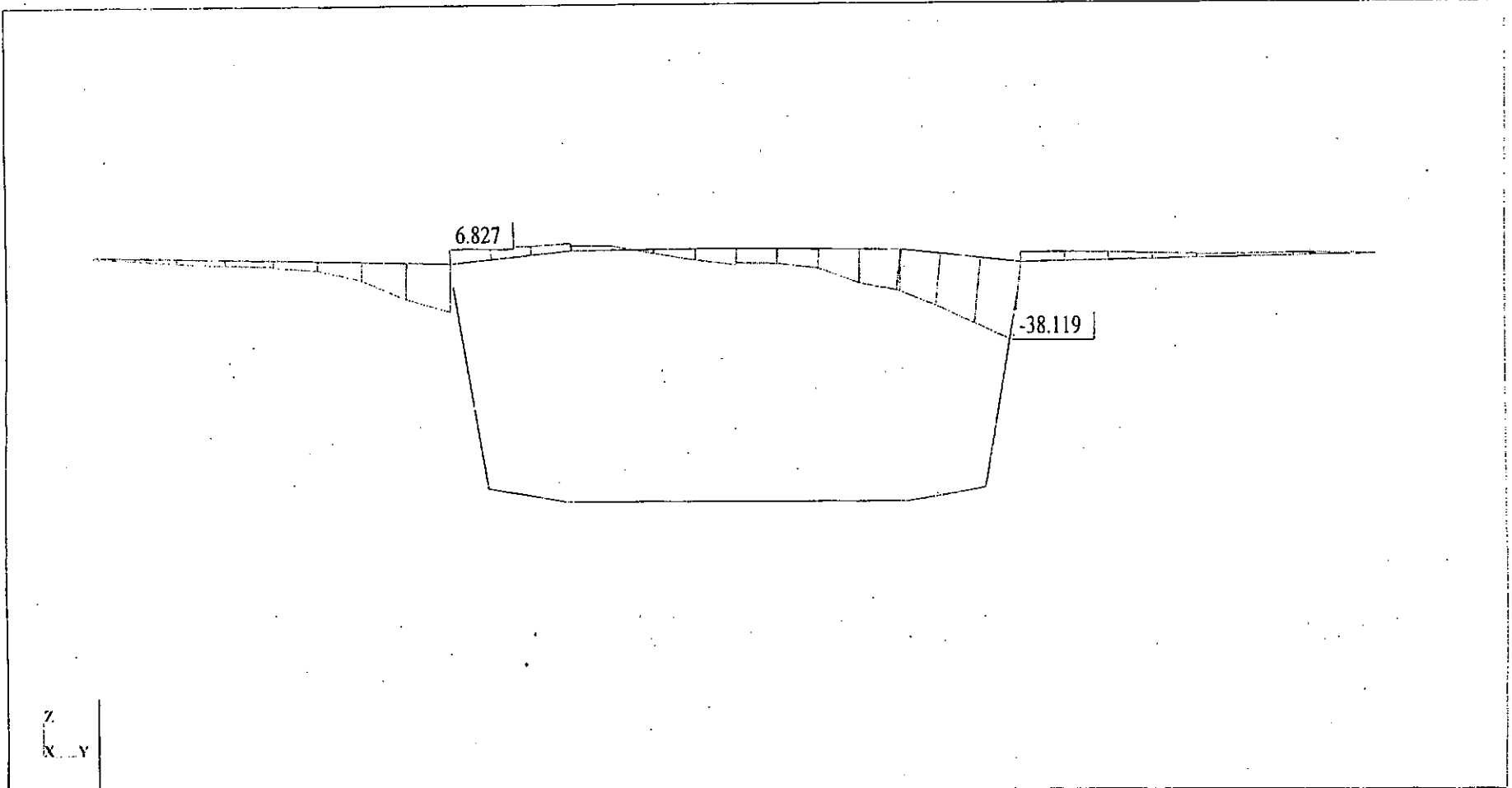


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### Diagrama Flexión Transversal en ELU. Máximos Cortantes Negativos



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Página : 4

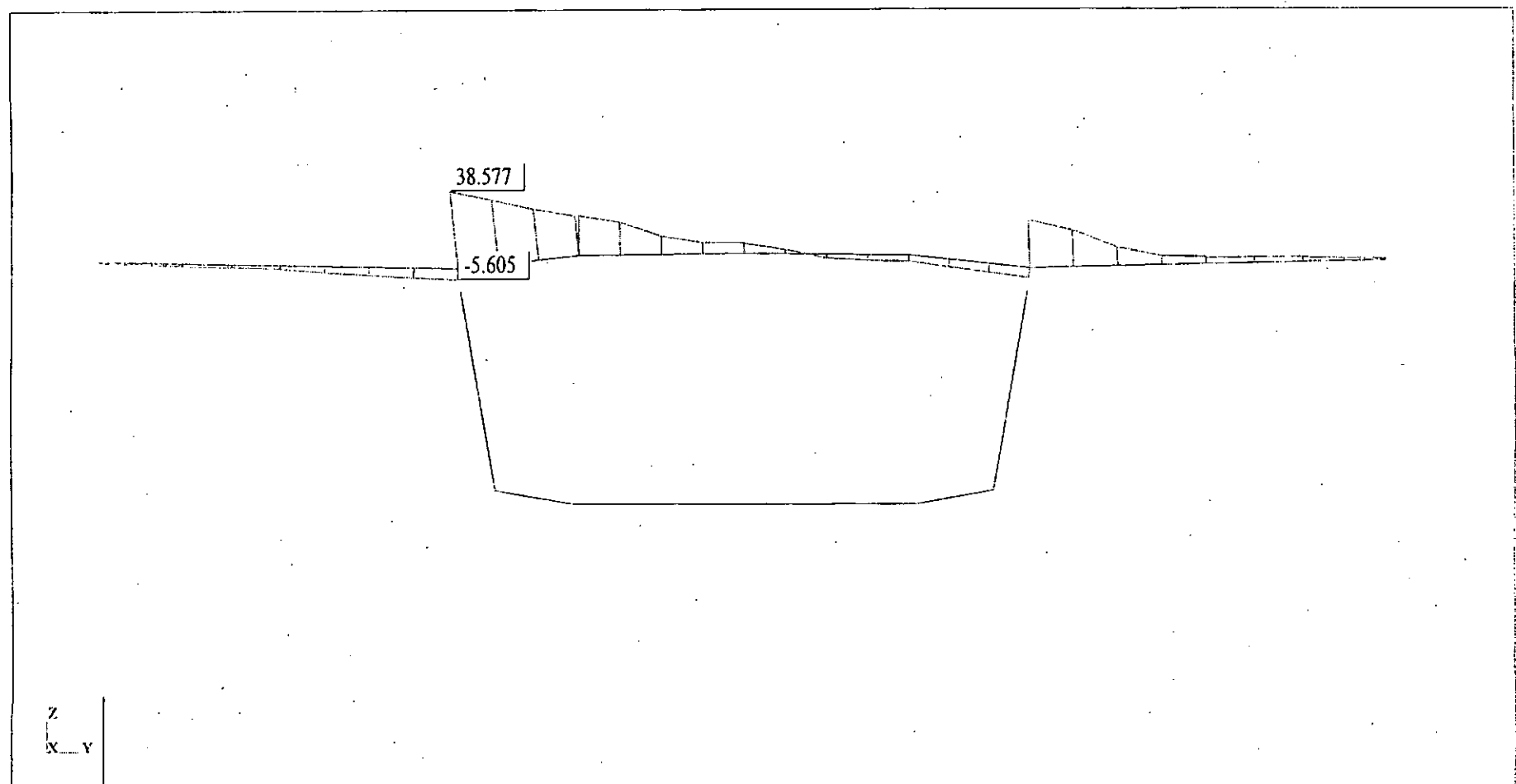


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### Diagrama Flexión Transversal en ELU. Máximos Cortantes Positivos

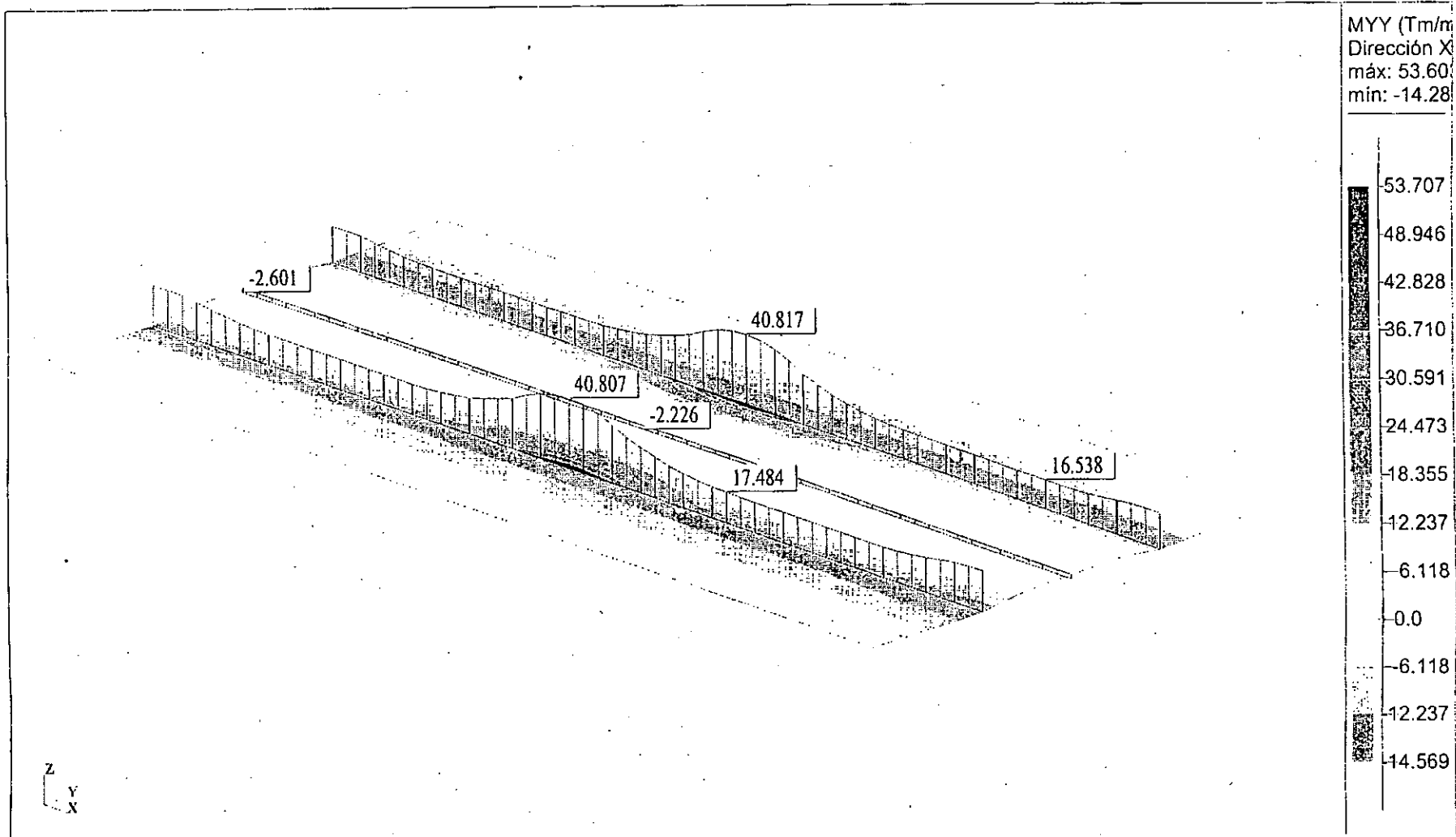


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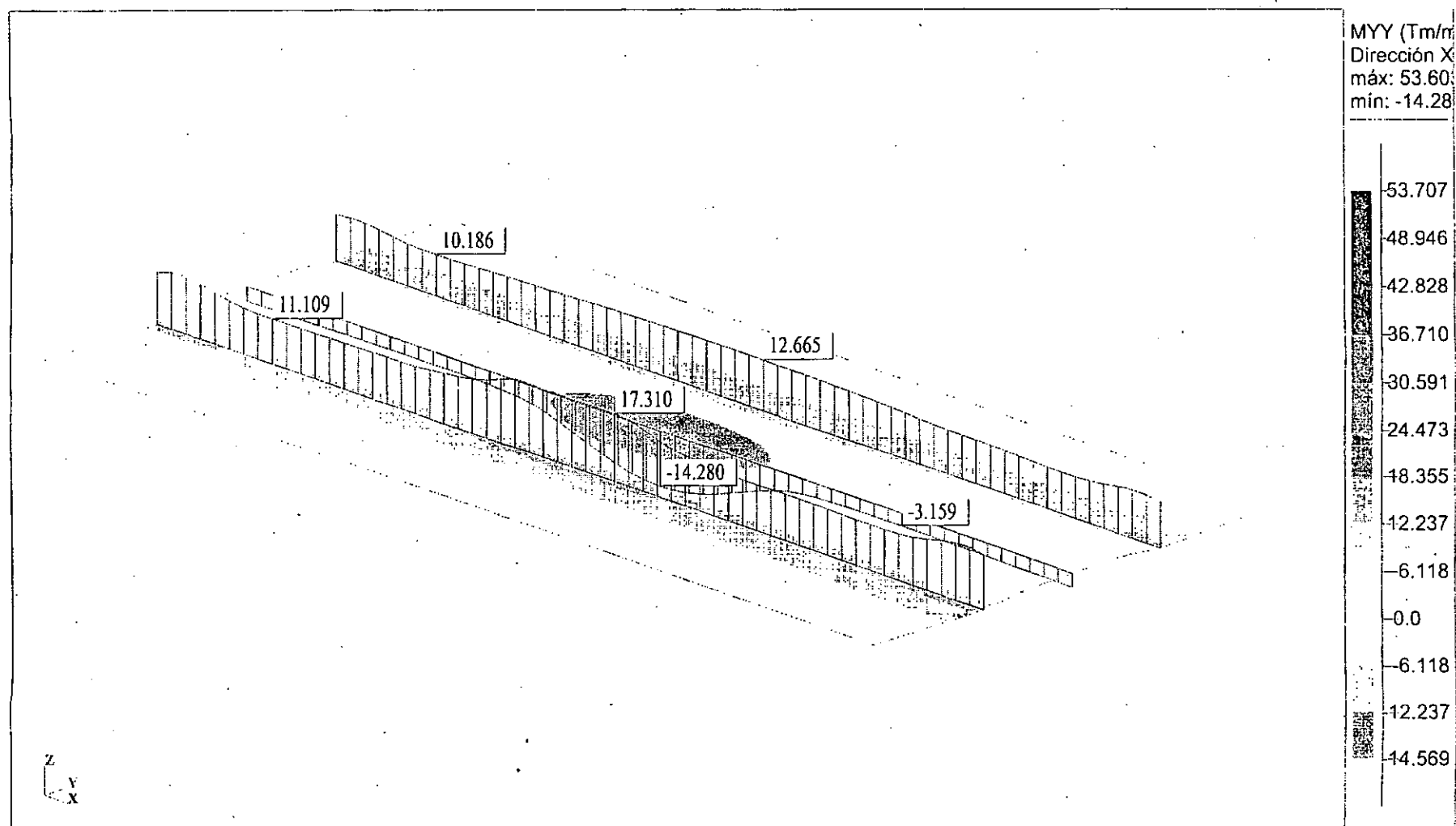
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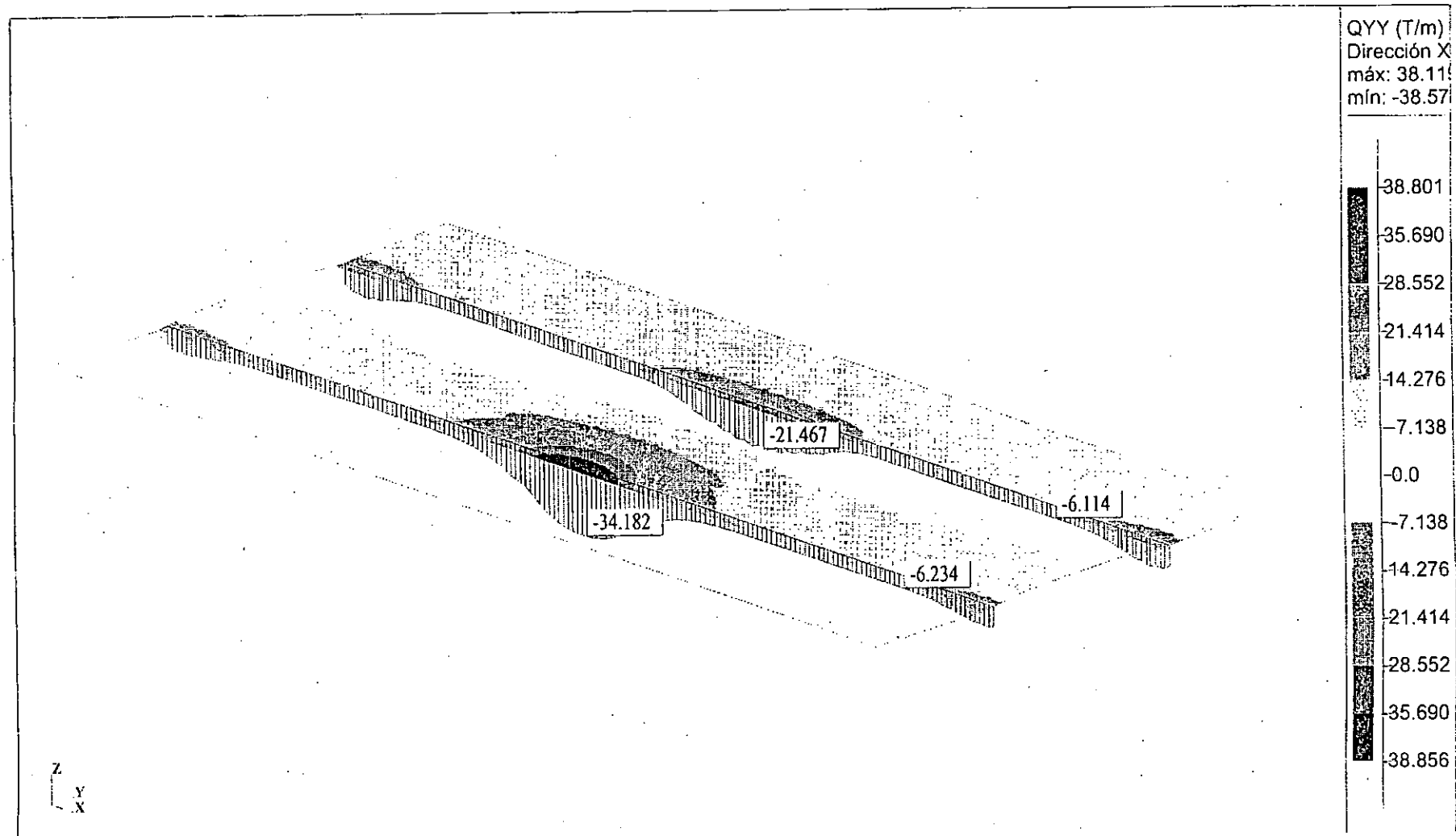


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### Mínimo Cortante en Secciones 3 y 4. ELU



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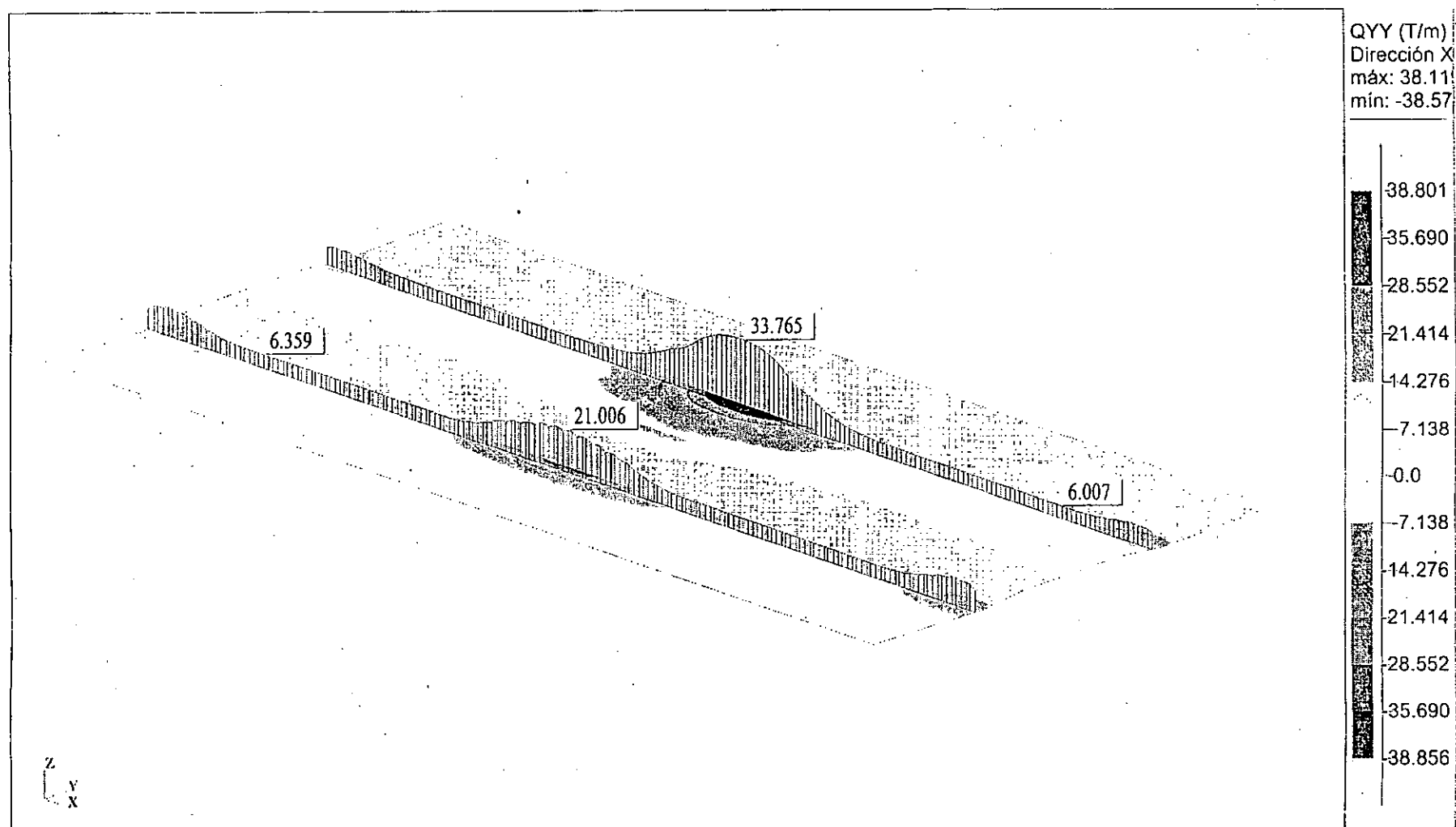


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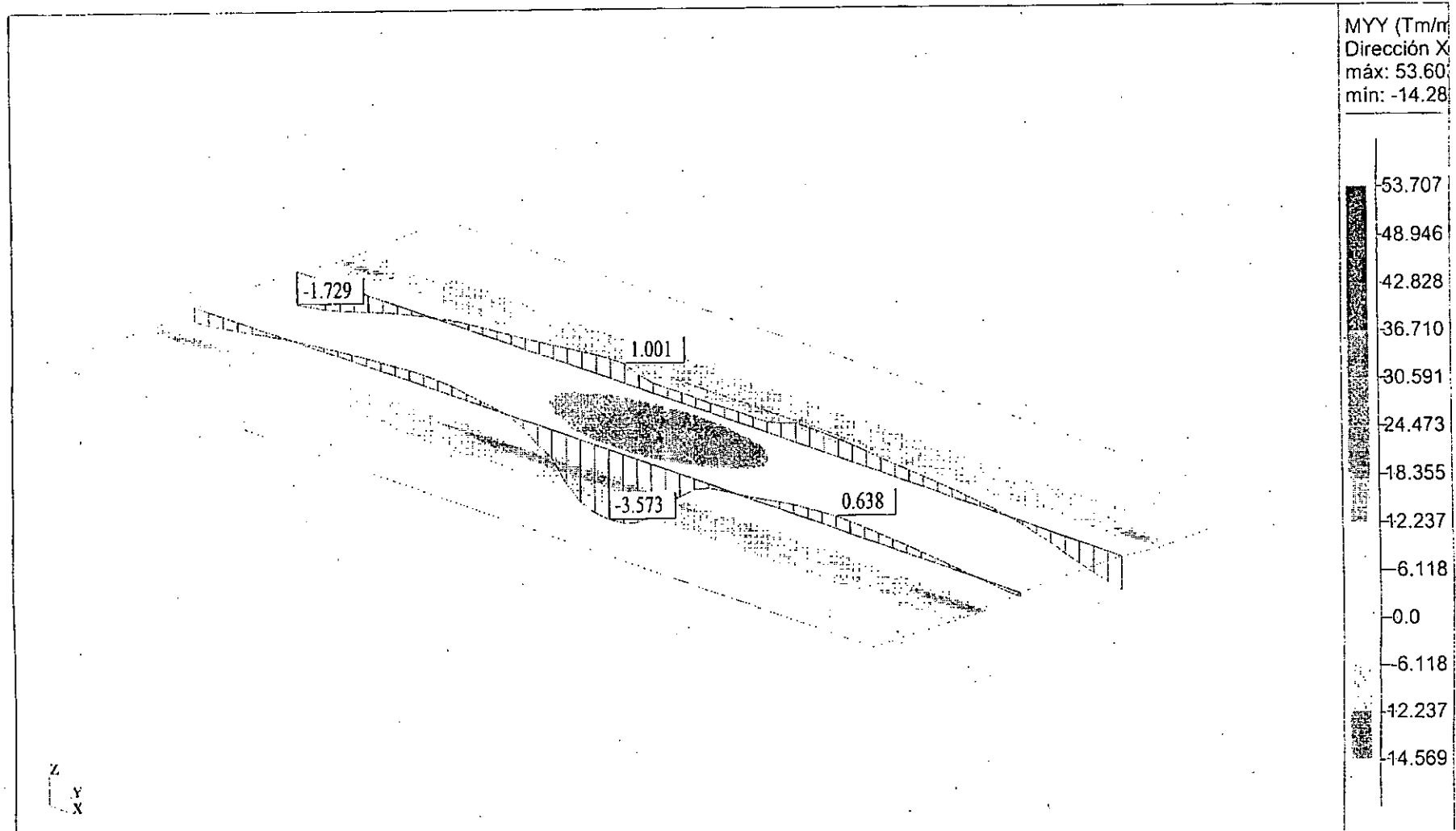
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### Máximo Cortante en Secciones 3 y 4. ELU



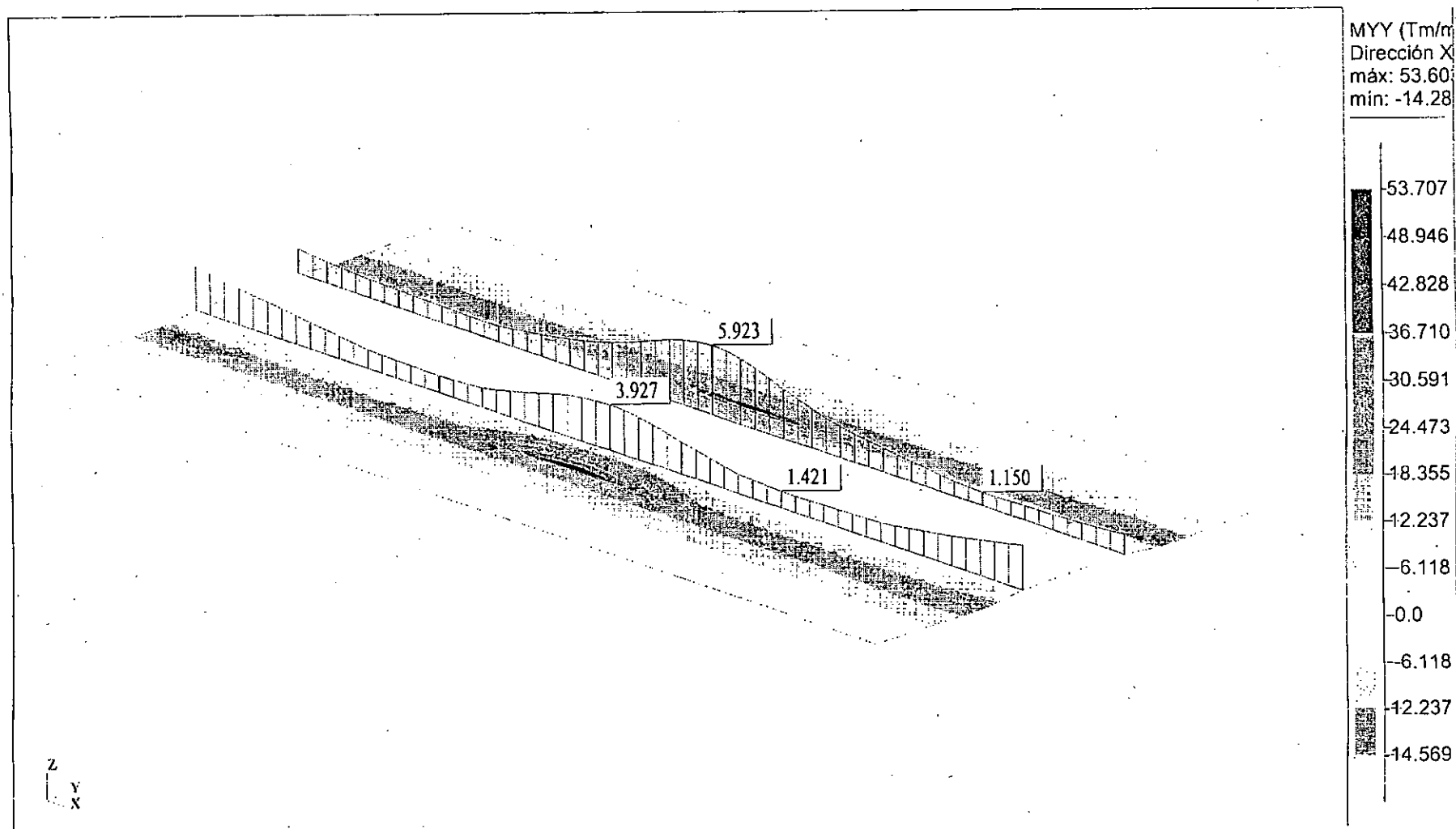
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Página : 5

**Máxima Flexión Transversal Positiva en Sección 2. ELU**

Fecha : 16/07/03

Página : 6

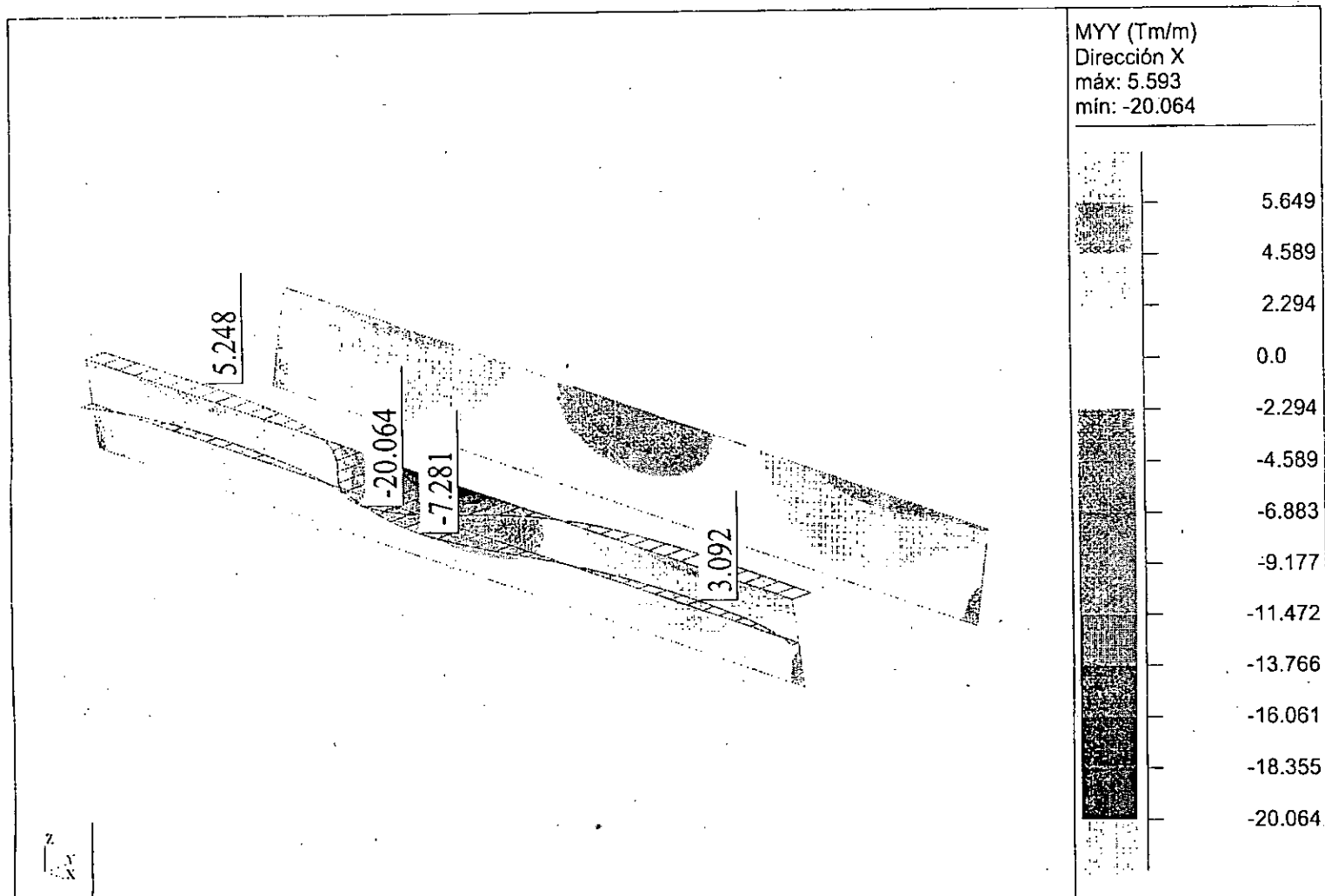
**Máxima Flexión Transversal Negativa en Sección 2. ELU**

Fecha : 16/07/03

Página : 7



### Máxima Flexión Transversal Negativa en Secciones 5, 6 y 7. ELU

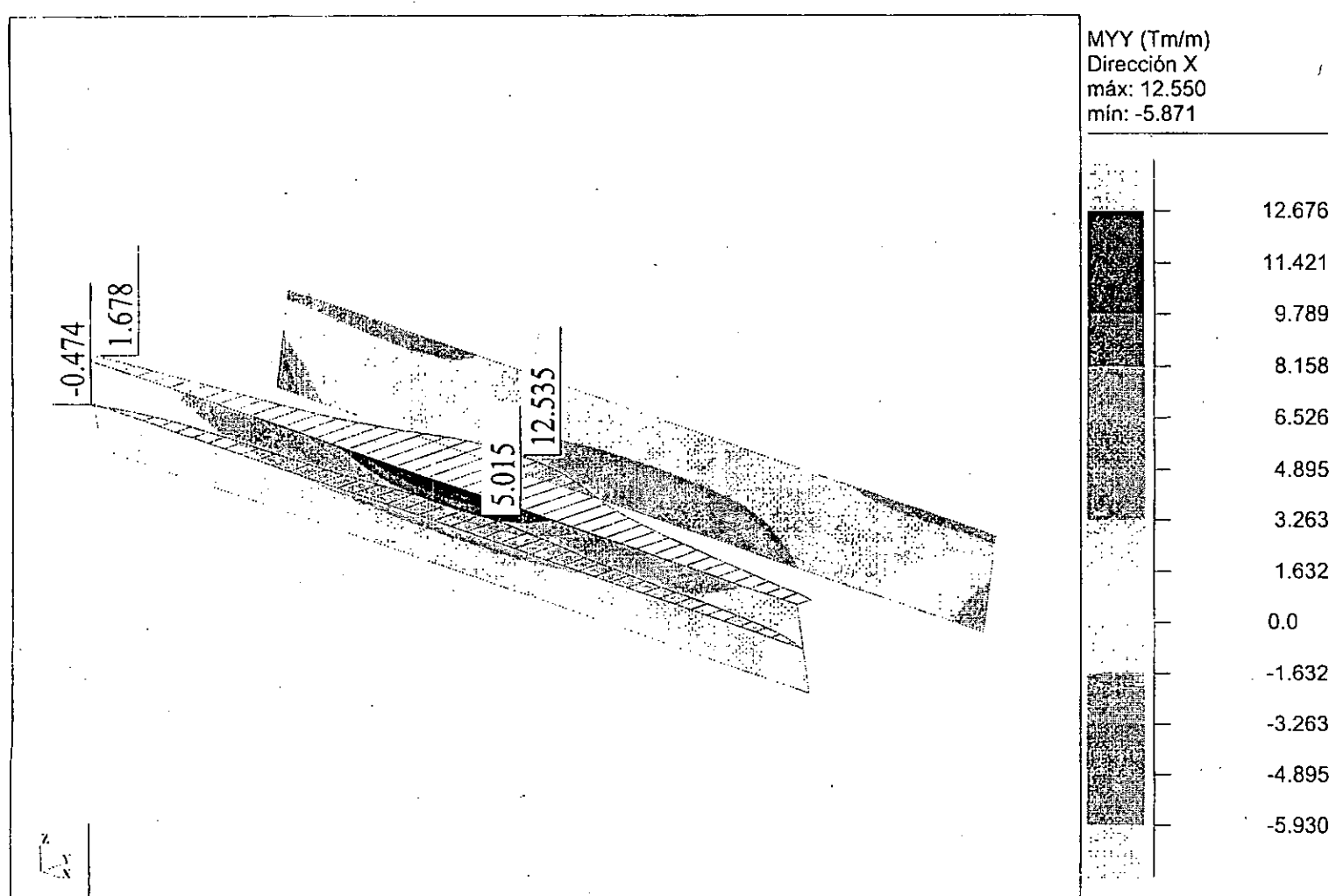


Fecha : 16/07/03

Página : 6



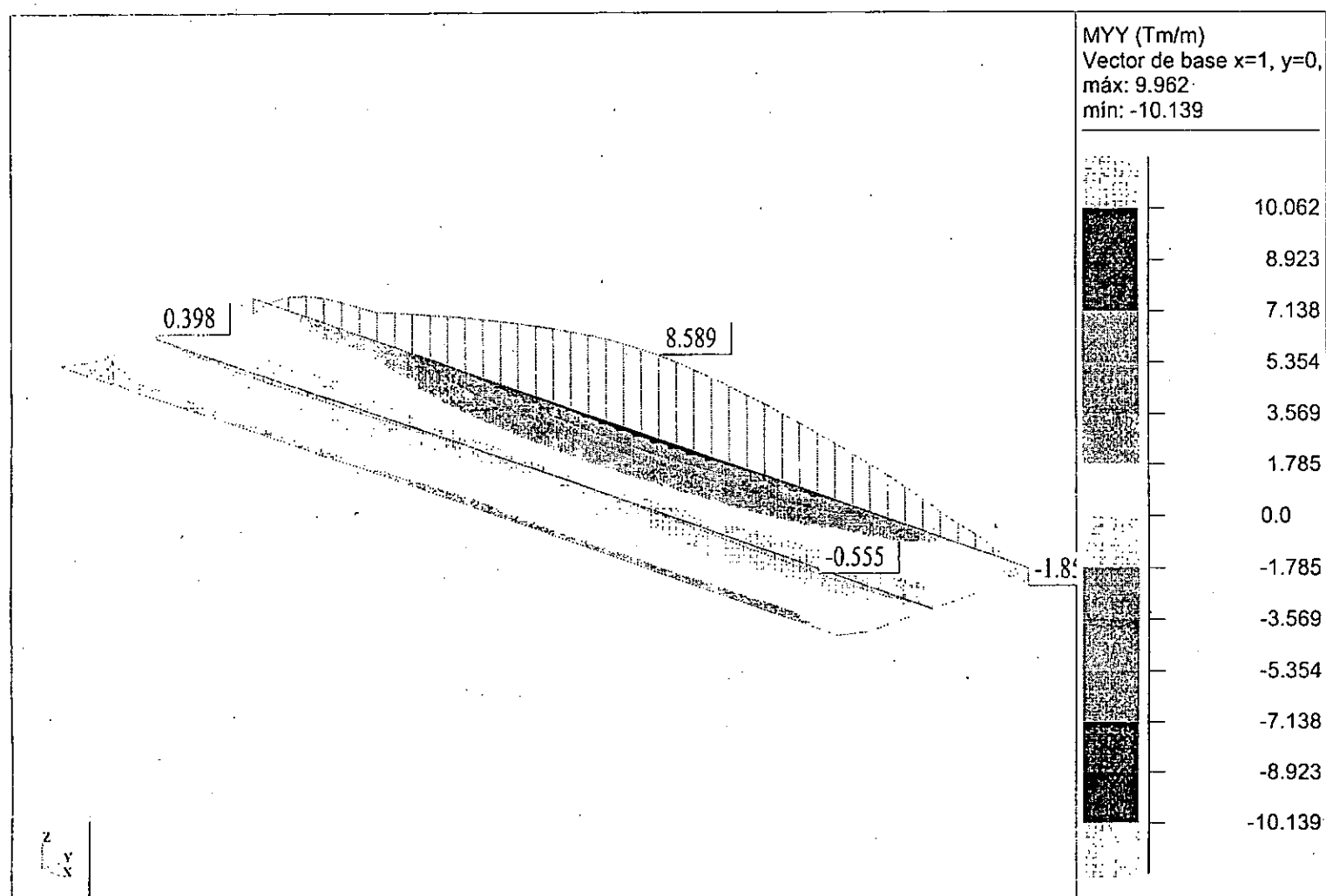
### Máxima Flexión Transversal Positiva en Secciones 5, 6 y 7. ELU



Fecha : 16/07/03

Página : 7

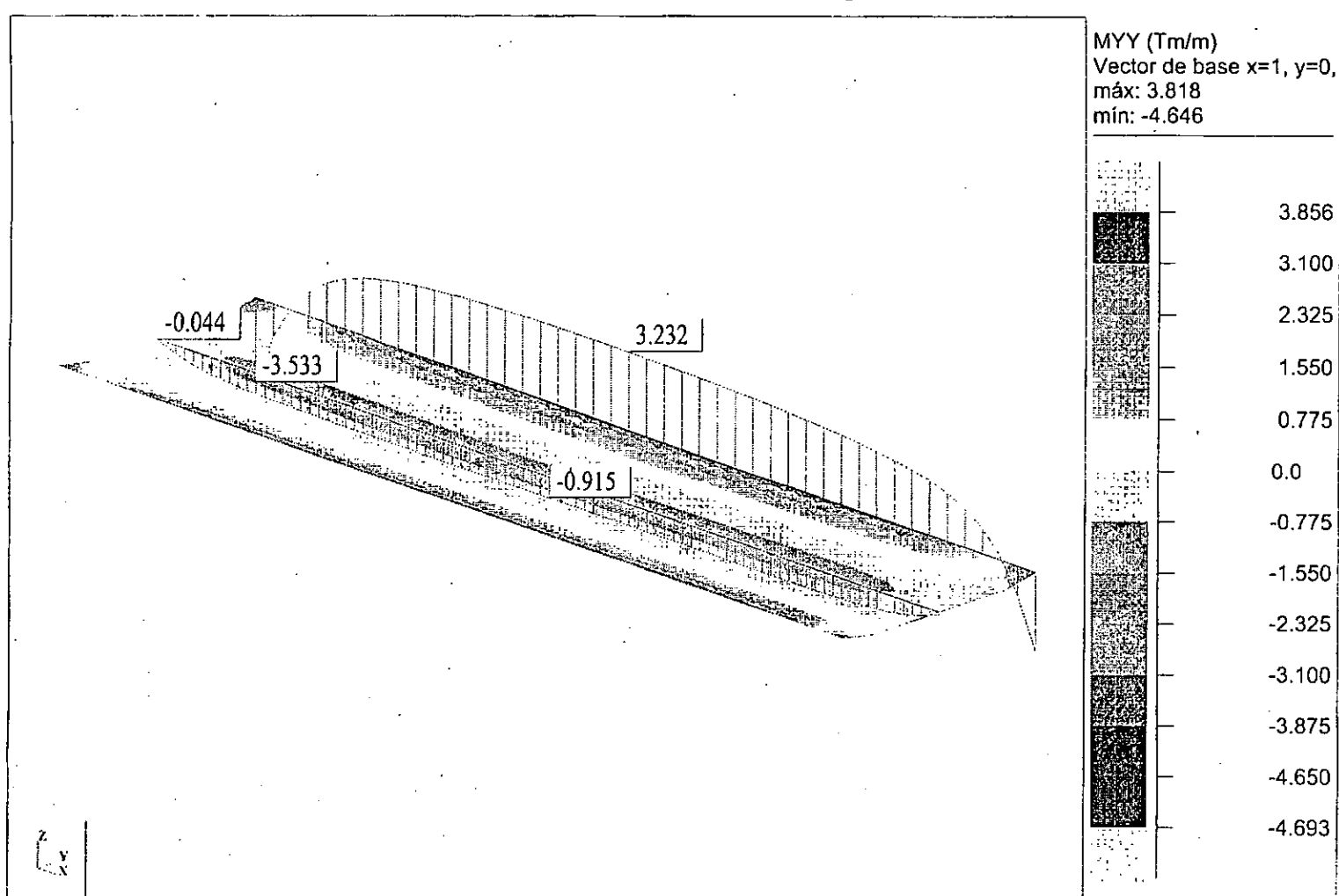
### Máximos Momentos Flectores Negativos en Secciones 8 y 10. ELU



Fecha : 16/07/03

Página : 8

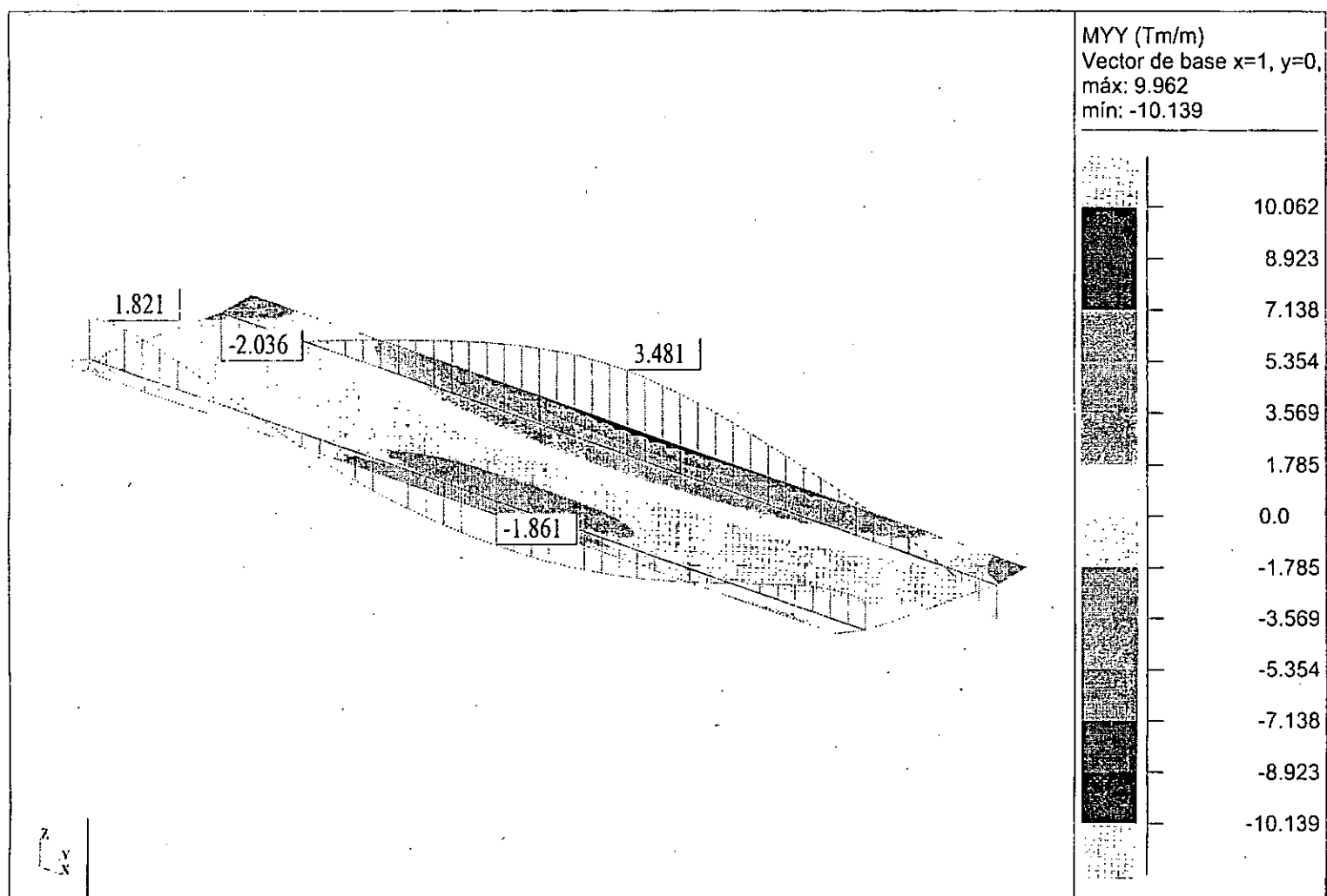
### Máximos Momentos Flectores Positivos en Secciones 8 y 10. ELU



Fecha : 16/07/03

Página : 9

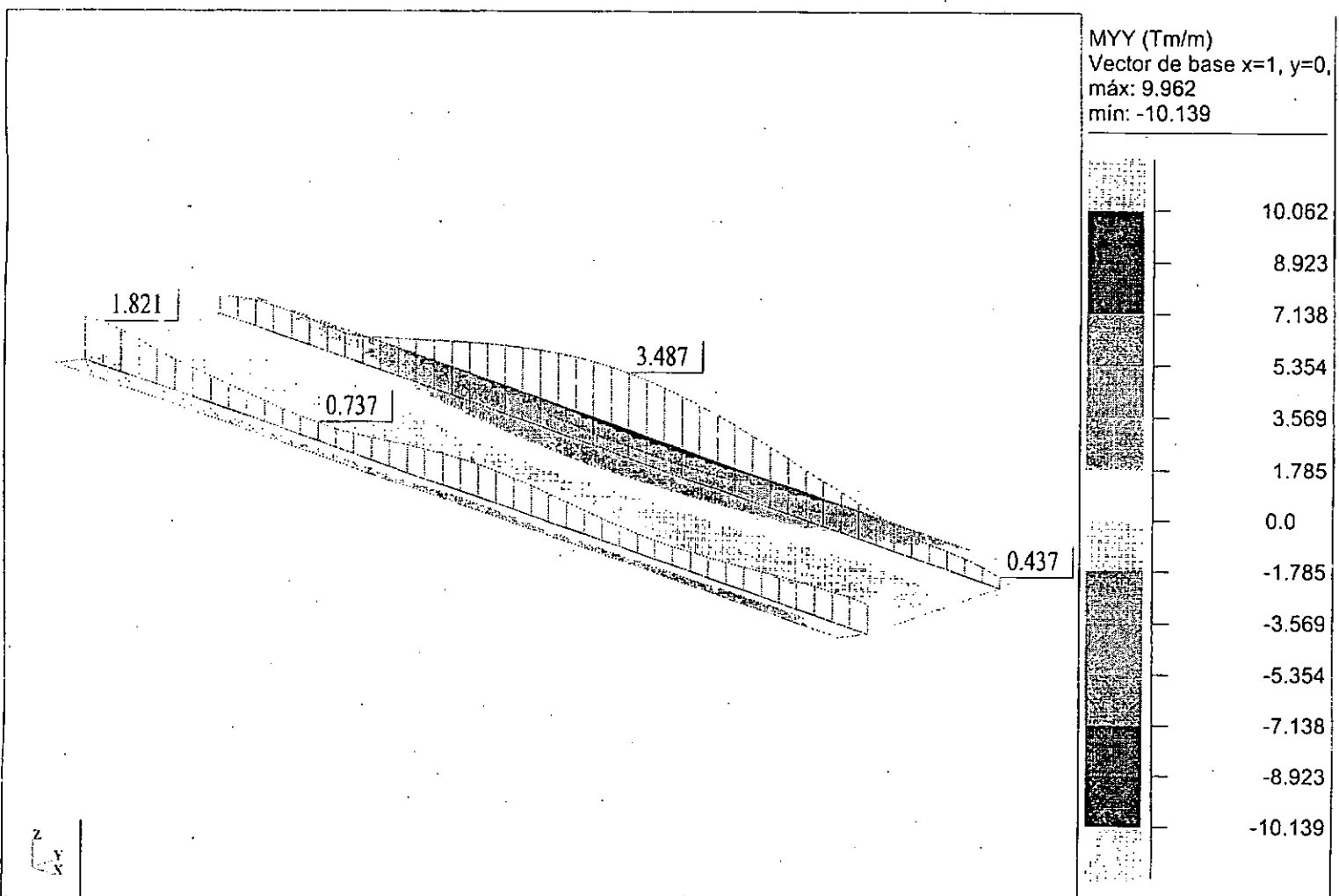
### Máximos Momentos Flectores Positivos en Sección 9. ELU



Fecha : 16/07/03

Página : 10

### Máximos Momentos Flectores Negativos en Sección 9. ELU



Fecha : 16/07/03

Página : 11



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anoia - Flexión Transversal  
Fecha: 16/07/2003  
Hora: 18:27:17

## Cálculo Armadura Necesaria por Flexión Transversal- Sección 1

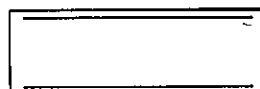
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 50.00  
fyk [MPa] = 500.00  
 $\gamma_c$  = 1.50  
 $\gamma_s$  = 1.15

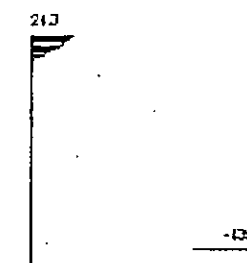
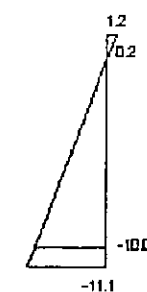
#### -- Sección

Sección : SECCION-1  
b [m] = 1.00  
h [m] = 0.34  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Dimensionamiento

Md [kN·m] = 142.8



#### Plano de deformación de agotamiento

x [m] = 0.034  
 $1/r$  [1/m] · 1.E-3 = 36.2  
 $\epsilon_s$  · 1.E-3 = 1.2  
 $\epsilon_i$  · 1.E-3 = -11.1

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm²] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|-------------------|------------------------|------------------|
| 0.030              | 0.0               | 0.2                    | 0.0              |
| 0.310              | 11.0              | -10.0                  | 434.8            |

At\_est [cm²] = 11.0

| $\phi$ [mm] | 12   | 14   | 16   | 20   | 25   |
|-------------|------|------|------|------|------|
| nº $\phi$   | 10   | 8    | 6    | 4    | 3    |
| nº capas    | 1    | 1    | 1    | 1    | 1    |
| At [cm²]    | 11.3 | 12.3 | 12.1 | 12.6 | 14.7 |
| wk [mm]     | 0.15 | 0.15 | 0.17 | 0.22 | 0.22 |





# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Ancoia - Flexión Transversal  
Fecha: 17/07/2003  
Hora: 13:21:34

## Cálculo Armadura Necesaria por Flexión Transversal - Sección 2

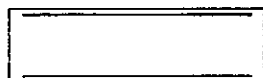
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 50.00  
fyk [MPa] = 500.00  
yc = 1.50  
ys = 1.15

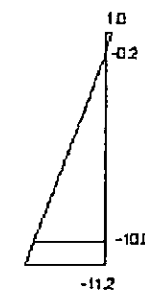
#### - Sección

Sección : SECCION-2  
b [m] = 1.00  
h [m] = 0.30  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Comprobación

At [cm²] = 6.0  
Ac [cm²] = 6.0  
Mu [kN·m] = 69.8



#### Plano de deformación de agotamiento

x [m] = 0.025  
1/r [1/m] · 1.E-3 = 40.0  
εs · 1.E-3 = 1.0  
εi · 1.E-3 = -11.2

#### Deformación y tensión de armaduras

| Profundidad | Armadura | Deformación | Tensión |
|-------------|----------|-------------|---------|
| [m]         | [cm²]    | · 1.E-3     | [MPa]   |
| 0.030       | 6.0      | -0.2        | 42.9    |
| 0.274       | 6.0      | -10.0       | 434.8   |



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anoia - Flexión Transversal  
Fecha: 16/07/2003  
Hora: 18:51:48

## Cálculo Armadura Necesaria por Flexión Transversal - Sección 3

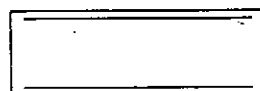
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 50.00  
fyk [MPa] = 500.00  
γc = 1.50  
γs = 1.15

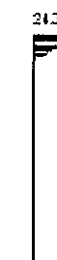
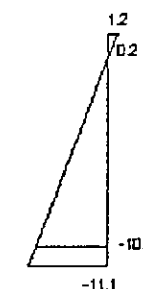
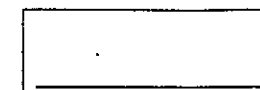
#### - Sección

Sección : SECCION-3  
b [m] = 1.00  
h [m] = 0.51  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Dimensionamiento

Md [kN·m] = 408.2



-135

#### Plano de deformación de agotamiento

x [m] = 0.059  
1/r [1/m] · 1.E-3 = 23.6  
εs · 1.E-3 = 1.4  
εi · 1.E-3 = -10.7

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm²] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|-------------------|------------------------|------------------|
| 0.030              | 0.0               | 0.7                    | 0.0              |
| 0.482              | 20.4              | -10.0                  | 434.8            |

At\_est [cm²] = 20.4

| φ [mm]   | 12   | 14   | 16   | 20   | 25   |
|----------|------|------|------|------|------|
| n°φ      | 19   | 14   | 11   | 7    | 5    |
| n° capas | 1    | 1    | 1    | 1    | 1    |
| At [cm²] | 21.5 | 21.6 | 22.1 | 22.0 | 24.5 |
| wk [mm]  | 0.17 | 0.18 | 0.19 | 0.23 | 0.24 |





# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anioa - Flexión Transversal  
Fecha: 16/07/2003  
Hora: 18:52:27

## Cálculo Armadura Necesaria por Flexión Transversal - Sección 4

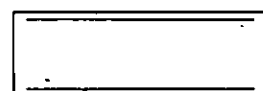
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 50.00  
fyk [MPa] = 500.00  
yc = 1.50  
ys = 1.15

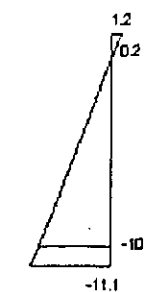
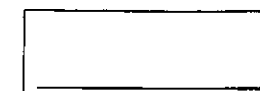
#### - Sección

Sección : SECCION-4  
b [m] = 1.00  
h [m] = 0.50  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Dimensionamiento

Md [kN·m] = 408.2



-12

#### Plano de deformación de agotamiento

x [m] = 0.059  
1/r [1/m] · 1.E-3 = 24.3  
εs · 1.E-3 = 1.4  
εi · 1.E-3 = -10.7

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm²] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|-------------------|------------------------|------------------|
| 0.030              | 0.0               | 0.7                    | 0.0              |
| 0.470              | 20.9              | -10.0                  | 434.8            |

At\_est [cm²] = 20.9

| φ [mm]   | 12   | 14   | 16   | 20   | 25   |
|----------|------|------|------|------|------|
| n°φ      | 19   | 14   | 11   | 7    | 5    |
| n° capas | 1    | 1    | 1    | 1    | 1    |
| At [cm²] | 21.5 | 21.6 | 22.1 | 22.0 | 24.5 |
| wk [mm]  | 0.18 | 0.19 | 0.20 | 0.25 | 0.25 |



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anóia - Flexión Transversal  
Fecha: 16/07/2003  
Hora: 18:54:12

## Cálculo Armadura Necesaria por Flexión Transversal Negativa - Sección 5

### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck (MPa) = 50.00  
fyk (MPa) = 500.00  
yc = 1.50  
ys = 1.15

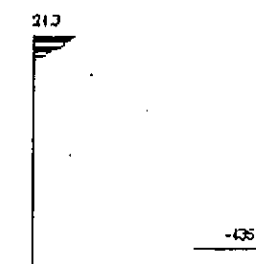
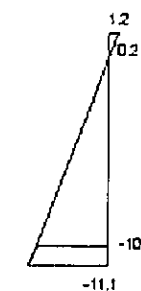
#### - Sección

Sección : SECCION-5-6-7  
b [m] = 1.00  
h [m] = 0.60  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Dimensionamiento

Md [kN·m] = 200.6



Plano de deformación de agotamiento

x [m] = 0.061  
1/r [1/m] · 1.E-3 = 19.6  
es · 1.E-3 = 1.2  
ei · 1.E-3 = -10.6

Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm²] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|-------------------|------------------------|------------------|
| 0.030              | 0.0               | 0.6                    | 0.0              |
| 0.570              | 19.2              | -10.0                  | 434.8            |

At\_est [cm²] = 19.2

| φ [mm]   | 12   | 14   | 16   | 20   | 25   |
|----------|------|------|------|------|------|
| n°φ      | 17   | 13   | 10   | 7    | 4    |
| n° capas | 1    | 1    | 1    | 1    | 1    |
| At [cm²] | 19.2 | 20.0 | 20.1 | 22.0 | 19.6 |
| wk [mm]  | 0.05 | 0.05 | 0.06 | 0.06 | 0.09 |



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anoia - Flexión Transversal  
Fecha: 16/07/2003  
Hora: 18:55:11

## Cálculo Armadura Necesaria por Flexión Transversal Positiva - Sección 5

### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 50.00  
fyk [MPa] = 500.00  
 $\gamma_c$  = 1.50  
 $\gamma_s$  = 1.15

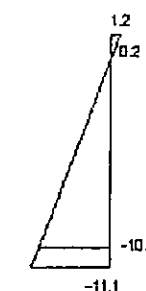
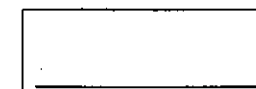
#### - Sección

Sección : SECCION-5-6-7  
b [m] = 1.00  
h [m] = 0.60  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Dimensionamiento

Md [kN·m] = 125.4



-135

#### Plano de deformación de agotamiento

$x$  [m] = 0.061  
 $1/r$  [1/m] · 1.E-3 = 19.6  
 $\epsilon_s$  · 1.E-3 = 1.2  
 $\epsilon_i$  · 1.E-3 = -10.6

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm <sup>2</sup> ] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|--------------------------------|------------------------|------------------|
| 0.030              | 0.0                            | 0.6                    | 0.0              |
| 0.570              | 19.2                           | -10.0                  | 434.8            |

At\_est [cm<sup>2</sup>] = 19.2

| $\phi$ [mm]           | 12   | 14   | 16   | 20   | 25   |
|-----------------------|------|------|------|------|------|
| n° $\phi$             | 17   | 13   | 10   | 7    | 4    |
| n° capas              | 1    | 1    | 1    | 1    | 1    |
| At [cm <sup>2</sup> ] | 19.2 | 20.0 | 20.1 | 22.0 | 19.6 |
| wk [mm]               | 0.03 | 0.03 | 0.04 | 0.04 | 0.06 |



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anoia - Flexión Transversal  
Hastiales

## Cálculo Armadura Necesaria por Flexión Transversal - Secciones 6 y 7

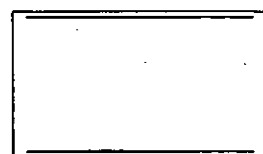
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
 $f_{ck}$  [MPa] = 40.00  
 $f_{yk}$  [MPa] = 500.00  
 $\phi_c$  = 1.50  
 $\phi_s$  = 1.15

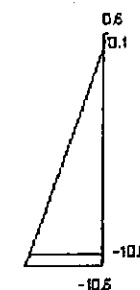
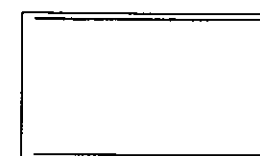
#### - Sección

Sección : SECCION-5-6-7  
 $b$  [m] = 1.00  
 $h$  [m] = 0.60  
 $r_i$  [m] = 0.030  
 $r_s$  [m] = 0.030



### 2 Comprobación

$A_t$  [cm<sup>2</sup>] = 5.0  
 $A_c$  [cm<sup>2</sup>] = 5.0  
 $M_u$  [kN·m] = 121.3



#### Plano de deformación de agotamiento

$x$  [m] = 0.033  
 $1/r$  [1/m] · 1.E-3 = 18.6  
 $\eta_s$  · 1.E-3 = 0.6  
 $\eta_i$  · 1.E-3 = -10.6

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm <sup>2</sup> ] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|--------------------------------|------------------------|------------------|
| 0.030              | 5.0                            | 0.1                    | -13.0            |
| 0.570              | 5.0                            | -10.0                  | 434.8            |

Obra: Viaducto del Anioia - Flexión Transversal  
Losa Inferior

## Cálculo Armadura Necesaria por Flexión Transversal - Sección 8

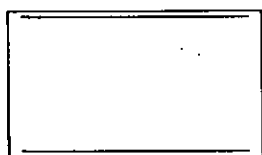
### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 40.00  
fyk [MPa] = 500.00  
 $\varphi$  = 1.50  
 $\varphi_s$  = 1.15

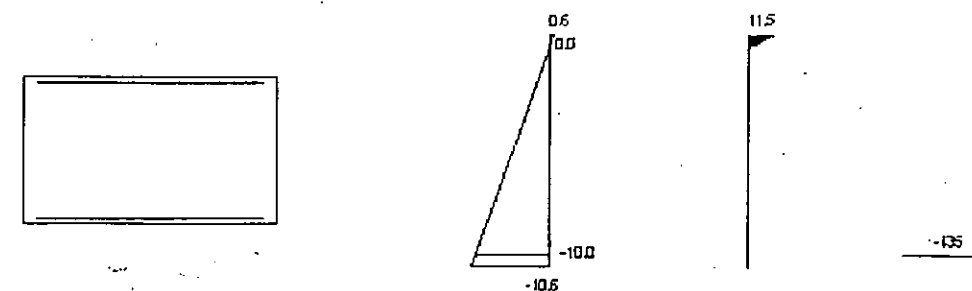
#### - Sección

Sección : SECCION-8  
b [m] = 1.00  
h [m] = 0.60  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Comprobación

At [cm²] = 4.5  
Ac [cm²] = 4.5  
Mu [kN·m] = 109.3



#### Plano de deformación de agotamiento

x [m] = 0.032  
 $1/x$  [1/m] · 1.E-3 = 18.6  
 $\eta_s$  · 1.E-3 = 0.6  
 $\eta_i$  · 1.E-3 = -10.6

#### Deformación y tensión de armaduras

| Profundidad | Armadura | Deformación | Tensión |
|-------------|----------|-------------|---------|
| [m]         | [cm²]    | · 1.E-3     | [MPa]   |
| 0.030       | 4.5      | 0.0         | -7.2    |
| 0.570       | 4.5      | -10.0       | 434.8   |



# PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Viaducto del Anoia - Flexión Transversal  
Losa Inferior

## Cálculo Armadura Necesaria por Flexión Transversal - Secciones 9 y 10

### 1 Datos

#### - Materiales

Tipo de hormigón : HA-50  
Tipo de acero : B-500-S  
fck [MPa] = 40.00  
fyk [MPa] = 500.00  
 $\varphi_c$  = 1.50  
 $\varphi_s$  = 1.15

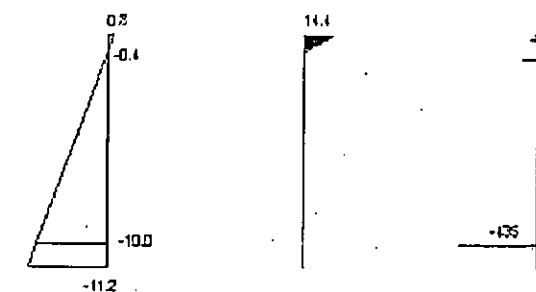
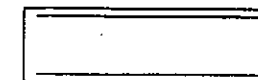
#### - Sección

Sección : SECCION-9-10  
b [m] = 1.00  
h [m] = 0.30  
ri [m] = 0.030  
rs [m] = 0.030



### 2 Comprobación

At [cm<sup>2</sup>] = 3.0  
Ac [cm<sup>2</sup>] = 3.0  
Mu [kN·m] = 34.9



#### Plano de deformación de agotamiento

x [m] = 0.020  
1/r [1/m] · 1.E-3 = 40.0  
 $\eta_s$  · 1.E-3 = 0.8  
 $\eta_i$  · 1.E-3 = -11.2

#### Deformación y tensión de armaduras

| Profundidad<br>[m] | Armadura<br>[cm <sup>2</sup> ] | Deformación<br>· 1.E-3 | Tensión<br>[MPa] |
|--------------------|--------------------------------|------------------------|------------------|
| 0.030              | 3.0                            | -0.4                   | 80.8             |
| 0.270              | 3.0                            | -10.0                  | 434.8            |



Estructura: Viaducto del Anoia  
Elemento: Cortante en Modelo Flexión Transversal

Sección 3

|                |       |                                                               |
|----------------|-------|---------------------------------------------------------------|
| D(mm)          | 482   |                                                               |
| fck(N/mm2)     | 50    |                                                               |
| Sigma_s(N/mm2) | 435   | Limitación de tensión en armadura de cortante (art. 40.2 EHE) |
| Bo(mm)         | 1000  |                                                               |
| As(cm2)        | 30    |                                                               |
| Vrd(Tn)        | 29.74 |                                                               |
| N(Tn)          | 0     | *N<0 para compresión.                                         |

| VERIFICACION DE LA NECESIDAD DE ARMADURA DE CORTANTE |          |
|------------------------------------------------------|----------|
| PSI                                                  | 1.644    |
| Roele                                                | 0.0062   |
| Sigmaprima (N/mm2)                                   | 0.00     |
| Vu2 (N)                                              | 299125.1 |
| No necesita armadura de cortante                     |          |

Sección 4

|                |       |                                                               |
|----------------|-------|---------------------------------------------------------------|
| D(mm)          | 470   |                                                               |
| fck(N/mm2)     | 50    |                                                               |
| Sigma_s(N/mm2) | 435   | Limitación de tensión en armadura de cortante (art. 40.2 EHE) |
| Bo(mm)         | 1000  |                                                               |
| As(cm2)        | 30    |                                                               |
| Vrd(Tn)        | 16.34 |                                                               |
| N(Tn)          | 0     | *N<0 para compresión.                                         |

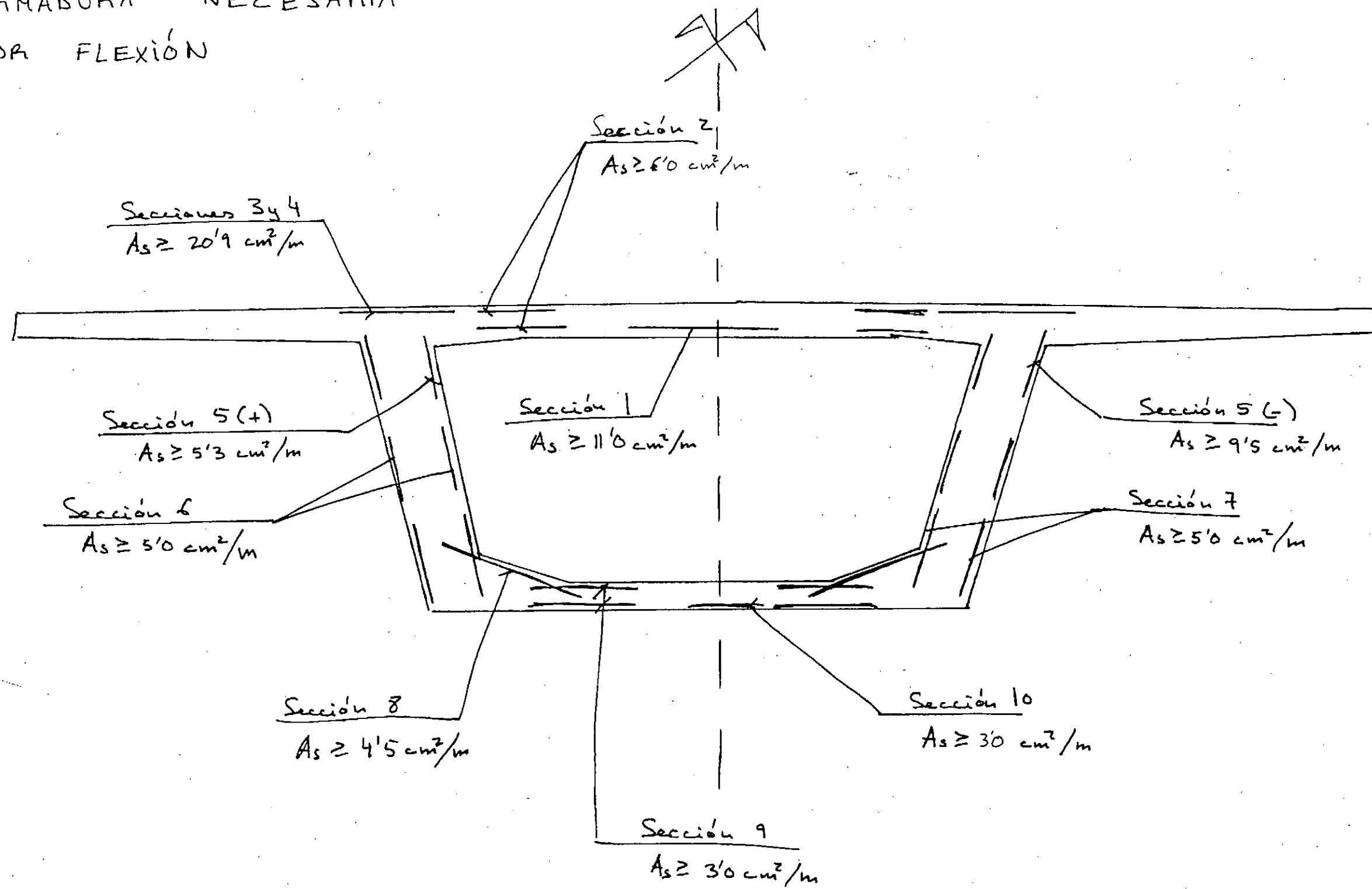
| VERIFICACION DE LA NECESIDAD DE ARMADURA DE CORTANTE |          |
|------------------------------------------------------|----------|
| PSI                                                  | 1.652    |
| Roele                                                | 0.0064   |
| Sigmaprima (N/mm2)                                   | 0.00     |
| Vu2 (N)                                              | 295601.4 |
| No necesita armadura de cortante                     |          |

Sección 5

|                |       |                                                               |
|----------------|-------|---------------------------------------------------------------|
| D(mm)          | 570   |                                                               |
| fck(N/mm2)     | 50    |                                                               |
| Sigma_s(N/mm2) | 435   | Limitación de tensión en armadura de cortante (art. 40.2 EHE) |
| Bo(mm)         | 1000  |                                                               |
| As(cm2)        | 10    |                                                               |
| Vrd(Tn)        | 10.00 |                                                               |
| N(Tn)          | 0     | *N<0 para compresión..                                        |

| VERIFICACION DE LA NECESIDAD DE ARMADURA DE CORTANTE |          |
|------------------------------------------------------|----------|
| PSI                                                  | 1.592    |
| Roele                                                | 0.0018   |
| Sigmaprima (N/mm2)                                   | 0.00     |
| Vu2 (N)                                              | 224625.7 |
| No necesita armadura de cortante                     |          |

ARNADURA NECESARIA  
POR FLEXIÓN



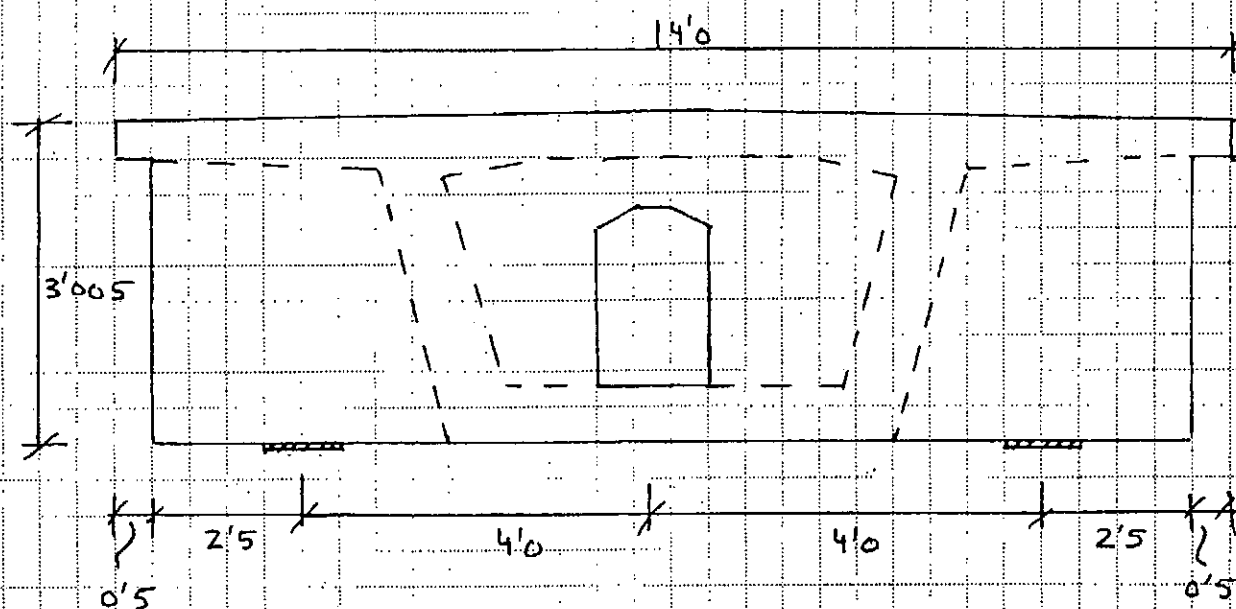


### 6.3. TRAVIESAS DE APOYO

En este apartado se incluyen los resultados del cálculo de la flexión transversal que se produce en las traviesas de apoyo en estribos y pilas.

La determinación de los esfuerzos de flexión y cortante se realizan a partir de las reacciones que se han calculado en el apartado 3 de este anejo.

TRAVIESA SOBRE ESTRIBOS.



ESFUERZOS MÁXIMOS

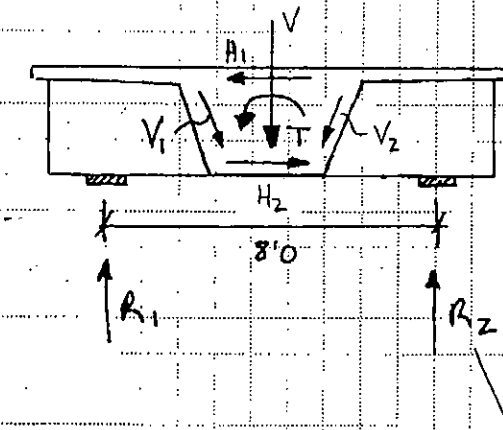
Hipótesis ELU-1: Máximo cortante

$$\left. \begin{array}{l} V_{d, \max} = 1269'0 \text{ T} \\ T_{d, \text{conc}} = 270'5 \text{ mT} \end{array} \right\} \text{Combinación 37}$$

Hipótesis ELU-2: Máximo torsor.

$$\left. \begin{array}{l} T_{d, \max} = 914'3 \text{ mT} \\ V_{d, \text{conc}} = 764'5 \text{ T} \end{array} \right\} \rightarrow \text{Comb. 46}$$

ESFUERZOS DE DISEÑO



$$A_m = 14'4 \text{ m}^2$$

$$\frac{1}{\cos \alpha} \approx 1'02$$

$$H_1 = \frac{T_d}{2 \cdot A_m} \cdot 6'3$$

$$H_2 = \frac{T_d}{2 \cdot A_m} \cdot 5'44$$

$$V_1 = 1'02 \cdot V_d + \frac{T_d}{2 \cdot A_m} \cdot 2'49$$

$$V_2 = 1'02 \cdot V_d - \frac{T_d}{2 \cdot A_m} \cdot 2'49$$

$$R_1 = \frac{V_d}{2} + \frac{T_d}{8}$$

$$R_2 = \frac{V_d}{2} - \frac{T_d}{8}$$

P.

PEDELTA, S.L.  
INGENIERÍA CIVIL

Fecha:

Hoja:

| FUERZA | ELU-1  | ELU-2 |
|--------|--------|-------|
| $V_d$  | 1267'0 | 764'5 |
| $T_d$  | 270'5  | 914'3 |
| $H_1$  | 59'2   | 200'0 |
| $H_2$  | 51'1   | 172'7 |
| $V_1$  | 1315'7 | 858'8 |
| $V_2$  | 1269'0 | 700'7 |
| $R_1$  | 667'3  | 496'5 |
| $R_2$  | 599'7  | 268'0 |



ROBOT v 16.1.1

Autor :

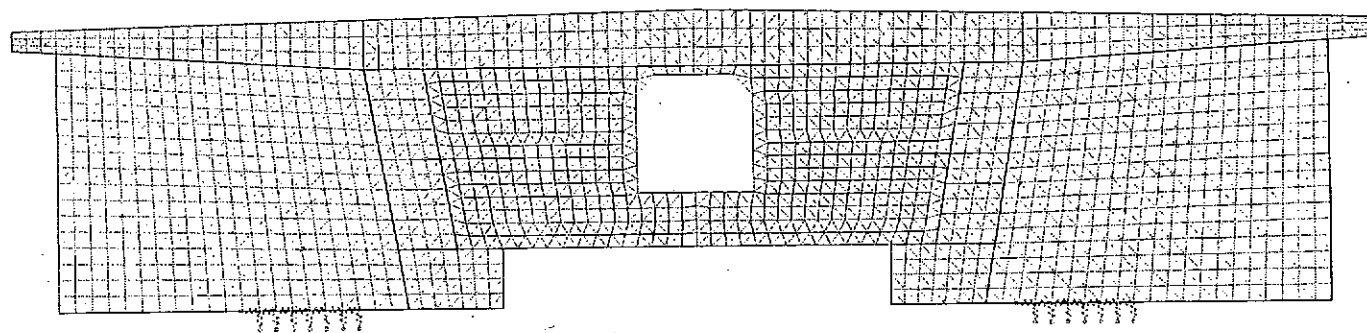
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Proyecto : Diafragma Estribo Anoia 02

### Modelo de Cálculo Traviesa E-1



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ROBOT v 16.1.1

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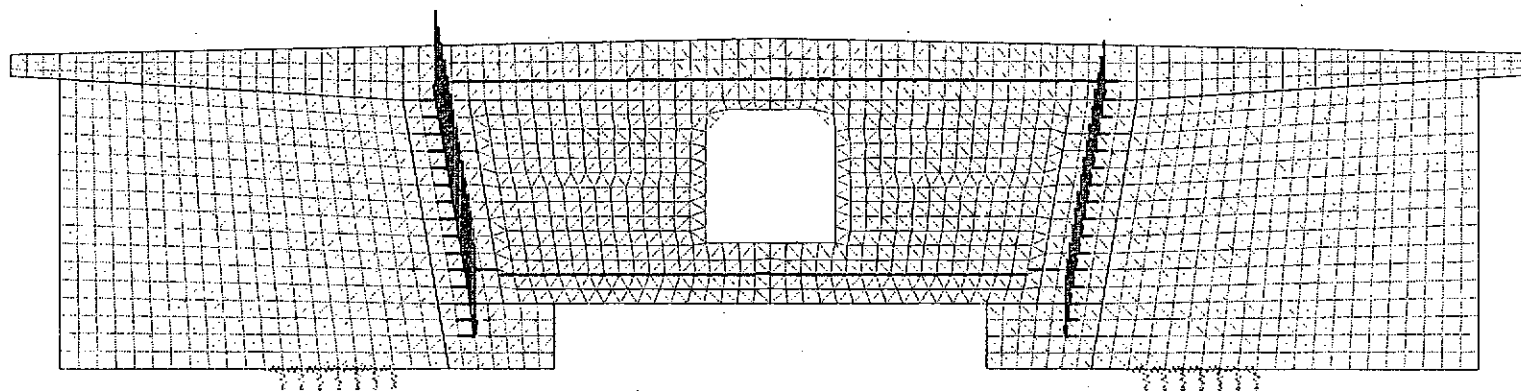
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### Modelo de Cálculo Traviesa E-1. Cargas.



casos: 2 (ELU 2)

T

Fecha : 22/07/03

Página : 3

**CASOS DE CARGA. VALORES.**

| Caso | Nombre del caso | Tipo de carga | Lista                           | Valores de carga           |
|------|-----------------|---------------|---------------------------------|----------------------------|
| 1    | ELU 1           | fuerza nodal  | 9 83 94 225 239A269CA3          | FX=-7.390(T) FZ=-40.860(T) |
| 1    | ELU 1           | fuerza nodal  | 10 38 44 290 314A324            | FX=7.950(T) FZ=-43.930(T)  |
| 1    | ELU 1           | fuerza nodal  | 138 153 183A199 219 243 326 619 | FX=1.310(T)                |
| 1    | ELU 1           | fuerza nodal  | 904A988CA2                      | FX=-1.380(T)               |
| 2    | ELU 2           | fuerza nodal  | 9 83 94 225 239A269CA3          | FX=-3.690(T) FZ=-20.390(T) |
| 2    | ELU 2           | fuerza nodal  | 10 38 44 290 314A324            | FX=5.560(T) FZ=-30.760(T)  |
| 2    | ELU 2           | fuerza nodal  | 904A988CA2                      | FX=-4.650(T)               |
| 2    | ELU 2           | fuerza nodal  | 138 153 183A199 219 243 326 619 | FX=4.430(T)                |

**REACCIONES EN APOYOS. SUMA DE VALORES RESULTANTES.**

sistema de coordenadas global - Casos: 1 2

| Nudo/Caso        | FX (T)       | FZ (T)       |
|------------------|--------------|--------------|
| <b>Caso 1</b>    |              |              |
| ELU 1            |              |              |
| Suma final       | 0.0          | 0.0          |
| Suma de reaccion | -0.150       | 1271.850     |
| Suma de esfuerzo | 0.150        | -1271.850    |
| Verificación     | -0.000       | -0.000       |
| Precisión:       | 2.20441e-012 | 5.23027e-025 |
| <b>Caso 2</b>    |              |              |
| ELU 2            |              |              |
| Suma final       | 0.0          | 0.0          |
| Suma de reaccion | -0.870       | 767.250      |
| Suma de esfuerzo | 0.870        | -767.250     |
| Verificación     | -0.000       | -0.000       |
| Precisión:       | 1.97464e-012 | 6.79372e-025 |

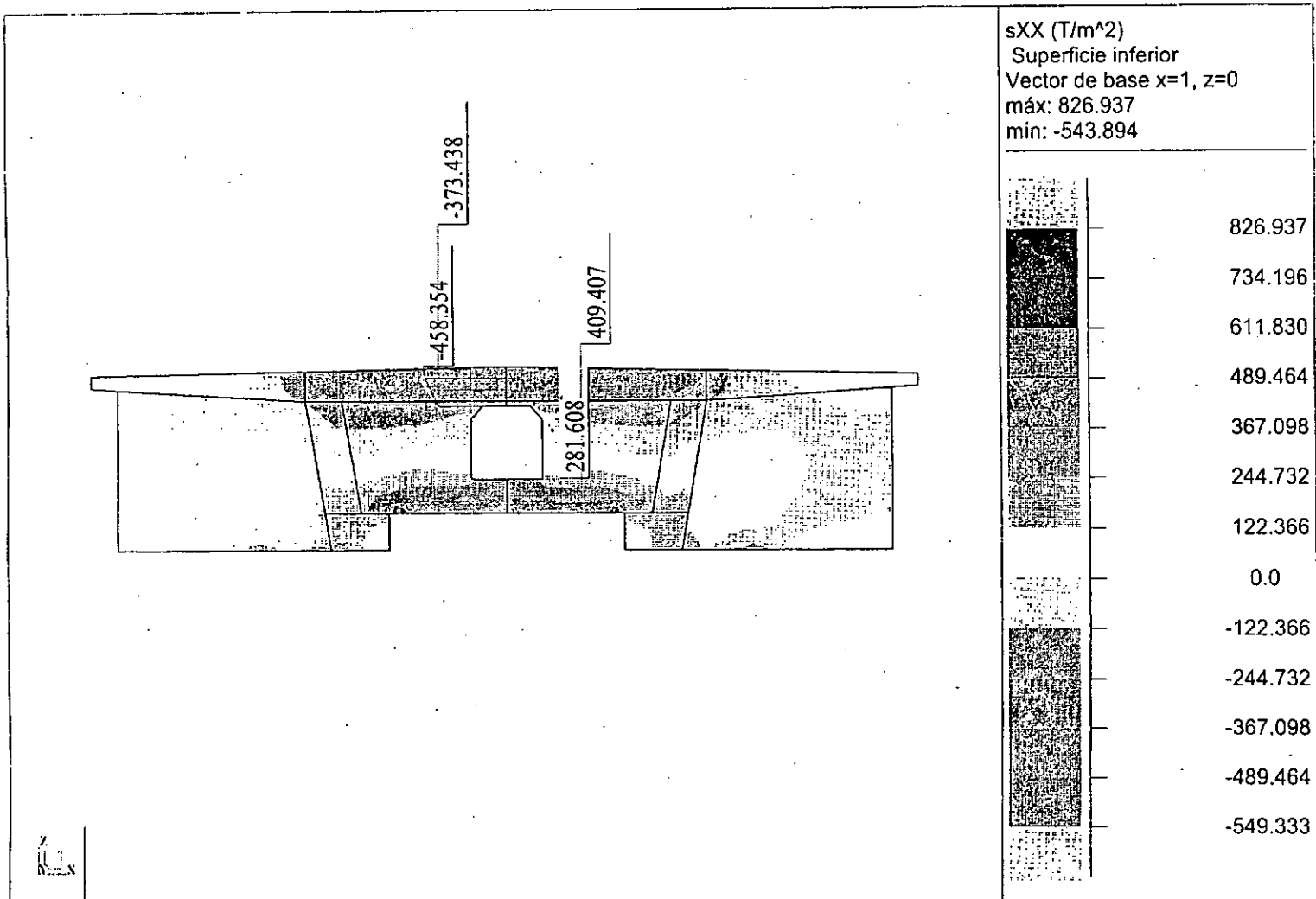


ROBOT v 16.1.1

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Proyecto : Diafragma Estribo Anoia 02

**sXX (T/m<sup>2</sup>). Vector de base x=1, z=0 Casos: 1 (ELU 1)**



Fecha : 22/07/03

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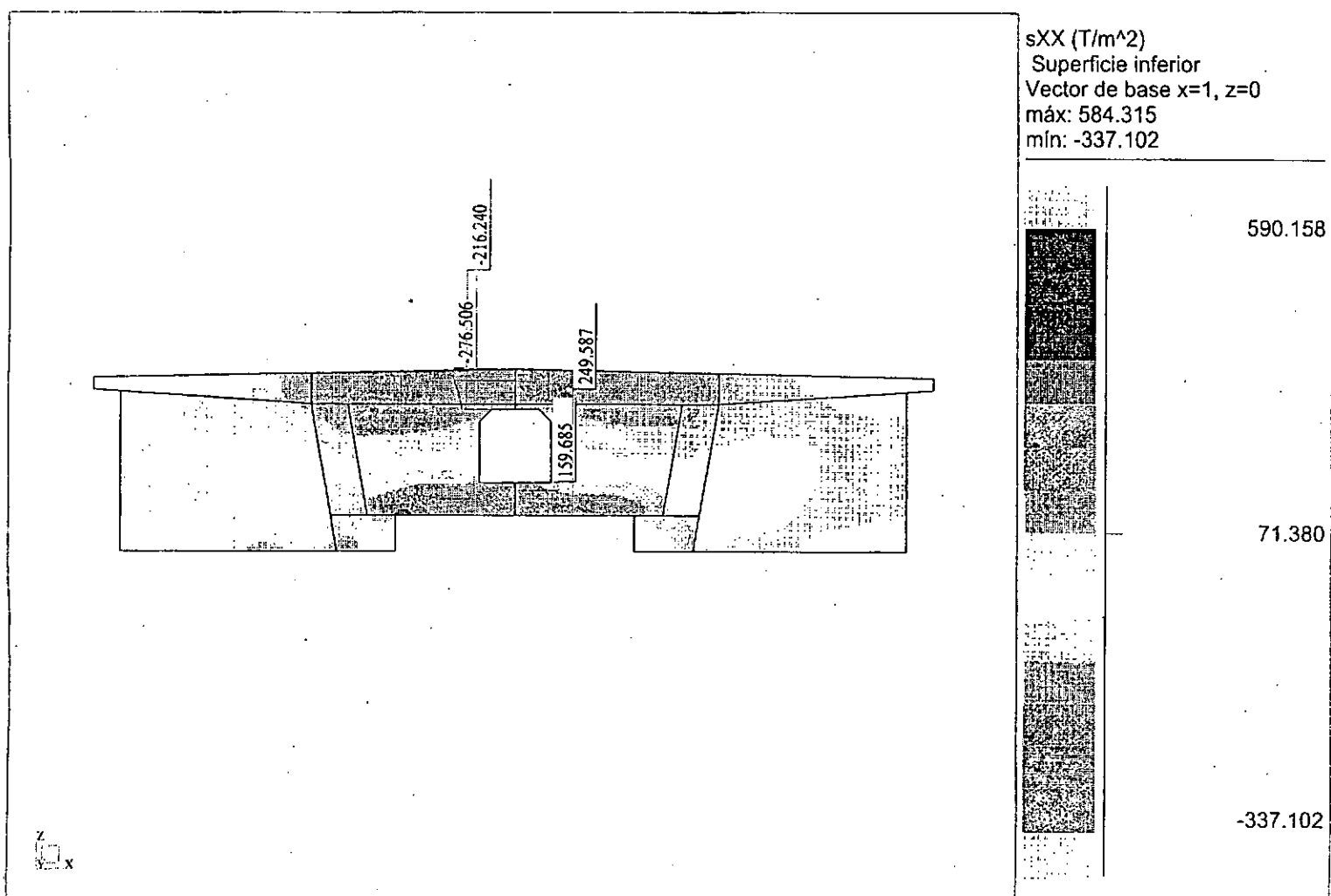


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Proyecto : Diafragma Estribo Anoia 02

**sXX (T/m<sup>2</sup>). Vector de base x=1, z=0 Casos: 2 (ELU 2)**



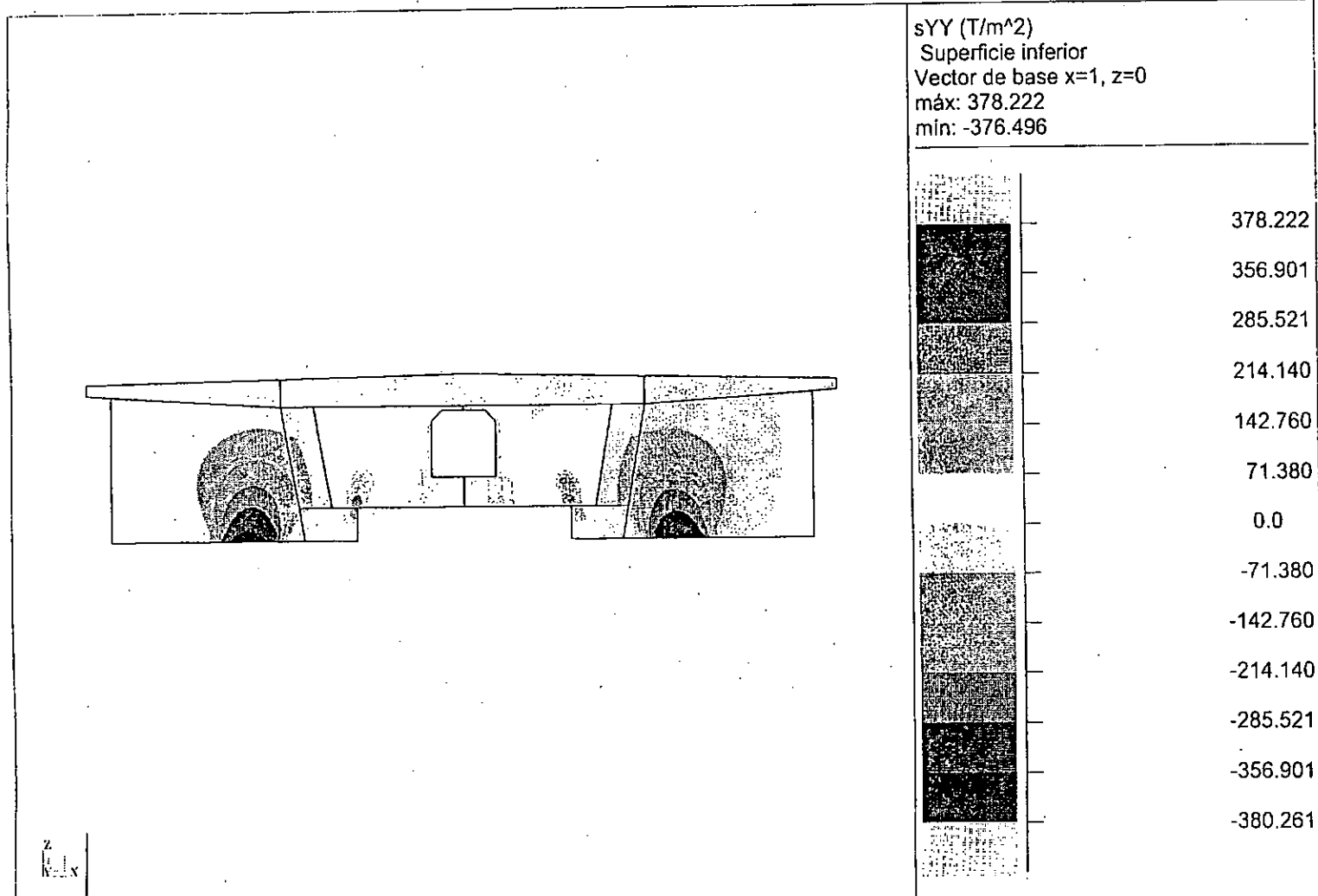
Fecha : 22/07/03

Página : 3

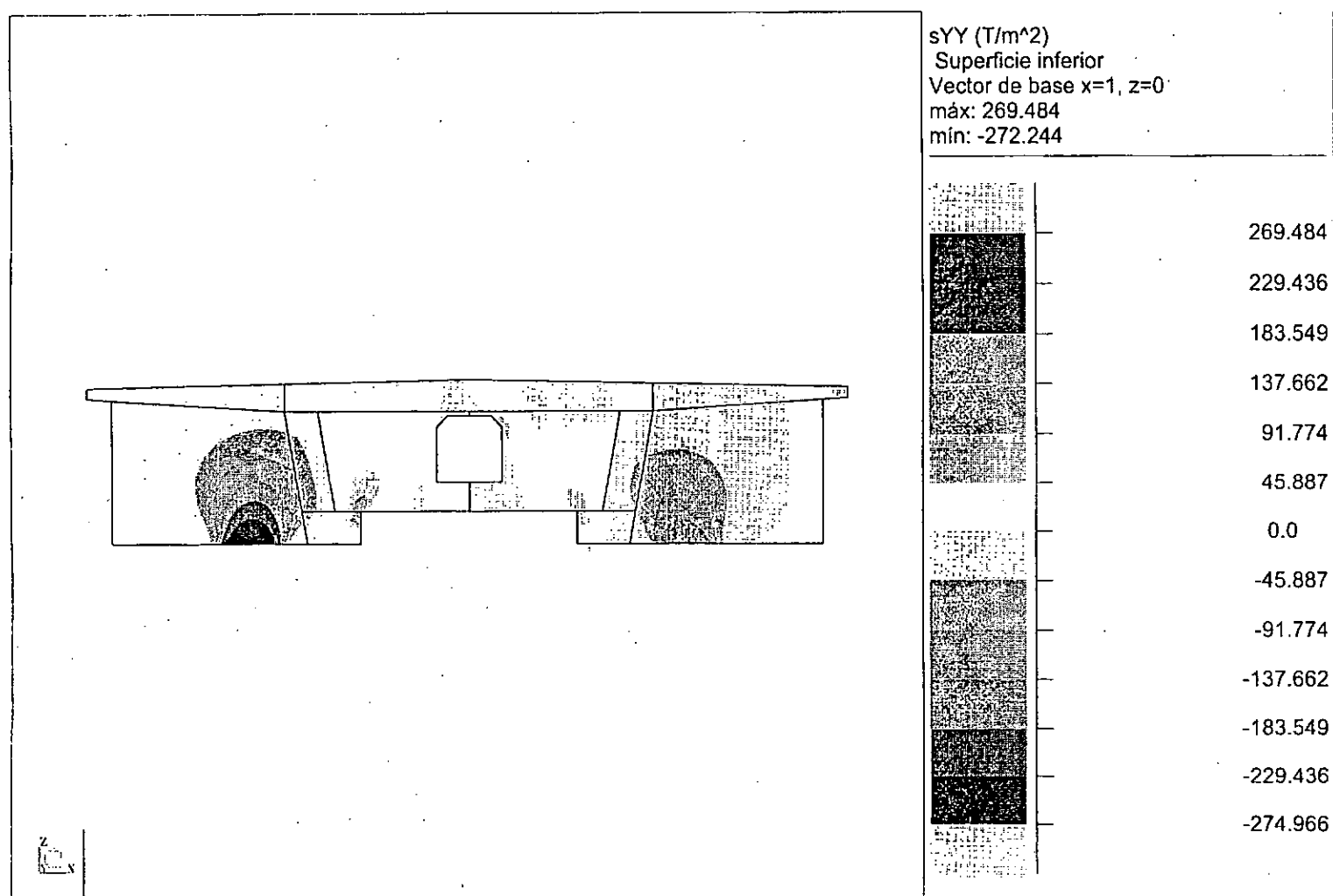


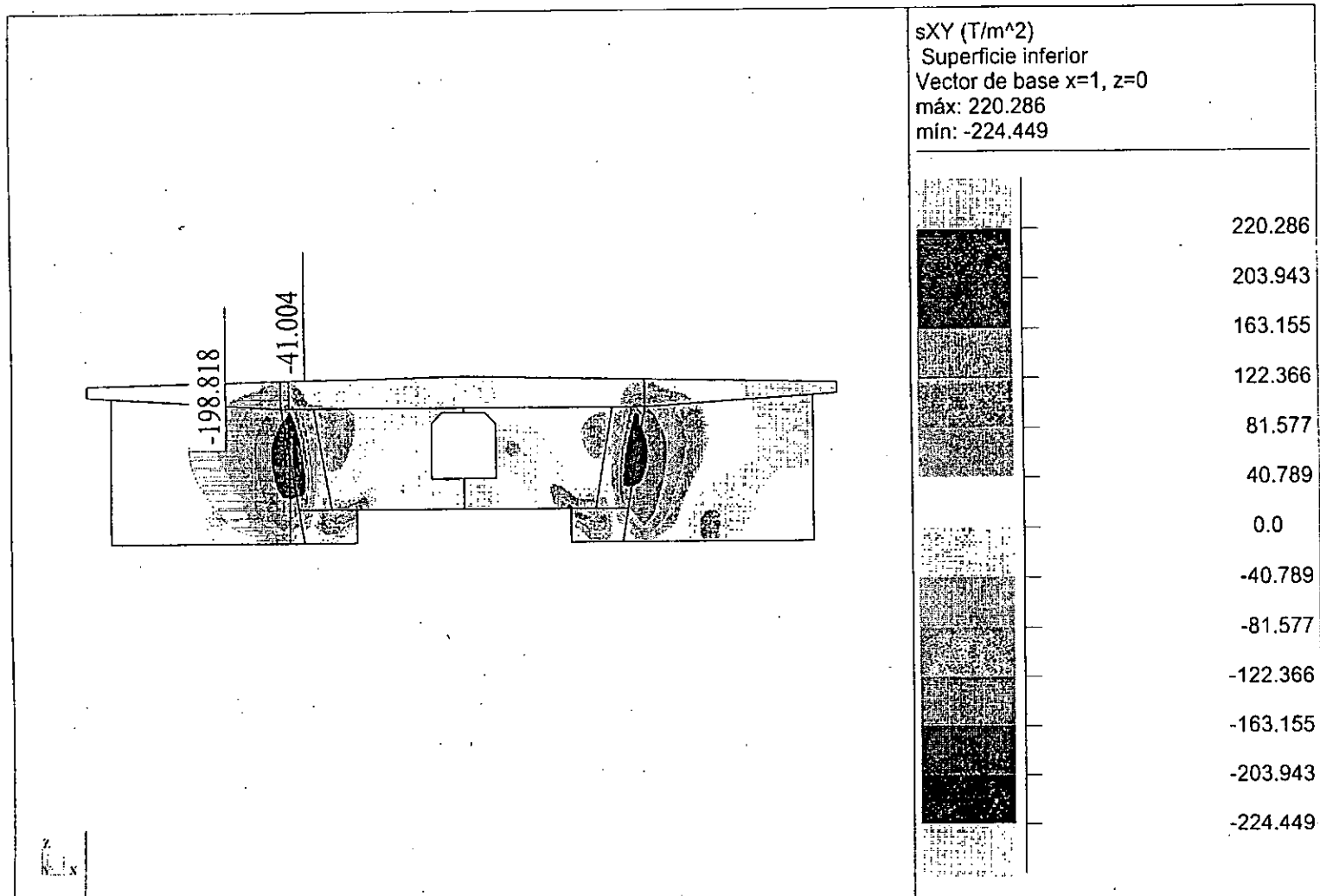


**sYY (T/m<sup>2</sup>). Vector de base x=1, z=0. Casos: 1 (ELU 1)**



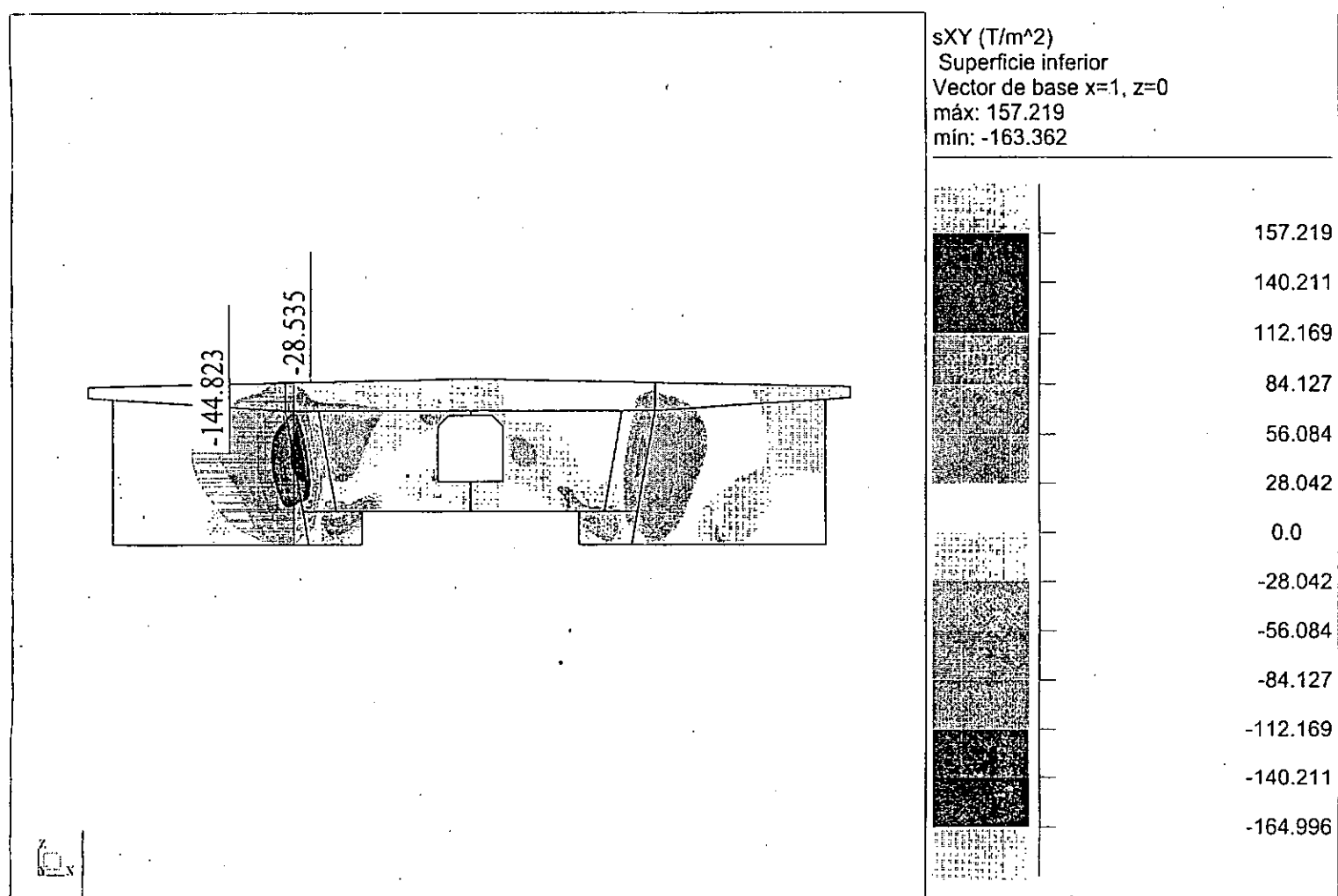
**sYY (T/m<sup>2</sup>). Vector de base x=1, z=0. Casos: 2 (ELU 2)**



**sXY (T/m<sup>2</sup>). Vector de base x=1, z=0. Casos: 1 (ELU 1)**

Fecha : 22/07/03

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**sXY (T/m<sup>2</sup>). Vector de base x=1, z=0. Casos: 2 (ELU 2)**

Fecha : 22/07/03

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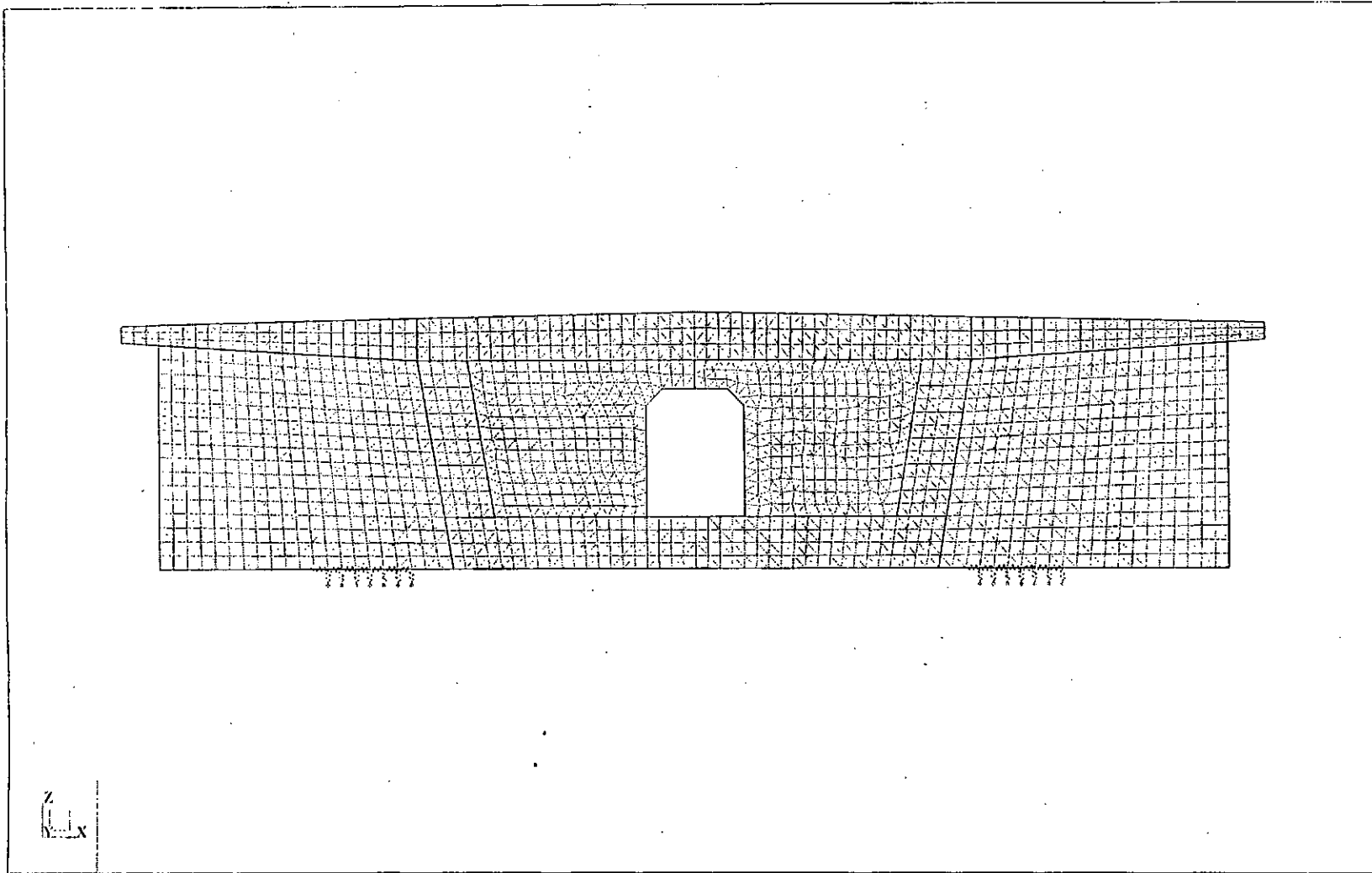


ROBOT v 16.1.1

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Dirección :

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Archivo : Diafragma Estribo Anoia 01.rtd  
Proyecto : Diafragma Estribo Anoia 01

### Modelo de Cálculo Traviesa E-2



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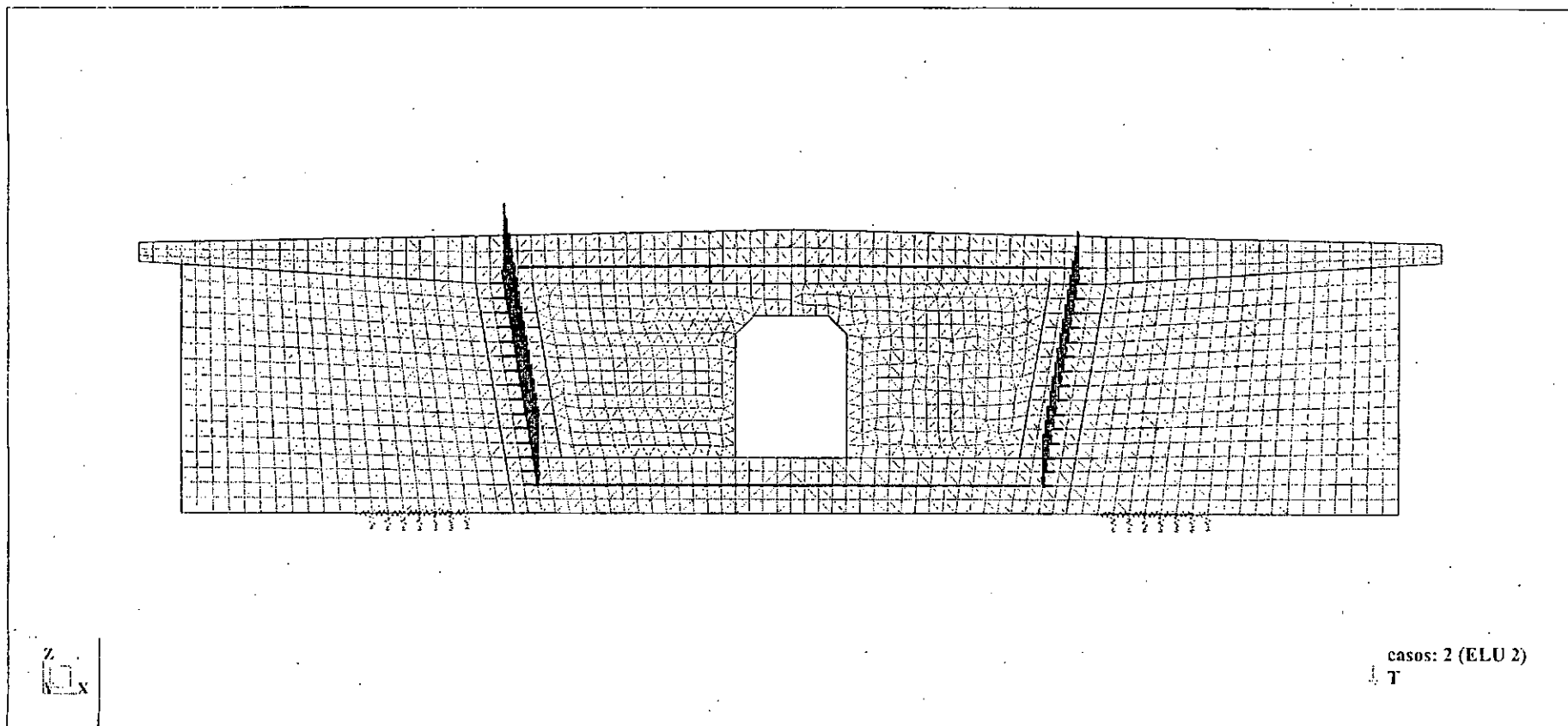


ROBOT v 16.1.1

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Proyecto : Diafragma Estribo Anoia 01

### Modelo de Cálculo Traviesa E-2. Cargas.



Fecha : 22/07/03

Página : 3



CASOS DE CARGA. VALORES.

| Caso | Nombre del caso | Tipo de carga | Lista                    | Valores de carga           |
|------|-----------------|---------------|--------------------------|----------------------------|
| 1    | ELU 1           | fuerza nodal  | 9 201 202 225 239A269CA3 | FX=-7.390(T) FZ=-40.860(T) |
| 1    | ELU 1           | fuerza nodal  | 10 93 94 290 314A324     | FX=7.950(T) FZ=-43.930(T)  |
| 1    | ELU 1           | fuerza nodal  | 96A198CA3                | FX=1.460(T)                |
| 1    | ELU 1           | fuerza nodal  | 904A988CA2               | FX=-1.380(T)               |
| 2    | ELU 2           | fuerza nodal  | 9 201 202 225 239A269CA3 | FX=-3.690(T) FZ=-20.390(T) |
| 2    | ELU 2           | fuerza nodal  | 10 93 94 290 314A324     | FX=5.560(T) FZ=-30.760(T)  |
| 2    | ELU 2           | fuerza nodal  | 96A198CA3                | FX=4.930(T)                |
| 2    | ELU 2           | fuerza nodal  | 904A988CA2               | FX=-4.650(T)               |

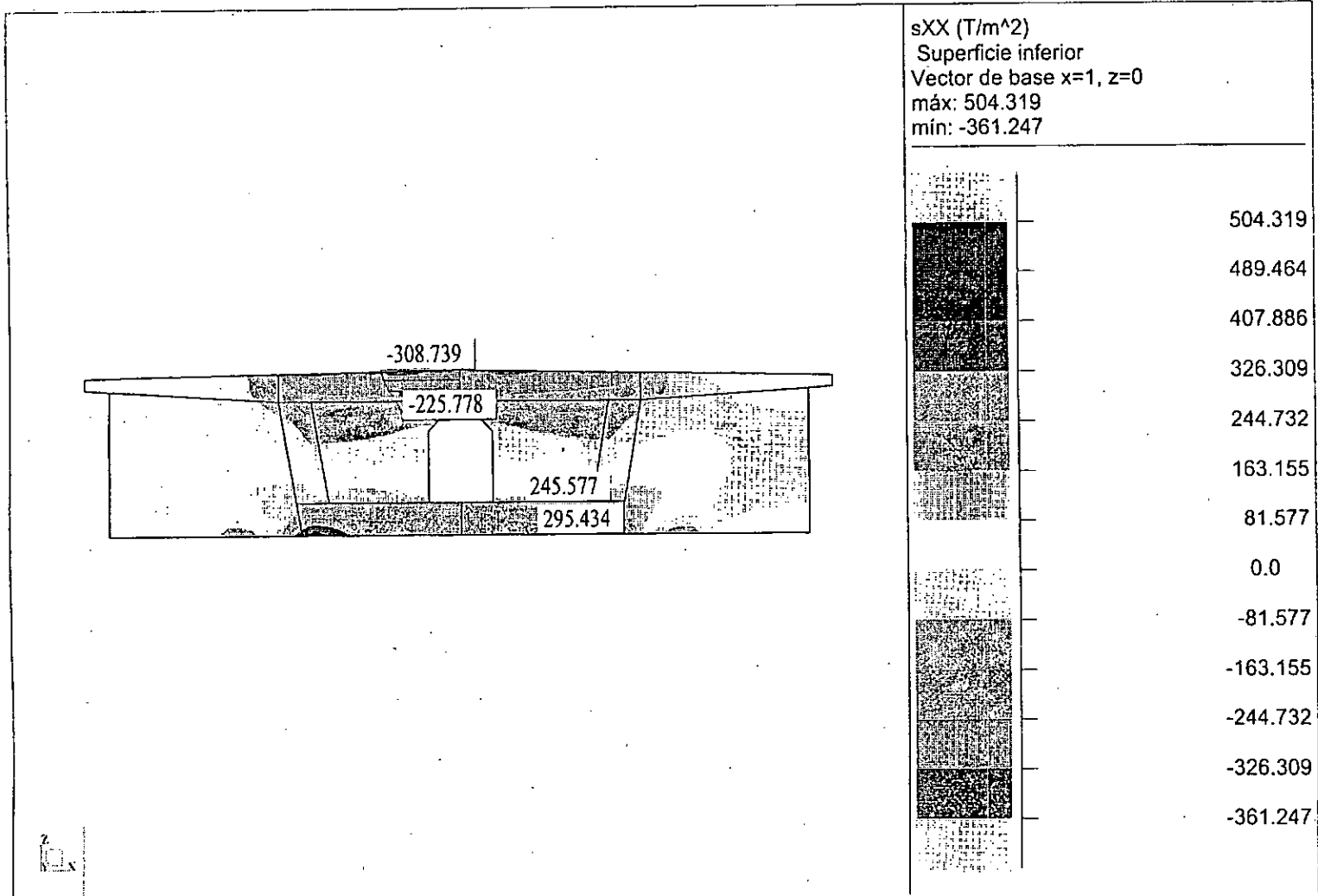


REACCIONES EN APOYOS. SUMA DE VALORES RESULTANTES.

sistema de coordenadas global - Casos: 1 2

| Nudo/Caso        | FX (T)       | FZ (T)       |
|------------------|--------------|--------------|
| Caso 1           | ELU 1        |              |
| Suma final       | 0.0          | 0.0          |
| Suma de reaccion | -0.160       | 1271.850     |
| Suma de esfuerzo | 0.160        | -1271.850    |
| Verificación     | -0.000       | 0.000        |
| Precisión:       | 1.95763e-012 | 2.01311e-024 |
| Caso 2           | ELU 2        |              |
| Suma final       | 0.0          | 0.0          |
| Suma de reaccion | -0.650       | 767.250      |
| Suma de esfuerzo | 0.650        | -767.250     |
| Verificación     | -0.000       | 0.000        |
| Precisión:       | 1.51067e-012 | 1.83817e-024 |

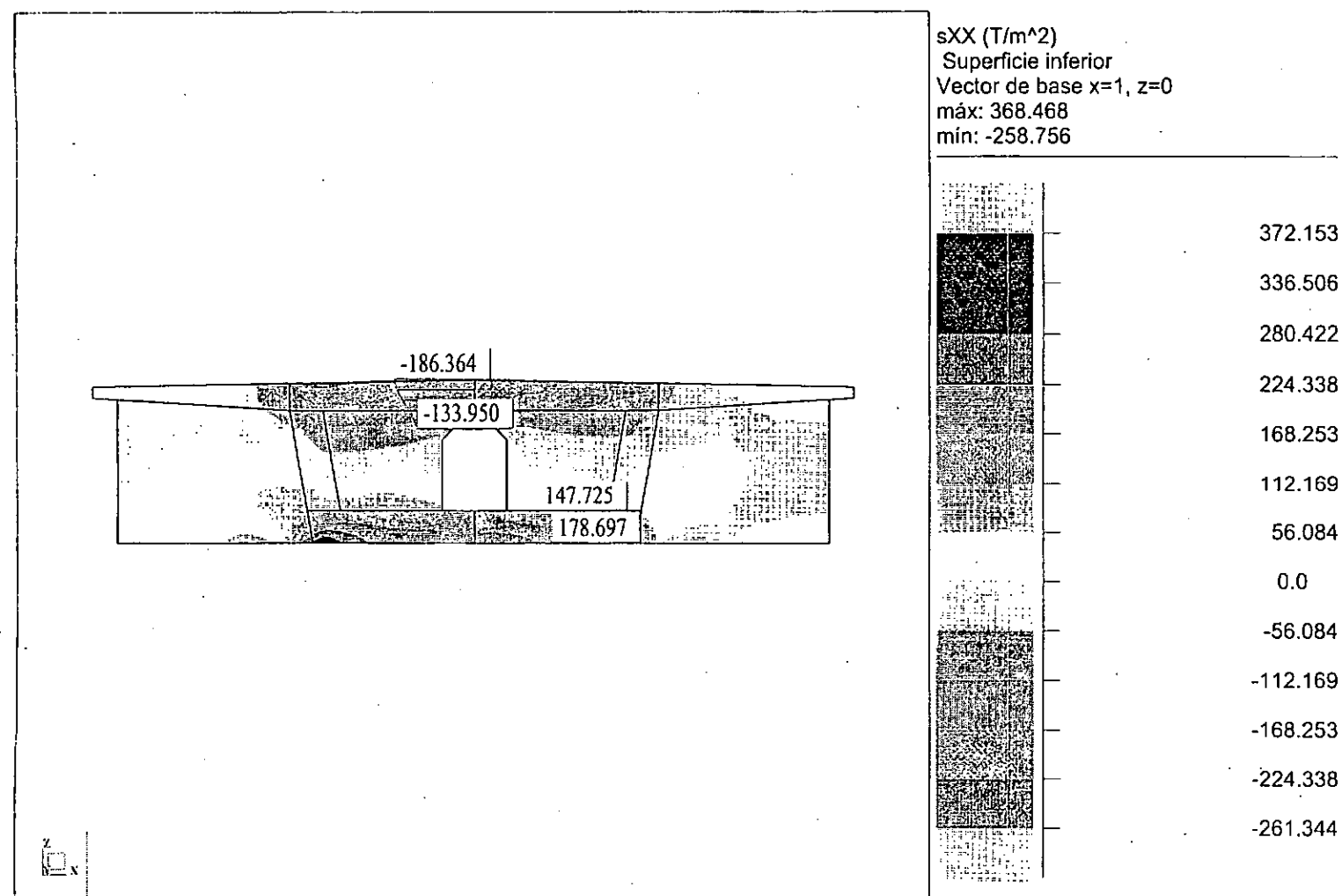
sXX (T/m<sup>2</sup>). Vector de base x=1, z=0 Casos: 1 (ELU 1)



Fecha : 22/07/03

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sXX (T/m<sup>2</sup>). Vector de base x=1, z=0. Casos: 2 (ELU 2)

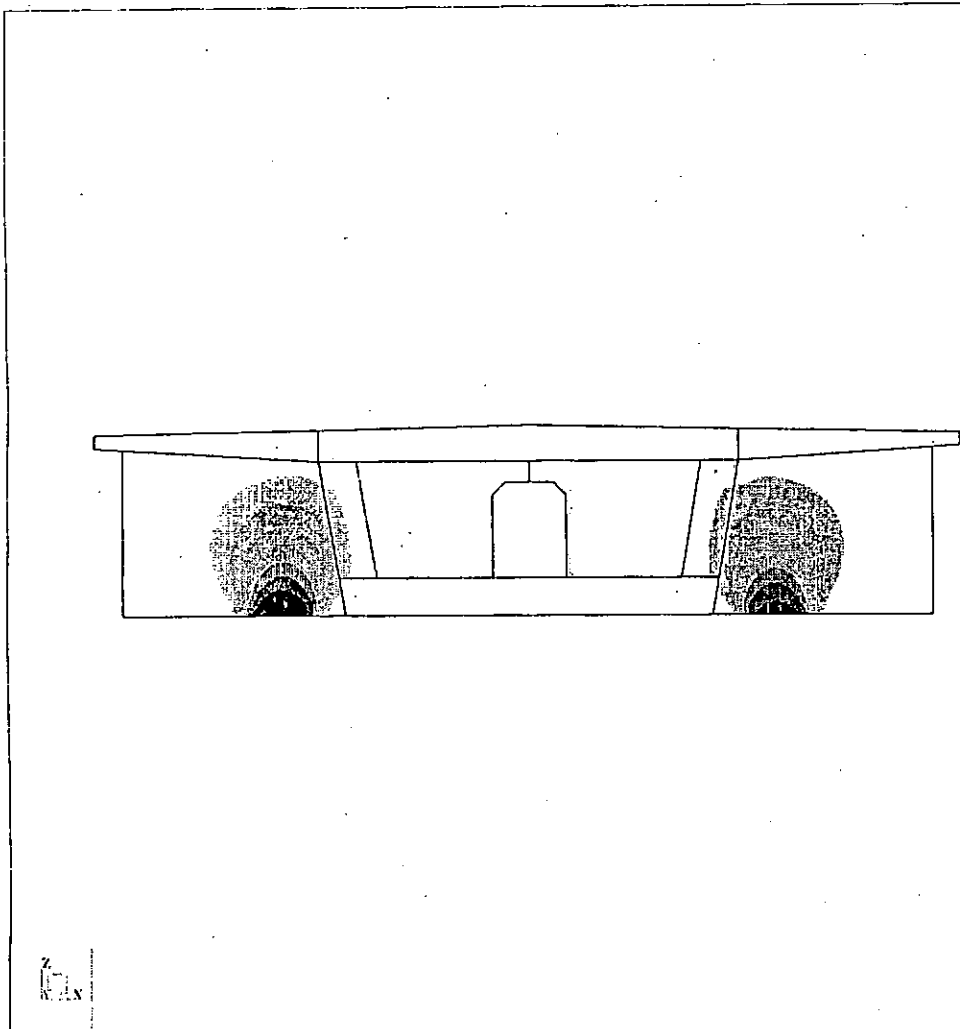


Fecha : 22/07/03

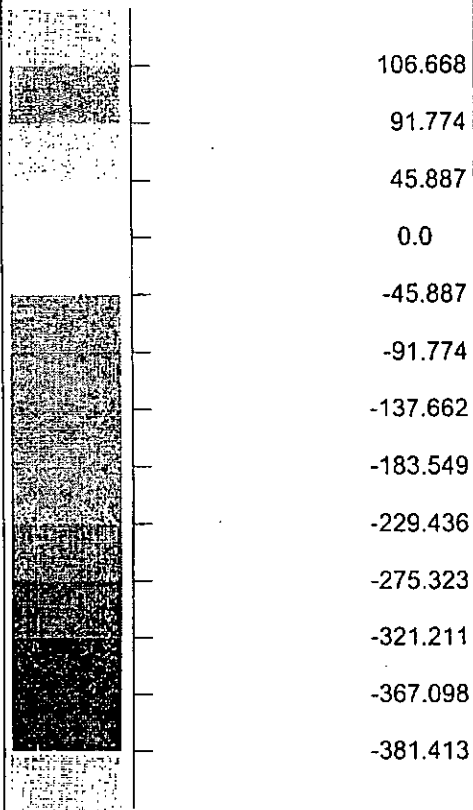
Página : 3



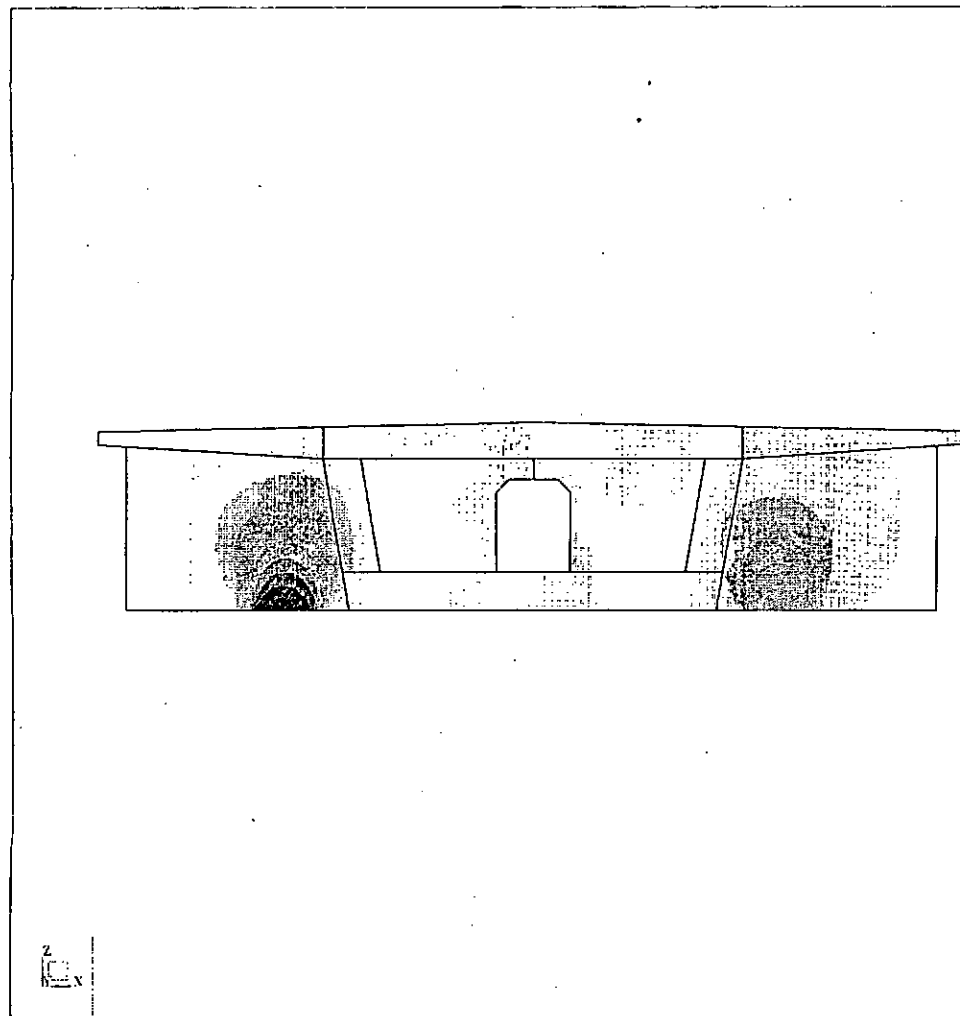
**sYY (T/m<sup>2</sup>). Vector de base x=1, z=0 Casos: 1 (ELU 1)**



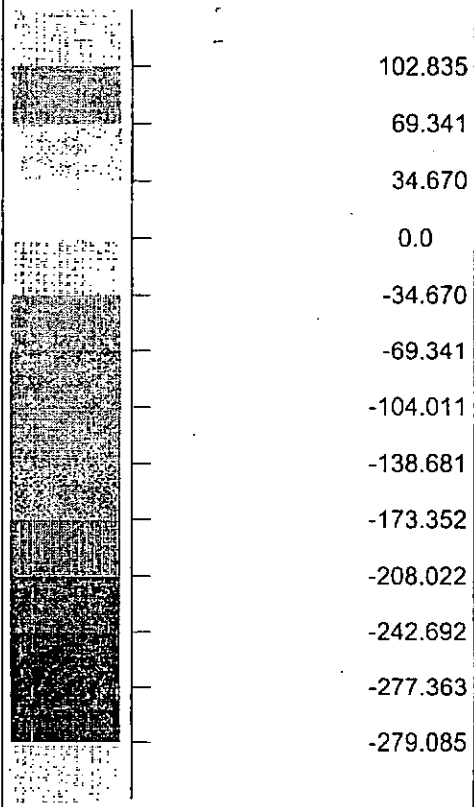
sYY (T/m<sup>2</sup>)  
Superficie inferior  
Vector de base x=1, z=0  
máx: 106.668  
mín: -377.637



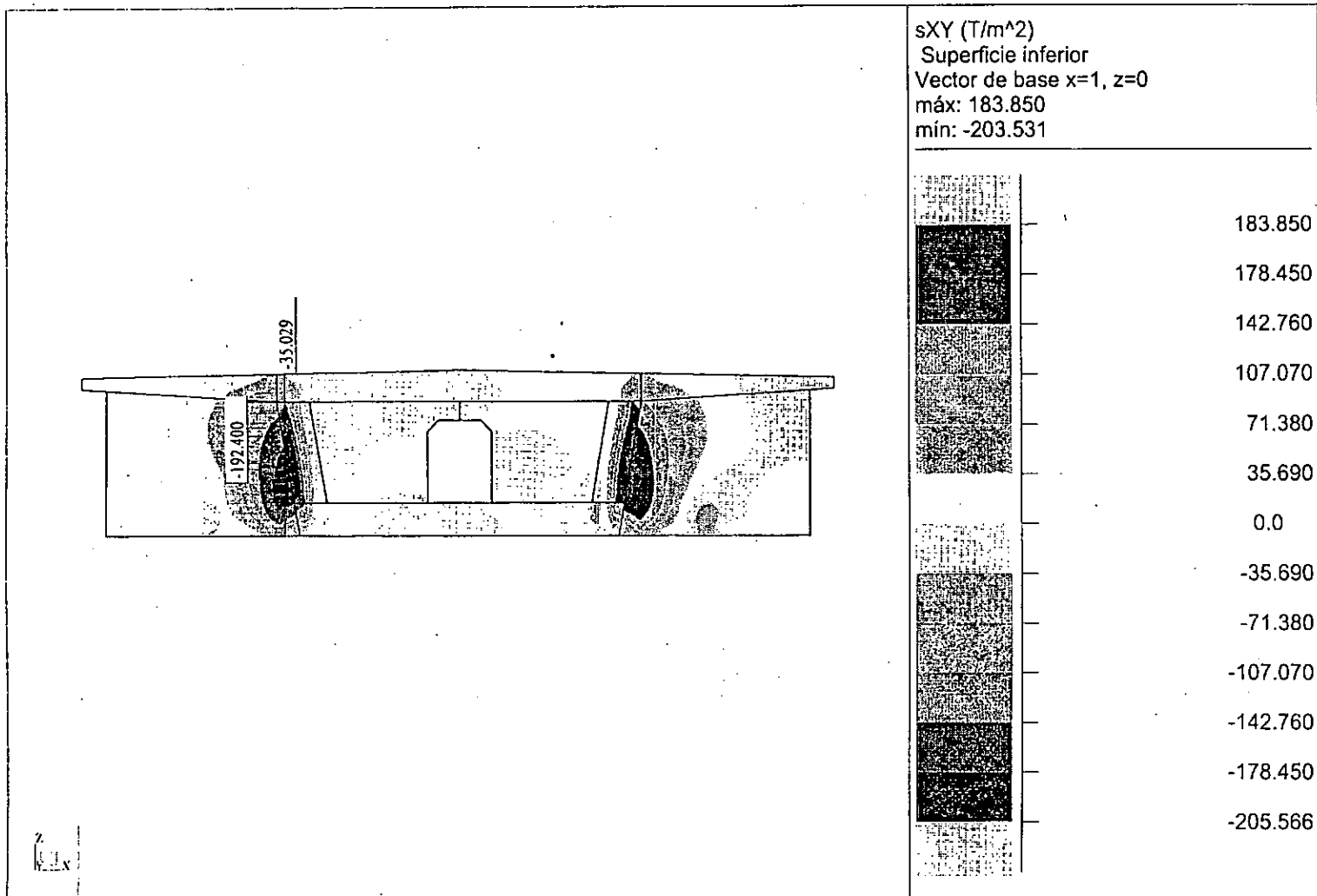
**sYY (T/m<sup>2</sup>). Vector de base x=1, z=0 Casos: 2 (ELU 2)**



sYY (T/m<sup>2</sup>)  
Superficie inferior  
Vector de base x=1, z=0  
máx: 101.817  
mín: -279.085



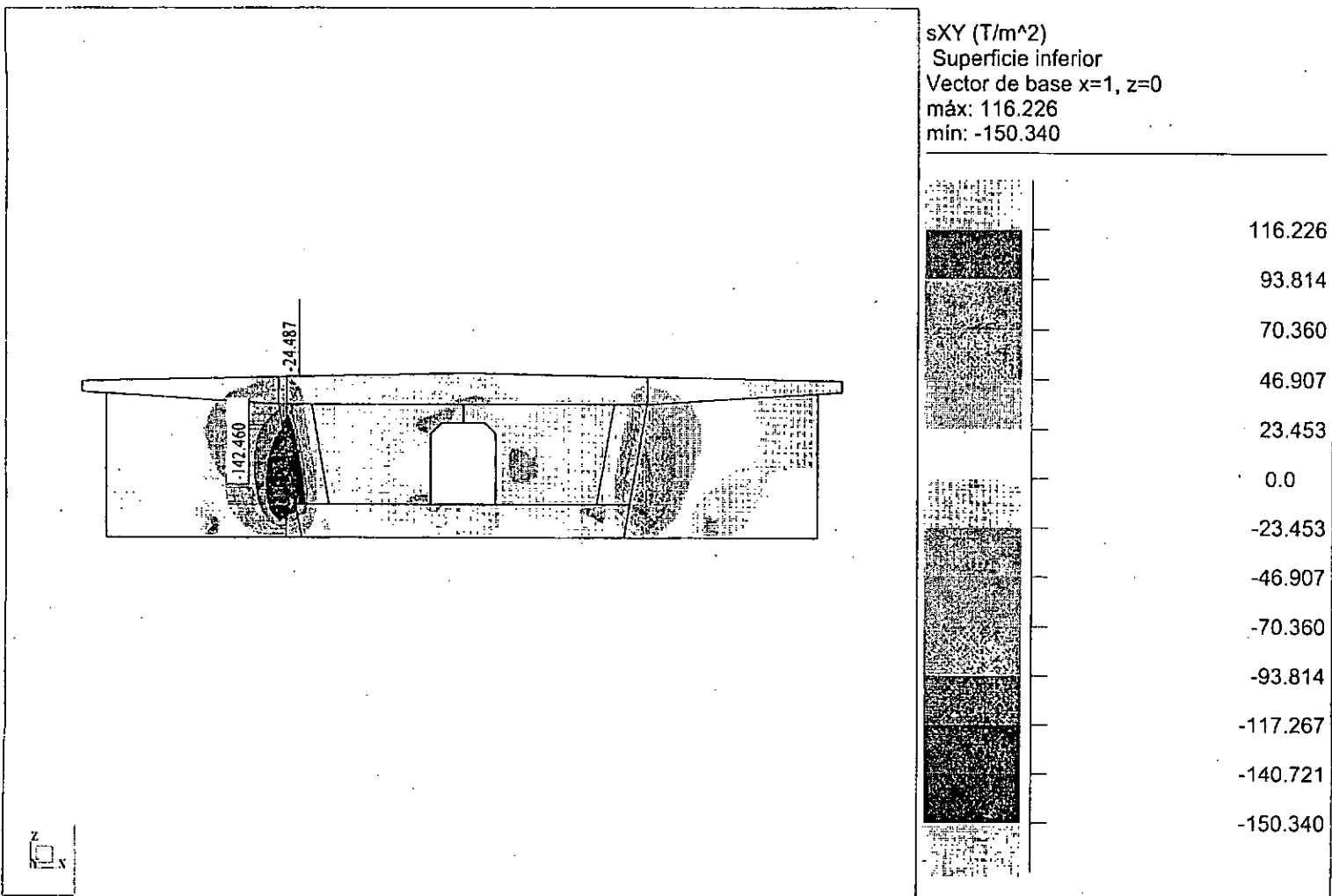
sXY (T/m^2). Vector de base x=1, z=0 Casos: 1 (ELU 1)



Fecha : 22/07/03

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sXY (T/m^2). Vector de base x=1, z=0 Casos: 2 (ELU 2)



Fecha : 22/07/03

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ARMADO TRAVIESA ESTRIBO 1:

En zona superior sobre paso de hombre:

$$T = \frac{458'3 + 373'4}{2} \cdot 0'7 \cdot 1'5 = 436'6 \text{ T}$$

$$T = A_s \cdot f_{yd} \Leftrightarrow A_s \geq 109 \text{ cm}^2 \Leftrightarrow \phi 32 \text{ a } 0'10$$

Armadura de cortante:

$$\tau_{max} = 198'8 \text{ T/m}^2 < \frac{f_{cd}}{13} \checkmark$$

$$V = \tau_{max} \cdot 1'5 = 298'2 \text{ T/m} \Leftrightarrow$$

$$\Leftrightarrow A_{sc} \geq 74'6 \text{ cm}^2/\text{m} \Leftrightarrow$$

$$\Leftrightarrow 2\phi 20 \text{ a } 0'15$$

Armadura en apoyos:

$$R_{d,max} \approx 1050 \text{ T/a.a}$$

$$A_{sa} \geq \frac{0'25 \cdot R_{d,max}}{f_{yd}} = 1'1 \text{ cm}^2 \Leftrightarrow$$

$$\Leftrightarrow 8 + 8\phi 25$$



ARMADO TRAVIESA ESTRIBO 2

En zona superior sobre "paso de hombre":

$$T_d = \frac{308'7 + 225'8}{2} \cdot 0'64 \cdot 1'5 = 256'6 \text{ T}$$

$$T_d \leq A_s \cdot f_{yd} \Rightarrow$$

$$\Rightarrow A_s \geq \frac{T_d}{4} = 64 \text{ cm}^2 \Leftrightarrow$$

$$\Leftrightarrow 11 \phi 32 \text{ (}\phi 32 \text{ a } 0'15)$$

Armadura de cortante:

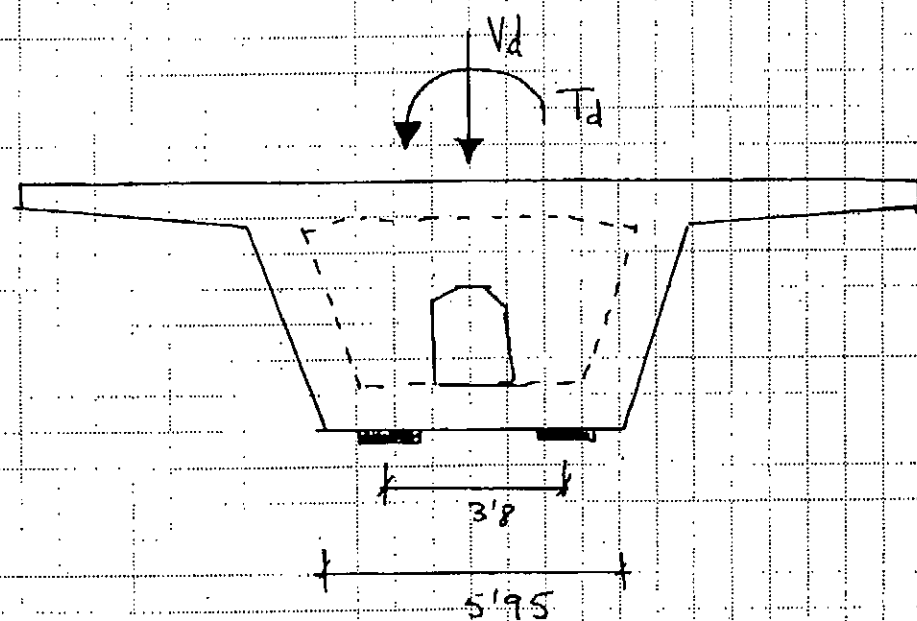
$$z_{max} = 192'4 \text{ T/m}^2 < \frac{f_{cd}}{\sqrt{3}} \checkmark$$

$$z_{max} \cdot 1'5 = 288'6 \text{ T/m} \Leftrightarrow$$

$$\Leftrightarrow A_{sc} \geq \frac{288'6}{4} = 72 \text{ cm}^2/\text{m} \Leftrightarrow$$

$$\Leftrightarrow 2 \phi 20 \text{ cada } 0'15$$

ANÁLISIS DE TRAVIESA DE APOYOS EN PILAS



Hipótesis 1:  $V_d = V_{d, \max}$

$$V_d = 2350 \text{ T} \quad (\text{Nudo } 81 \equiv \text{Pila } 4)$$

$$T_d = 298 \text{ mT}$$

Hipótesis 2:  $T_d = T_{d, \max}$

$$V_d = 1670 \text{ T}$$

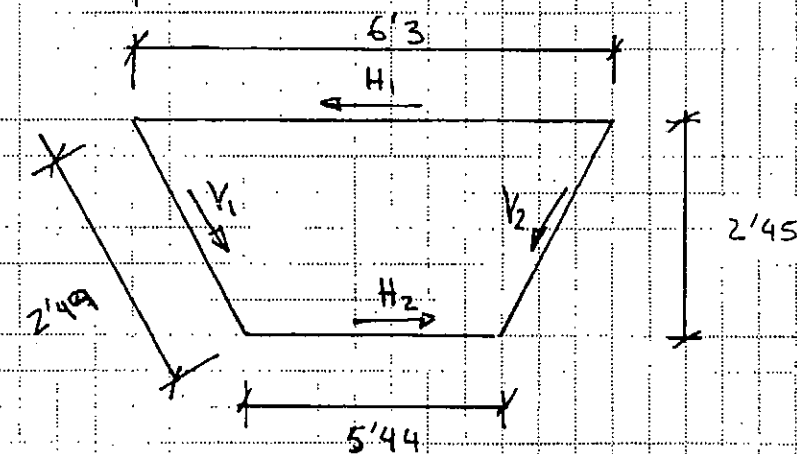
$$T_d = 10.34 \text{ mT} \quad (\text{Nudo } 81)$$

Reacciones en apoyos:

$$\text{Hip. 1.} \quad \begin{cases} R_{\max} = \frac{2 \cdot V_d}{2} + \frac{2 \cdot T_d}{3'8} = 2507 \text{ T} \\ R_{\min} = 2193 \text{ T} \end{cases}$$

$$\text{Hip. 2.} \quad \begin{cases} R_{\max} = 2214 \text{ T} \\ R_{\min} = 1126 \text{ T} \end{cases}$$

Cargas a introducir en el modelo de elementos finitos:



$$A_m = 14'4 \text{ m}^2$$

$$H_1 = \frac{T_d}{2 \cdot A_m} \cdot 6'3$$

$$H_2 = \frac{T_d}{2 \cdot A_m} \cdot 5'44$$



$$V_1 = 1'02 \cdot V_d + \frac{T_d}{2 \cdot A_m} \cdot 2'49$$

$$V_2 = 1'02 \cdot V_d - \frac{T_d}{2 \cdot A_m} \cdot 2'49$$

Hipótesis ELU 1:

$$H_1 = 130 \text{ T}$$

$$H_2 = 113 \text{ T}$$

$$V_1 = 2449 \text{ T}$$

$$V_2 = 2345 \text{ T}$$

Hipótesis ELU 2:

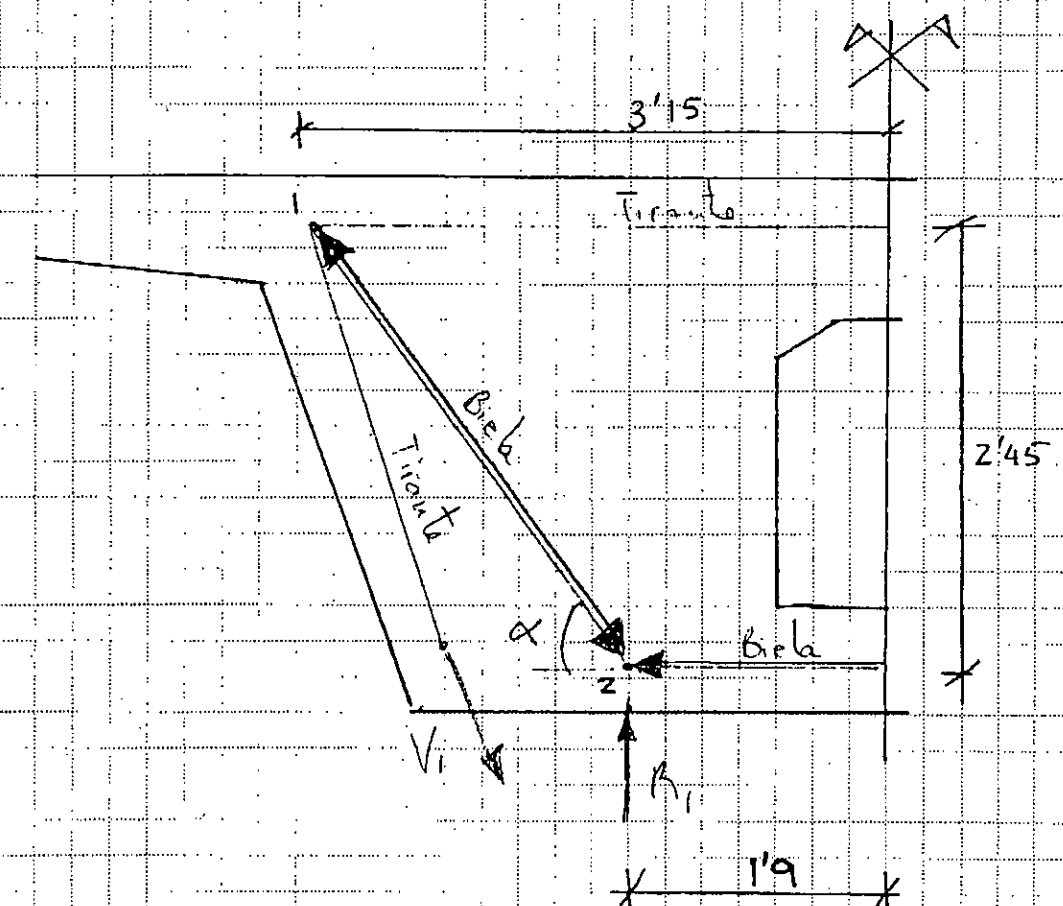
$$H_1 = 452 \text{ T}$$

$$H_2 = 391 \text{ T}$$

$$V_1 = 1882 \text{ T}$$

$$V_2 = 1525 \text{ T}$$

ESQUEMA DE BIÉLAS Y TIRANTES.



$$V_1 = 2449 \text{ T}$$

$$R_1 = 2507 \text{ T}$$

$$C = \frac{R_1}{\text{sen } \alpha} = 2814 \text{ T}$$

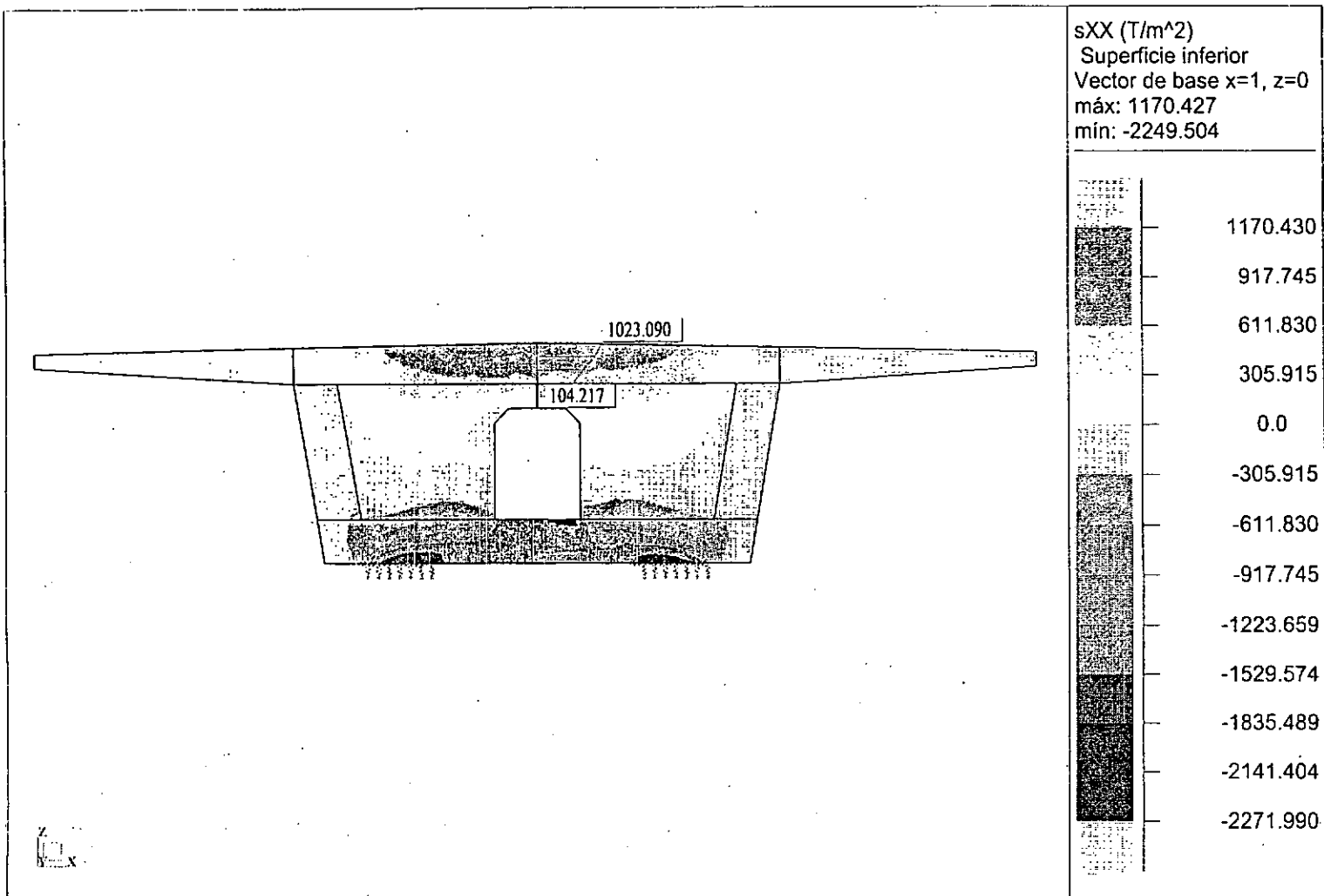
$$\alpha = \arctg \frac{2'45}{3'15 - 1'9} = 62'97''$$

$$T = C \cdot \cos \alpha = 1279 \text{ T} \Rightarrow$$

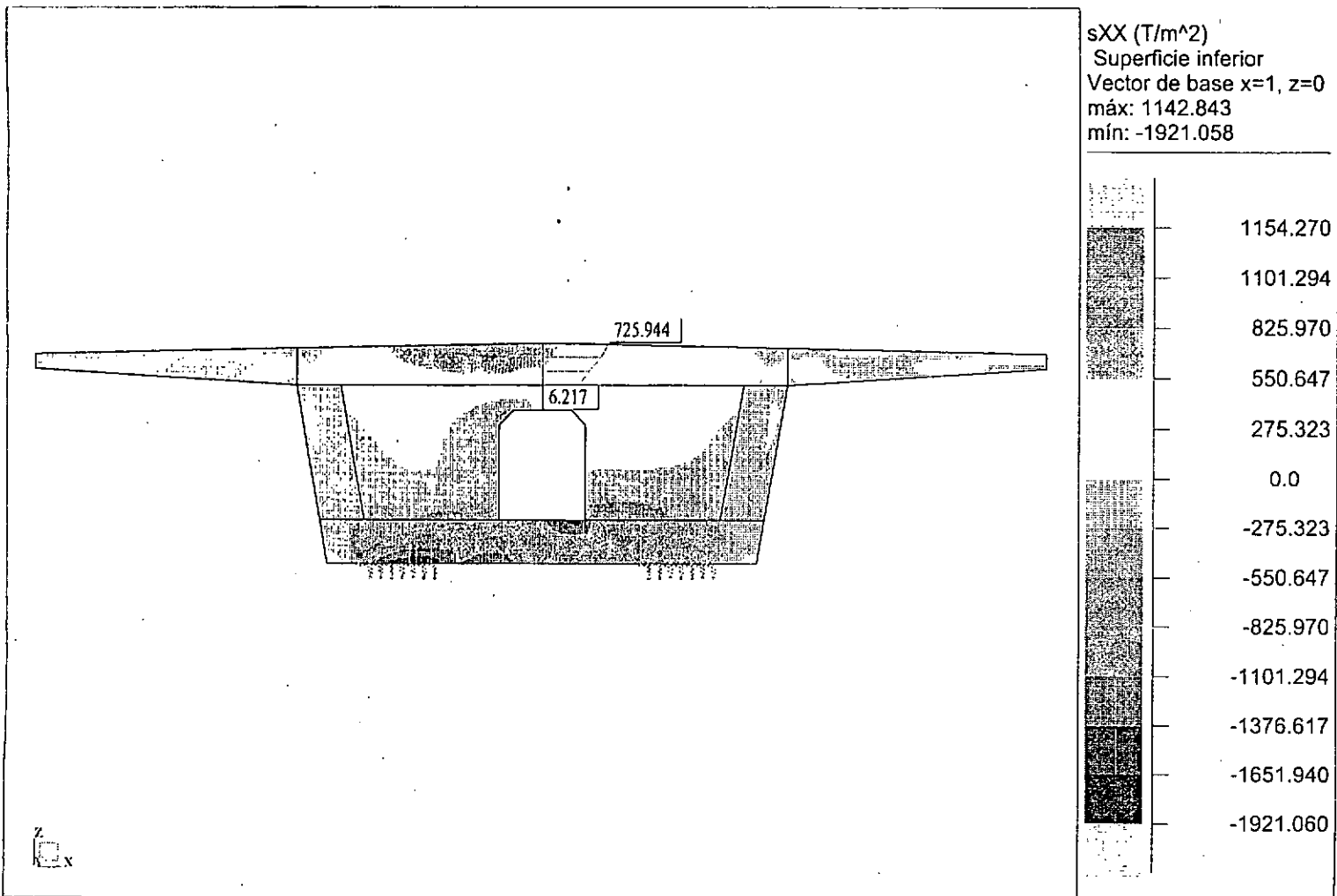
$$\Rightarrow A_s \geq 320 \text{ cm}^2$$



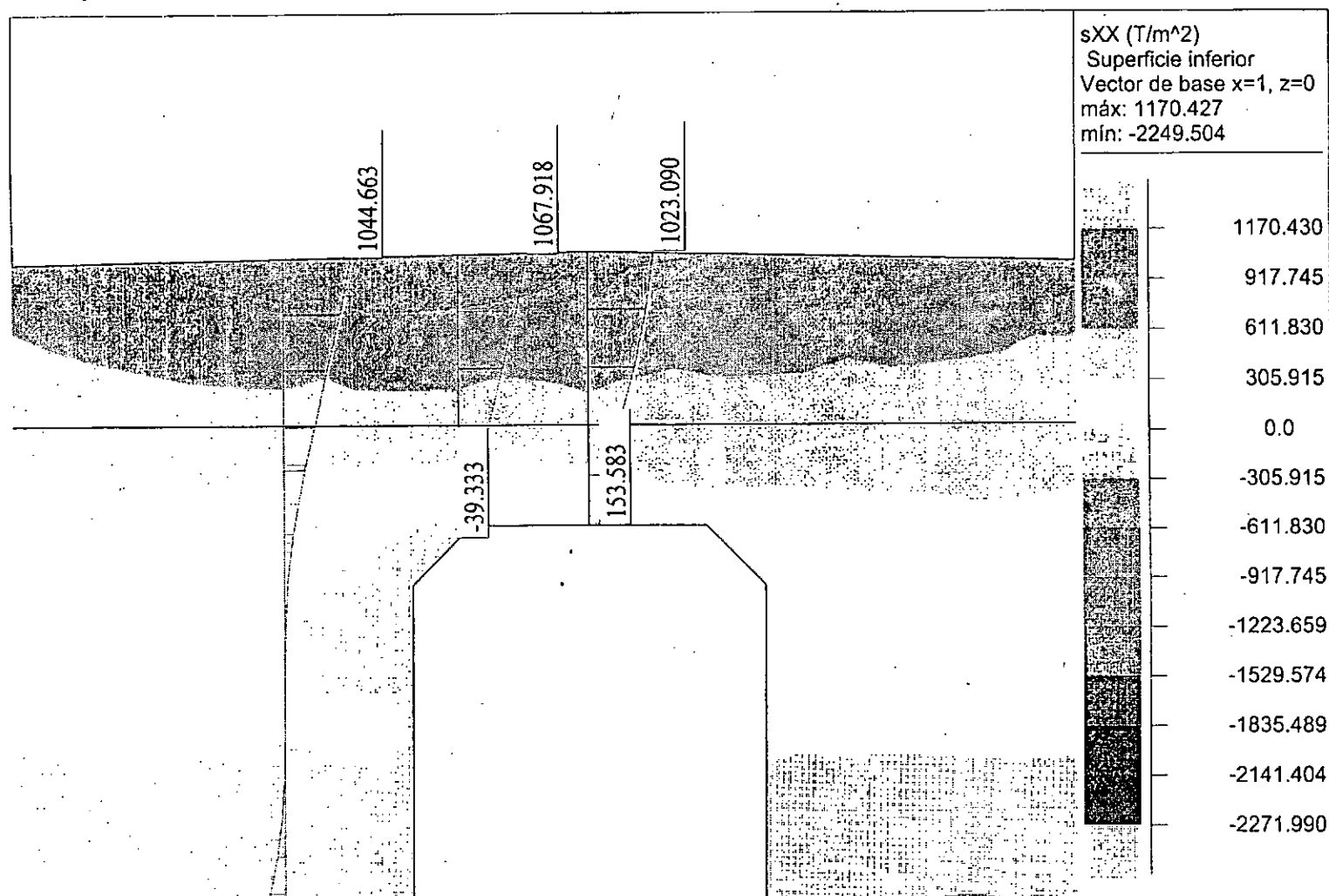
**sXX (T/m<sup>2</sup>) Vector de base x=1, z=0; ELU 1**



**sXX (T/m<sup>2</sup>) Vector de base x=1, z=0; ELU 2**



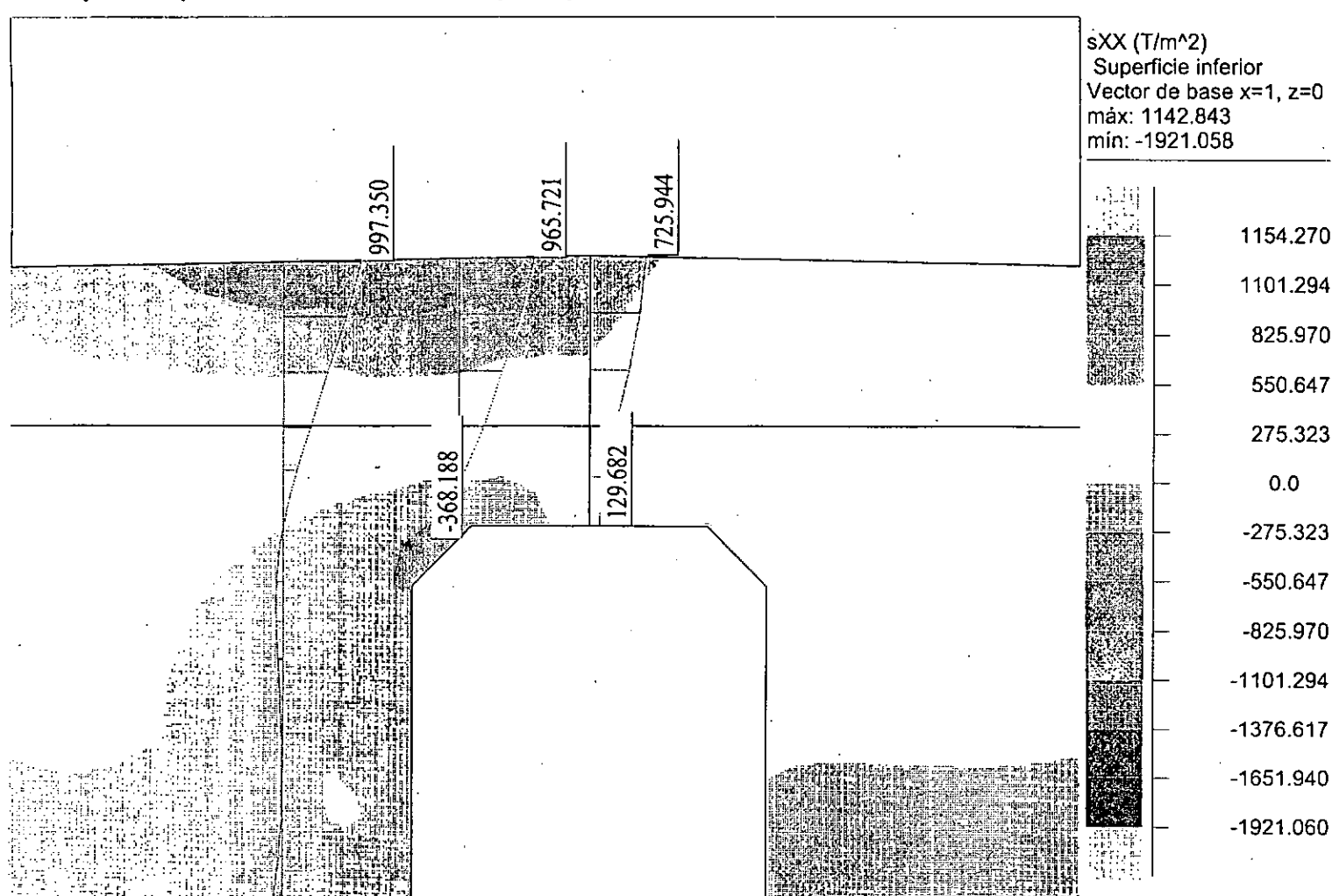
sXX (T/m<sup>2</sup>). Vector de base x=1, z=0; Cortes en ELU 1



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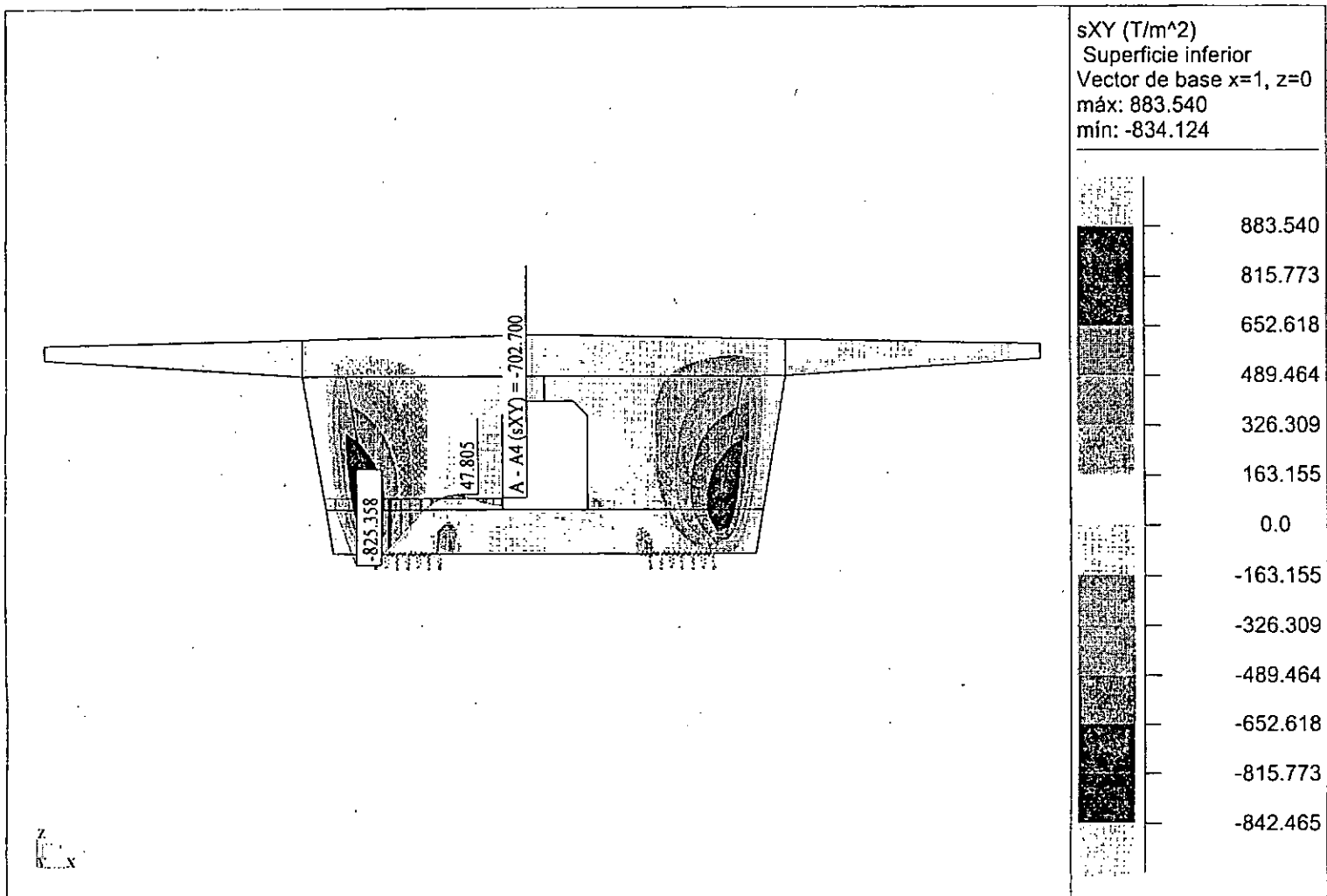
sXX (T/m<sup>2</sup>). Vector de base x=1, z=0; Cortes en ELU 2



Fecha : 18/07/03

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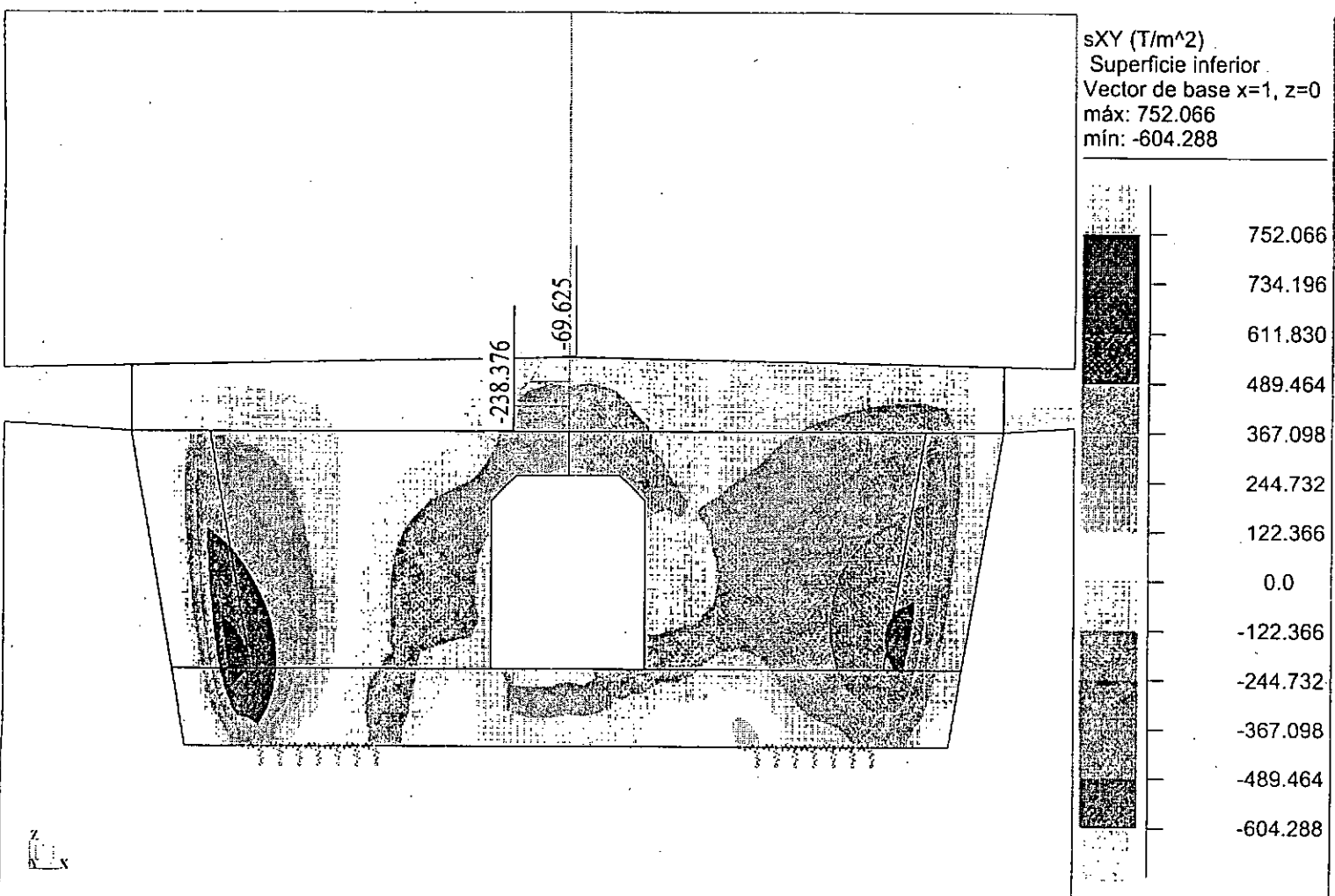
sXY (T/m<sup>2</sup>) Vector de base x=1, z=0; ELU 1



Fecha : 18/07/03

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sXY (T/m<sup>2</sup>). Vector de base x=1, z=0 Corte superior en ELU 2

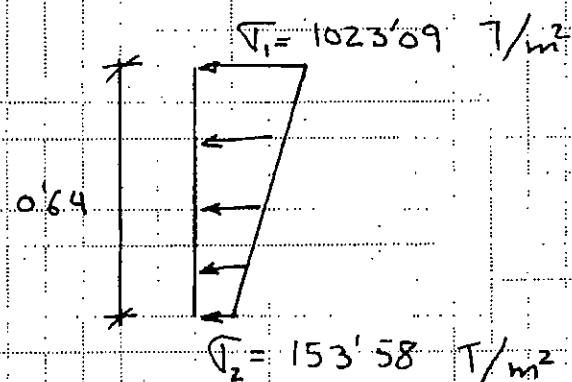


Fecha : 18/07/03

Página : 2

ARMADO SEGÚN M.E.F.

Armadura en tirante superior:



$$T_d = \frac{T_1 + T_2}{2} \cdot 0.64 \cdot 1.5 = 564.8 \text{ T}$$

$$T_d = A_s \cdot f_{yd} \Leftrightarrow A_s = \frac{T_d}{4} = 141.2 \text{ cm}^2$$

Armadura de cortante en almas.

En ELU I las tensiones tangenciales máximas son:

$$\tau_{\max} = 883.54 \text{ T/m}^2$$

$$\tau_{cu} = 0.30 \cdot f_{cd} = 1000 \text{ T/m}^2 > \tau_{\max} \checkmark$$

Según el diagrama adjunto la integral de tensiones tangenciales en 1 alma es:

$$R = 702.7 \text{ T}$$

Considerando que estas tensiones se concentran principalmente en un ancho de 1.2 m aproximadamente:

$$T_d = \frac{R}{1.2} = 585.6 \text{ T/m} \Rightarrow$$

$$\Rightarrow A_{sc} \geq \frac{T_d}{4} = 146 \text{ cm}^2/\text{m}$$

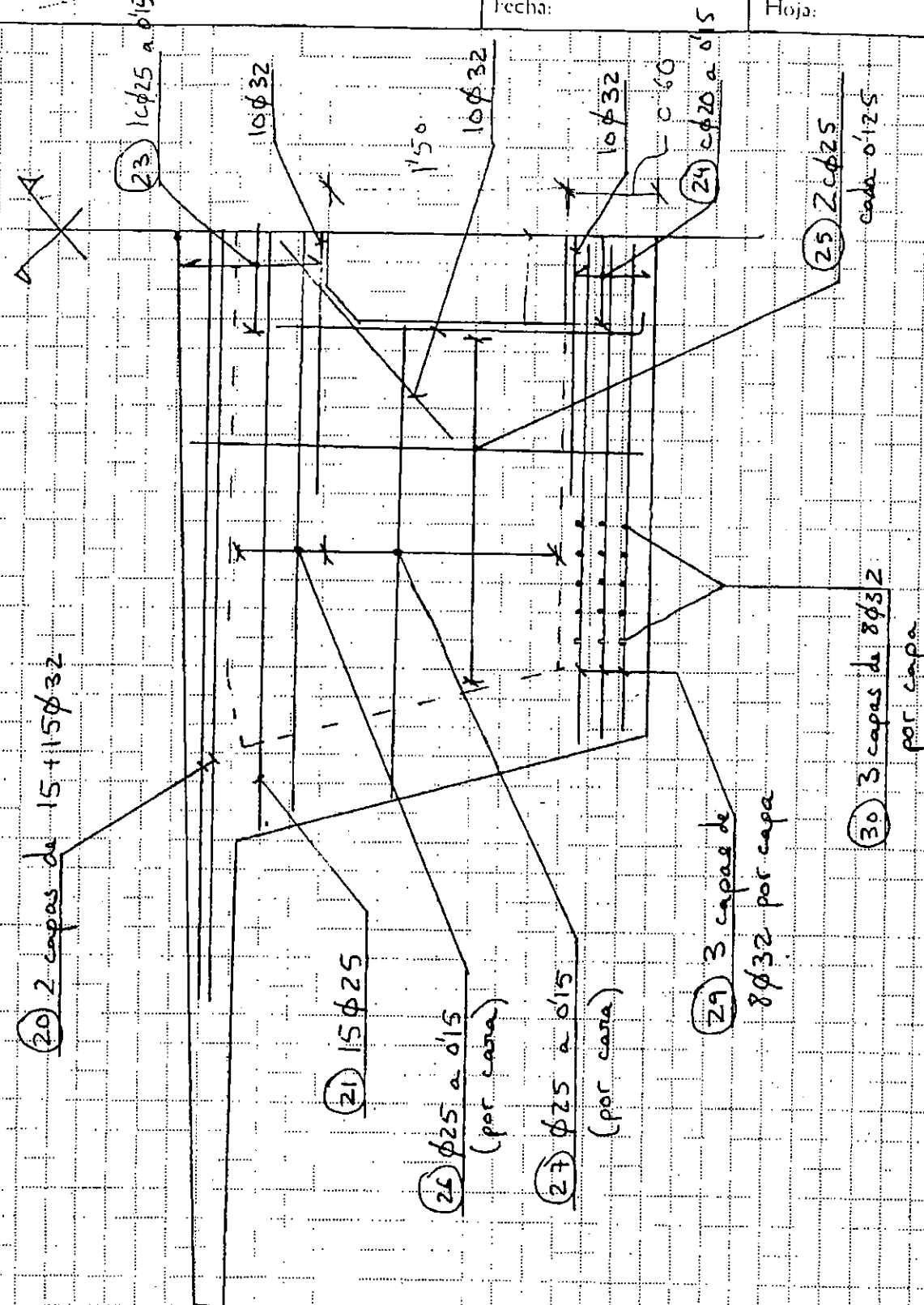
$\Updownarrow$   
 $2 \phi 25 \text{ cada } 0.125$

Introducción de la reacción:

$$R_{d, \max} = 2507 \text{ T}$$

$$A_s \geq \frac{0.25 \cdot R_{d, \max}}{f_y} = 157 \text{ cm}^2$$

$\uparrow$   
 $3 \# 8 + 8 \phi 32$





#### 6.4. INTRODUCCIÓN DEL PRETENSADO

La regularización de las tensiones normales en el tablero inducidas por el pretensado produce tracciones en la zona de anclajes, cuyo efecto se puede estudiar a partir de dos análisis independientes:

- Estudio de la introducción de una fuerza puntual en el anclaje, que permite el cálculo de los refuerzos de armadura en la zona inmediatamente detrás de la placa de anclaje.
- En las zonas de estribos la fuerza rasante se incrementa por el efecto de introducción de pretensado, cuyo valor total se reparte en planta, a efectos de cálculo, con un ángulo de aproximadamente  $35^\circ$ . El efecto de esta regularización de tensiones se puede abordar a partir del método de bielas y tirantes, cuyo modelo sería análogo al que se emplea para el cálculo de vigas de gran canto. El cálculo adicional se incluye en el apartado 7.3 (armadura de rasante)

En las hojas siguientes se detallan los cálculos de las armaduras a colocar en la zona de introducción de la fuerza de pretensado.



Geometría de la sección

|                                                             |         |
|-------------------------------------------------------------|---------|
| Ancho total                                                 | 14.00 m |
| Ancho del fondo                                             | 5.95 m  |
| Voladizo                                                    | 3.60 m  |
| Canto de tablero                                            | 3.01 m  |
| Espesor en arranque de voladizo                             | 0.50 m  |
| Espesor en extremo de voladizo                              | 0.20 m  |
| Número de anclajes                                          | 12      |
| Distancia entre anclajes extremos                           | 6.30 m  |
| Distancia horizontal entre parejas de anclajes consecutivos | 5.80 m  |
| Distancia horizontal entre dos placas del mismo nervio      | 0.50    |
| Distancia vertical entre anclajes consecutivos              | 0.60 m  |
| Área de la sección                                          | 9.67 m2 |
| Altura media de las placas de anclaje                       | 1.8 m   |

Pretensado

|                                  |                 |
|----------------------------------|-----------------|
| Fuerza de pretensado             | 625.0 T/anclaje |
| Dimensión de la placa de anclaje | 0.40 m          |
| Diámetro de la vaina             | 0.12 m          |
| Número de cables                 | 12              |
| Numero de cables por agrupación  | 2               |

1era Regularización de tensiones de pretensado

Opción de armado por anclaje

|                               |      |             |
|-------------------------------|------|-------------|
| Armadura (cercos por anclaje) | 58.6 | cm2/anclaje |
|-------------------------------|------|-------------|

| nº cercos |     |     |
|-----------|-----|-----|
| d16       | d20 | d25 |
| 15        | 9   | 6   |

Opción de armado cada dos anclajes

|                     |       |     |
|---------------------|-------|-----|
| Armadura horizontal | 104.7 | cm2 |
|---------------------|-------|-----|

|            |  | d 20 | d 25 | por/capa |
|------------|--|------|------|----------|
| 3 capas de |  | 11   | 7    |          |

|                   |      |     |
|-------------------|------|-----|
| Armadura vertical | 78.2 | cm2 |
|-------------------|------|-----|

| nº cercos |     |     | por 2 cables |
|-----------|-----|-----|--------------|
| d16       | d20 | d25 |              |
| 19        | 12  | 8   |              |

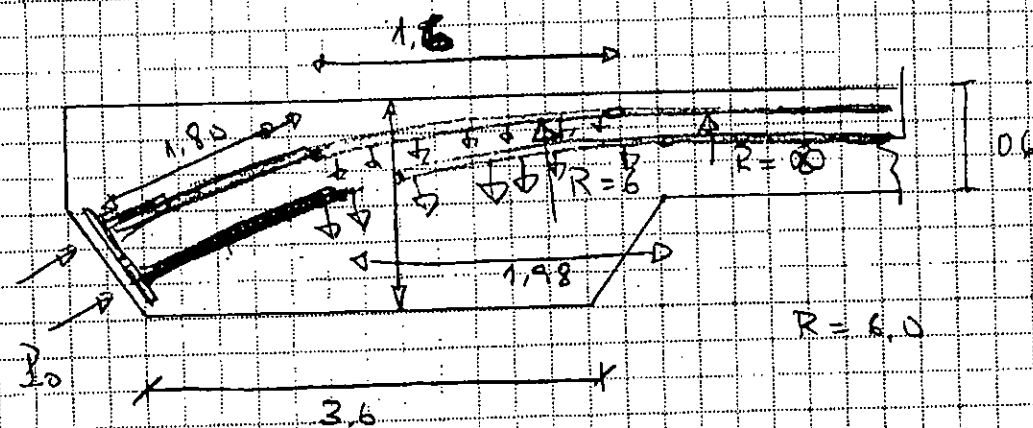
2ª regularización de tensiones

|                                                             |       |       |                                  |           |               |                |
|-------------------------------------------------------------|-------|-------|----------------------------------|-----------|---------------|----------------|
| Zona de regularización de tensiones                         | 7.8   | m     |                                  |           |               |                |
| Tensión normal en voladizo                                  | 775.3 | T/m2  |                                  |           |               |                |
| Tension rasante media en plano de voladizo                  | 250.9 | T/m2  |                                  |           |               |                |
| Tensión rasante de agotamiento del hormigón                 | 666.7 | T/m2  |                                  |           |               |                |
| Rasante medio en plano de voladizo (valor k)                | 125.5 | T/m   |                                  |           |               |                |
| Armadura de rasante total en plano de voladizo Ssu          | 47.0  | cm2/m | a repartir en dos caras en       | 7.8 m/tab |               |                |
| Armadura de viga de regularización (viga de gran canto) T1d | 40.5  | cm2   | a repartir en 2 caras y long. en | 0.8 m     | equivalente a | 52.0 cm2/m tab |
| Armadura de viga de regularización (viga de gran canto) T2d | 50.6  | cm2   | a repartir en 2 caras y long. en | 2.7 m     | equivalente a | 18.6 cm2/m tab |
| Armadura de flexión horizontal en voladizo T3d              | 94.1  | cm2   | a repartir en dos caras en       | 2.3 m/tab | equivalente a | 40.3 cm2/m tab |



## BLOQUE DE ANCLAJE (PRETENSADO)

Arreglo del Bloque de anclaje



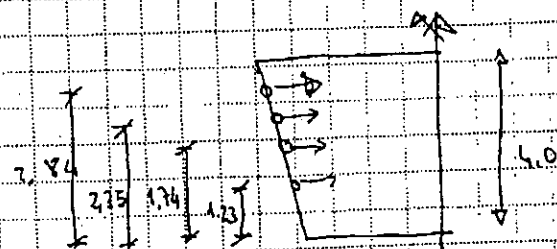
$$P_{0, \text{anclaje}} = 625 \text{ T/cable}$$

$$\rightarrow A_s = \frac{625 \times 0.25}{2.6} = 60 \text{ cm}^2 \rightarrow 12 \phi 25$$

6 c d 25 por suelaje

Fuerza de desviación

$$U = \frac{P_0}{R} = 10.4 \text{ T/m, cable} \times \frac{140}{144} = 10.1$$

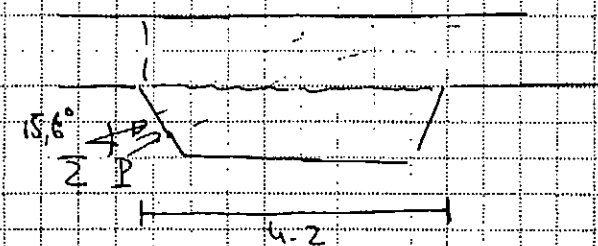


$$M_k = 4.68 \text{ mT} \times \frac{2 \times 1.8}{4.0} = 4.80 \text{ mT}$$

$$\rightarrow A_s \geq 108 \frac{\text{cm}^2}{\text{m}} \rightarrow 2 \text{ cables } \phi 32/15 \text{ v}$$

H = 1.65 d = 1.60

Rasante en bloque de hormigón



Texto final

$$\Sigma P = 4 \times 625 + 4 \times 605 = 4920 \text{ T} \cdot \cos 15.6^\circ = 4740 \text{ T}$$

$$R_k = \frac{4740}{4.2} = 1128 \text{ T/m}$$

H = 3.50m  $\rightarrow 334 \text{ T/m} \approx 1070 \text{ T/m}$

$$1128 \text{ T/m} \rightarrow 4740 \text{ T} \rightarrow A_s \geq \frac{4740 \text{ T}}{f_{yd}} = 1549 \text{ cm}^2$$

$f_{yd} = 1.35$   
 $f_{yd} = 1.0$

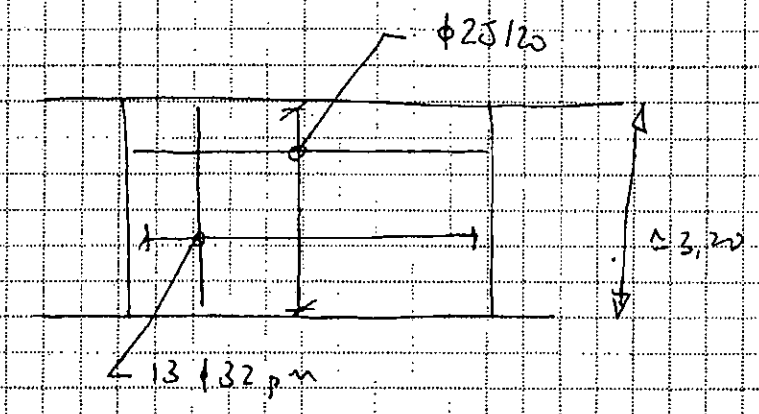
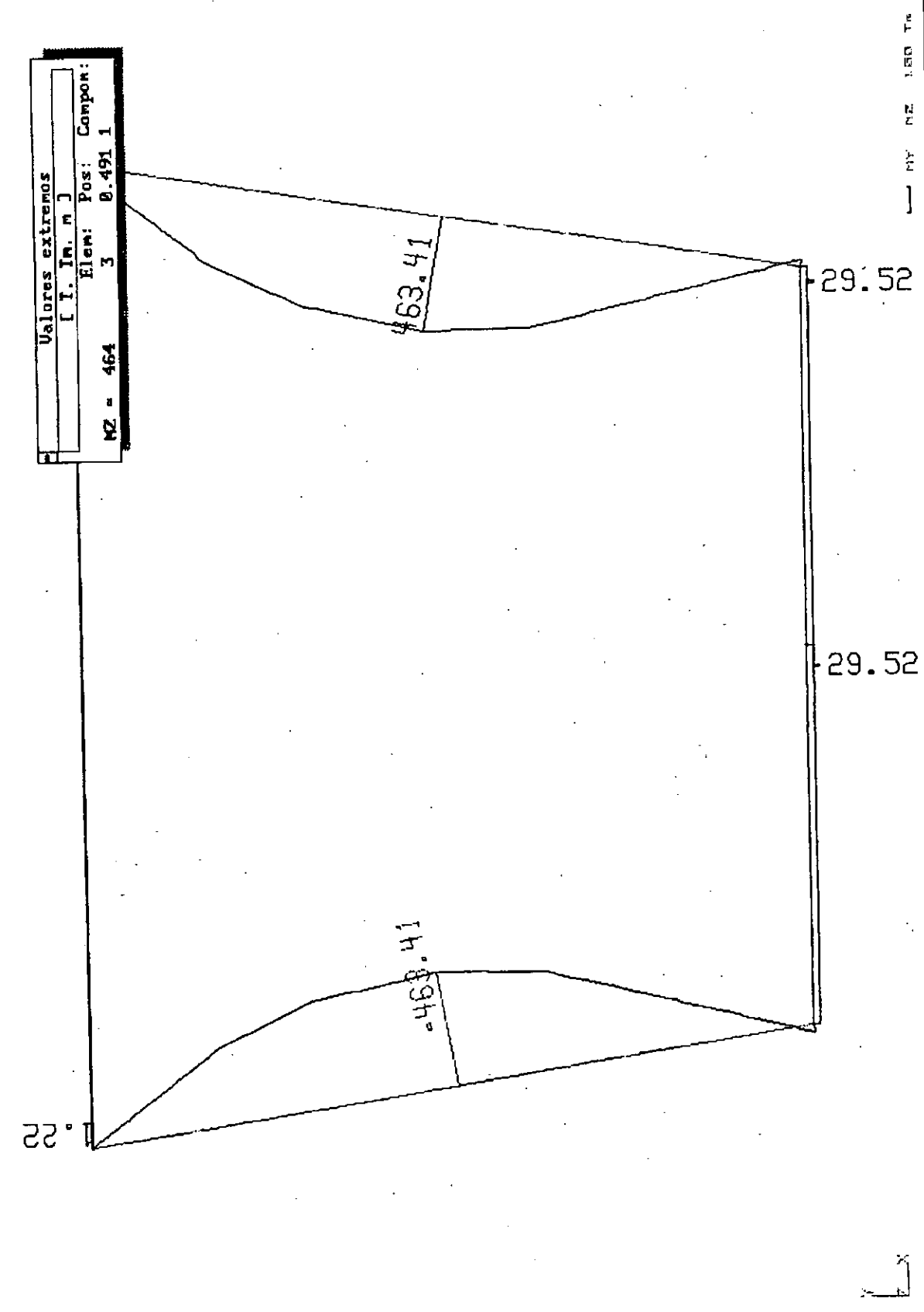
Prolongando cables de catenaria pretensado

$$2 \times 6 \times 4 \times 2 = 96 \phi 25 \equiv 470 \text{ cm}^2 \rightarrow A_{s, \text{rec}} \geq 1830 \text{ cm}^2$$

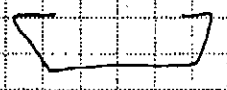
$$\rightarrow \frac{1830 \text{ cm}^2}{4.2} \rightarrow 270 \text{ cm}^2 \rightarrow 85 \phi 20$$

PRETENSADO

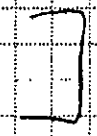
| Valores extremos<br>[ T. Im. m ] |         |            |           |
|----------------------------------|---------|------------|-----------|
| Nº = 464                         | Elem: 3 | Pos: 0.491 | Campon: 1 |



$\phi 25/25 \rightarrow 2 \times 3.0 \times 6.6 \times 4.9 = 194 \text{ cm}^2$



$13 \phi 32 \text{ p.m.} \rightarrow 13 \times 2 \times 8 \times 4.0 = 832 \text{ cm}^2$



Necesitamos acero auxiliar

$832 + 194 = 1026 \rightarrow 104 \text{ cm}^2$   
 $4 \times \phi 16 \text{ No.}$

Cont. te  $\rightarrow 13 \phi 32 \checkmark$

## 7. VERIFICACIÓN DEL E.L.U DE ROTURA POR TENSIONES TANGENCIALES

### 7.1 EVALUACIÓN DEL E.L.U. DE CORTANTE

En este apartado se comprueba el Estado Límite Último de rotura por cortante de acuerdo con los criterios de la Normativa española vigente (EHE, artículo 44)

Los cálculos realizados han sido los siguientes:

- Cálculo de la envolvente de esfuerzos cortantes para las distintas acciones consideradas en el proyecto del tablero. Los esfuerzos de cálculo se han combinado de acuerdo con los criterios del apartado 2 de este Anejo.

La envolvente de esfuerzos flectores positivos se muestra en los listados adjuntos con la notación  $V_{rd}$ , conjuntamente con el esfuerzo flector y torsor concomitantes.

Donde

$$V_{rd} = V_d + V_{pd} + V_{cd}$$

donde,

- $V_{rd}$  = Valor del esfuerzo cortante efectivo calculado como:
- $V_d$  = Valor de cálculo del esfuerzo cortante producido por las acciones exteriores
- $V_{pd}$  = Valor de cálculo del esfuerzo cortante producido por el pretensado.
- $V_{cd}$  = Valor de cálculo del la componente paralela a la sección de las tensiones normales en piezas de sección variable

- Comprobación del agotamiento por compresión oblicua en el alma.

$$V_{rd} \leq V_{u1}$$

- $V_{u1}$  = Esfuerzo cortante de agotamiento por compresión oblicua del alma.

- Comprobación del agotamiento por tracción en el alma.

$$V_{rd} \leq V_{u2}$$

- $V_{u2}$  = Esfuerzo cortante de agotamiento por tracción en el alma.

- El cálculo de todos los parámetros resistentes se ha realizado de forma automática. Posteriormente se ha determinado la armadura de cortante necesaria  $A_{sc}$  por criterios resistentes y se comprueba que verifica los criterios de armadura mínima a cortante (el máximo de los dos valores es el que aparece en los listados).

COMBINACION 37 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 1     | -3117.769  | 1266.967  | -270.493 | 1095.208  | -1093.068 | 246.450  |
| 2     | -1150.069  | 1095.095  | -246.789 | -646.795  | -950.926  | 221.654  |
| 3     | 493.174    | 957.052   | -222.115 | -2019.590 | -813.174  | 196.639  |
| 4     | 1781.495   | 823.293   | -196.949 | -3045.989 | -680.057  | 171.403  |
| 5     | 2738.014   | 694.214   | -172.338 | -3802.954 | -555.408  | 147.089  |
| 6     | 3439.198   | 573.538   | -147.131 | -4221.683 | -437.088  | 121.997  |
| 7     | 3815.456   | 459.036   | -123.472 | -4369.233 | -317.707  | 97.617   |
| 8     | 3934.117   | 343.629   | -96.976  | -4281.651 | -204.061  | 70.151   |
| 9     | 3830.078   | 233.683   | -73.822  | -4030.562 | -98.529   | 48.596   |
| 10    | 3575.006   | 131.713   | -48.488  | -3617.040 | -64.948   | 23.269   |
| 11    | 3168.447   | 101.910   | -26.413  | -1662.970 | -59.037   | 2.309    |
| 12    | 2754.857   | 82.095    | -3.749   | -1294.613 | -55.160   | -17.543  |
| 13    | 1543.715   | 71.102    | 18.430   | -914.783  | -56.264   | -37.229  |
| 14    | 1185.646   | 71.783    | 38.992   | -547.974  | -61.587   | -56.644  |
| 15    | 883.843    | 79.118    | 58.797   | -221.639  | -71.361   | -75.190  |
| 16    | 668.094    | 91.993    | 77.443   | -144.563  | -90.081   | -93.799  |
| 17    | 561.600    | 108.718   | 96.650   | 53.402    | -105.666  | -111.214 |
| 18    | 575.385    | 130.376   | 114.181  | -752.232  | 8.892     | -131.470 |
| 19    | 1556.032   | 20.113    | 131.832  | -293.565  | 576.852   | -147.654 |
| 20    | 1057.656   | -550.316  | 148.688  | 2034.839  | 1025.448  | -147.071 |
| 21    | -10508.562 | 2301.945  | -302.932 | 5897.667  | -1682.942 | 287.556  |
| 22    | -5942.341  | 1684.344  | -289.673 | 3964.184  | -1067.389 | 261.456  |
| 23    | -4095.115  | 1071.606  | -264.213 | 1888.174  | -967.576  | 235.040  |
| 24    | -2103.484  | 975.107   | -235.844 | 125.682   | -836.091  | 205.380  |
| 25    | -421.492   | 847.272   | -206.420 | -1255.050 | -706.089  | 175.524  |
| 26    | 807.958    | 721.162   | -173.562 | -2226.381 | -613.271  | 142.231  |
| 27    | 1791.800   | 632.585   | -143.220 | -2999.659 | -525.212  | 111.706  |
| 28    | 2511.388   | 548.991   | -113.967 | -3510.211 | -436.190  | 81.748   |
| 29    | 2981.487   | 464.530   | -83.465  | -3710.067 | -354.694  | 51.221   |
| 30    | 3154.957   | 387.831   | -52.675  | -3741.691 | -282.357  | 20.971   |
| 31    | 3175.568   | 320.434   | -25.218  | -3622.069 | -220.010  | -7.495   |
| 32    | 3060.642   | 262.820   | 6.093    | -2314.582 | -173.562  | -38.449  |
| 33    | 1773.345   | 221.268   | 34.129   | -2085.969 | -140.279  | -64.190  |
| 34    | 1580.201   | 192.641   | 59.585   | -1832.426 | -115.567  | -89.411  |
| 35    | 1376.363   | 172.730   | 85.440   | -1602.971 | -99.584   | -114.921 |
| 36    | 1209.728   | 161.069   | 110.378  | -1444.997 | -90.718   | -139.424 |
| 37    | 1125.895   | 156.531   | 133.309  | -1388.151 | -90.463   | -161.921 |
| 38    | 1151.896   | 160.374   | 156.918  | -2417.990 | -85.888   | -184.719 |
| 39    | 2271.487   | 159.418   | 177.791  | -2121.203 | 477.440   | -204.823 |
| 40    | 2067.834   | -400.541  | 199.521  | 2077.327  | 1129.605  | -201.142 |
| 41    | -11497.926 | 2345.057  | -297.380 | 6969.145  | -1669.901 | 283.234  |
| 42    | -7015.000  | 1671.293  | -285.724 | 5215.838  | -1016.066 | 257.523  |
| 43    | -5349.958  | 1020.425  | -259.739 | 3245.424  | -929.700  | 230.507  |
| 44    | -3465.277  | 937.408   | -232.189 | 1551.505  | -812.441  | 201.674  |
| 45    | -1852.655  | 823.760   | -202.695 | 229.437   | -752.140  | 171.693  |
| 46    | -205.067   | 767.502   | -170.427 | -1308.960 | -658.488  | 139.160  |
| 47    | 868.739    | 678.116   | -140.882 | -2178.429 | -570.367  | 109.370  |
| 48    | 1684.563   | 594.493   | -111.212 | -2783.222 | -481.323  | 78.905   |
| 49    | 2249.488   | 509.742   | -80.903  | -3075.674 | -399.527  | 48.980   |
| 50    | 2516.112   | 433.072   | -51.870  | -3199.990 | -327.271  | 19.919   |
| 51    | 2630.000   | 365.366   | -22.044  | -3173.274 | -264.688  | -10.648  |
| 52    | 2608.804   | 307.795   | 6.830    | -1925.305 | -222.520  | -39.351  |
| 53    | 1381.649   | 270.375   | 36.321   | -1801.224 | -189.413  | -66.320  |
| 54    | 1294.006   | 241.941   | 62.231   | -1654.294 | -164.942  | -92.034  |

COMBINACION 37 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 55    | 1197.488   | 222.263   | 87.322   | -1533.768 | -149.313  | -116.763 |
| 56    | 1140.328   | 211.052   | 111.392  | -1487.283 | -140.864  | -140.480 |
| 57    | 1168.057   | 206.872   | 135.651  | -1543.604 | -140.794  | -164.253 |
| 58    | 1307.713   | 210.794   | 158.117  | -2686.641 | -136.007  | -185.929 |
| 59    | 2540.421   | 209.580   | 180.518  | -2501.469 | 427.407   | -207.593 |
| 60    | 2448.427   | -350.449  | 202.526  | 1883.987  | 1110.105  | -203.387 |
| 61    | -11561.952 | 2346.235  | -294.515 | 7028.773  | -1671.199 | 280.287  |
| 62    | -7074.690  | 1672.603  | -284.461 | 5270.573  | -1017.139 | 256.377  |
| 63    | -5404.991  | 1021.532  | -258.644 | 3298.657  | -930.359  | 229.418  |
| 64    | -3518.976  | 938.025   | -231.137 | 1604.950  | -812.835  | 200.636  |
| 65    | -1906.596  | 824.137   | -201.690 | 283.642   | -752.458  | 170.760  |
| 66    | -259.840   | 767.830   | -170.685 | -1254.531 | -658.777  | 139.415  |
| 67    | 813.634    | 678.314   | -140.903 | -2123.750 | -570.667  | 109.441  |
| 68    | 1629.501   | 594.812   | -111.606 | -2729.449 | -481.710  | 79.454   |
| 69    | 2195.131   | 510.344   | -81.480  | -3023.144 | -400.366  | 49.360   |
| 70    | 2463.465   | 433.824   | -51.703  | -3150.111 | -328.160  | 19.561   |
| 71    | 2580.039   | 366.470   | -21.800  | -3126.831 | -265.871  | -10.921  |
| 72    | 2562.231   | 308.915   | 7.010    | -1880.974 | -223.893  | -39.346  |
| 73    | 1337.419   | 271.818   | 35.720   | -1761.154 | -190.792  | -65.746  |
| 74    | 1253.753   | 243.407   | 62.020   | -1618.084 | -166.378  | -91.852  |
| 75    | 1161.238   | 223.611   | 86.719   | -1500.952 | -150.673  | -116.217 |
| 76    | 1107.649   | 212.413   | 111.307  | -1457.796 | -142.076  | -140.418 |
| 77    | 1138.600   | 208.110   | 135.315  | -1516.772 | -142.184  | -163.882 |
| 78    | 1281.112   | 212.081   | 157.452  | -2663.518 | -137.360  | -185.293 |
| 79    | 2517.310   | 211.015   | 180.556  | -2482.175 | 425.921   | -207.665 |
| 80    | 2429.150   | -348.964  | 202.534  | 1947.016  | 1115.168  | -203.365 |
| 81    | -11689.680 | 2349.844  | -297.557 | 7148.923  | -1674.679 | 283.229  |
| 82    | -7194.923  | 1676.108  | -285.744 | 5383.135  | -1020.665 | 257.512  |
| 83    | -5517.629  | 1025.045  | -259.453 | 3403.815  | -934.094  | 230.240  |
| 84    | -3623.935  | 941.789   | -233.176 | 1701.278  | -816.688  | 202.722  |
| 85    | -2002.882  | 828.067   | -203.191 | 370.464   | -756.328  | 172.162  |
| 86    | -346.754   | 771.698   | -169.889 | -1175.882 | -662.715  | 138.874  |
| 87    | 735.035    | 682.264   | -140.676 | -2053.833 | -574.588  | 109.151  |
| 88    | 1559.771   | 598.672   | -110.557 | -2668.057 | -485.540  | 77.996   |
| 89    | 2133.813   | 514.293   | -79.729  | -2970.173 | -404.205  | 47.682   |
| 90    | 2410.344   | 437.467   | -50.708  | -3104.575 | -331.781  | 19.125   |
| 91    | 2534.743   | 370.007   | -22.417  | -3088.825 | -269.396  | -10.457  |
| 92    | 2524.414   | 312.632   | 8.390    | -1851.492 | -227.627  | -40.685  |
| 93    | 1308.030   | 275.550   | 35.793   | -1739.918 | -194.614  | -65.787  |
| 94    | 1232.739   | 247.287   | 62.272   | -1605.501 | -170.348  | -91.966  |
| 95    | 1148.735   | 227.646   | 87.398   | -1497.546 | -154.602  | -116.905 |
| 96    | 1103.994   | 216.278   | 111.851  | -1463.019 | -146.064  | -140.939 |
| 97    | 1143.957   | 212.018   | 135.606  | -1531.132 | -145.956  | -164.207 |
| 98    | 1295.344   | 215.920   | 158.576  | -2686.366 | -140.958  | -186.404 |
| 99    | 2540.256   | 214.600   | 179.944  | -2533.324 | 403.974   | -207.026 |
| 100   | 2480.252   | -327.048  | 202.738  | 1779.981  | 1075.004  | -203.757 |
| 101   | -11457.994 | 2297.244  | -297.157 | 7014.419  | -1640.532 | 282.749  |
| 102   | -7060.523  | 1641.952  | -283.074 | 5304.709  | -1004.808 | 254.754  |
| 103   | -5439.071  | 1009.188  | -258.338 | 3360.999  | -918.134  | 229.196  |
| 104   | -3581.177  | 925.817   | -231.162 | 1693.919  | -800.609  | 200.647  |
| 105   | -1995.546  | 811.969   | -201.639 | 399.050   | -740.271  | 170.660  |
| 106   | -375.357   | 755.681   | -169.514 | -1112.407 | -646.697  | 138.339  |
| 107   | 671.505    | 666.205   | -140.018 | -1954.576 | -558.595  | 108.520  |
| 108   | 1460.575   | 582.736   | -110.389 | -2534.070 | -469.605  | 78.215   |
| 109   | 1999.834   | 498.333   | -80.773  | -2801.604 | -388.241  | 48.604   |

COMBINACION 37 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 110   | 2241.944   | 421.529   | -50.454  | -2901.590 | -315.814  | 18.627   |
| 111   | 2331.928   | 354.124   | -21.953  | -2851.248 | -253.375  | -10.743  |
| 112   | 2286.940   | 296.509   | 8.015    | -1578.733 | -211.503  | -40.422  |
| 113   | 1035.613   | 259.495   | 36.179   | -1431.452 | -178.438  | -66.146  |
| 114   | 924.496    | 231.031   | 62.401   | -1260.611 | -153.996  | -92.144  |
| 115   | 804.266    | 211.351   | 87.422   | -1115.903 | -138.259  | -116.912 |
| 116   | 722.794    | 200.060   | 111.667  | -1044.533 | -129.891  | -140.782 |
| 117   | 725.985    | 195.885   | 135.005  | -1076.276 | -130.116  | -163.590 |
| 118   | 840.984    | 200.042   | 157.905  | -2197.043 | -125.719  | -185.772 |
| 119   | 2051.232   | 199.382   | 180.700  | -1990.916 | 1047.567  | -207.736 |
| 120   | 1938.323   | -970.605  | 201.203  | 2158.086  | 1120.472  | -203.600 |
| 121   | -11568.574 | 2337.303  | -294.966 | 7057.535  | -1661.302 | 280.917  |
| 122   | -7103.743  | 1662.719  | -281.327 | 5323.240  | -1007.440 | 253.035  |
| 123   | -5457.866  | 1011.861  | -256.624 | 3373.319  | -920.984  | 227.449  |
| 124   | -3593.791  | 928.777   | -228.208 | 1700.299  | -803.566  | 197.635  |
| 125   | -2001.950  | 814.970   | -199.339 | 399.283   | -742.525  | 168.265  |
| 126   | -379.710   | 758.155   | -167.202 | -1111.732 | -649.130  | 136.134  |
| 127   | 671.353    | 668.862   | -137.901 | -1957.480 | -561.368  | 106.305  |
| 128   | 1464.793   | 585.588   | -107.840 | -2541.980 | -472.620  | 75.539   |
| 129   | 2009.529   | 501.535   | -78.114  | -2816.480 | -391.793  | 46.165   |
| 130   | 2259.295   | 425.454   | -48.623  | -2925.867 | -320.242  | 16.572   |
| 131   | 2359.468   | 358.780   | -18.797  | -1703.311 | -258.751  | -16.082  |
| 132   | 1142.827   | 302.192   | 12.063   | -1642.258 | -218.290  | -42.223  |
| 133   | 1103.894   | 266.441   | 38.561   | -1515.030 | -185.937  | -68.597  |
| 134   | 1013.585   | 238.885   | 64.477   | -1368.301 | -162.266  | -94.252  |
| 135   | 917.848    | 219.856   | 89.566   | -1250.878 | -147.106  | -119.095 |
| 136   | 864.082    | 209.150   | 114.311  | -1209.048 | -138.879  | -143.390 |
| 137   | 896.757    | 205.077   | 137.628  | -1269.594 | -138.539  | -166.218 |
| 138   | 1040.251   | 208.710   | 160.524  | -2413.374 | -132.393  | -188.381 |
| 139   | 2272.594   | 206.244   | 182.695  | -2221.991 | 1040.220  | -209.738 |
| 140   | 2172.774   | -963.177  | 203.909  | 1045.566  | 1092.652  | -207.367 |
| 141   | -9371.857  | 2139.458  | -223.830 | 6111.213  | -2119.896 | 214.475  |
| 142   | -6141.963  | 2120.793  | -217.087 | 5078.125  | -1416.855 | 193.907  |
| 143   | -5168.394  | 1419.634  | -192.413 | 3948.172  | -679.950  | 168.445  |
| 144   | -4096.705  | 684.751   | -172.375 | 2824.448  | -399.840  | 147.682  |
| 145   | -3030.338  | 407.064   | -148.437 | 1873.585  | -449.556  | 124.250  |
| 146   | -617.876   | 459.145   | -124.822 | 102.400   | -364.534  | 99.572   |
| 147   | -412.779   | 376.865   | -100.989 | -231.230  | -347.275  | 75.288   |
| 148   | -124.086   | 362.565   | -77.193  | -166.669  | -339.081  | 51.769   |
| 149   | -226.596   | 357.263   | -54.032  | -335.852  | -338.117  | 28.957   |
| 150   | -87.883    | 359.381   | -31.207  | -485.982  | -346.717  | 6.379    |
| 151   | 41.184     | 371.400   | -9.098   | -608.311  | -349.557  | -16.560  |
| 152   | 151.838    | 377.760   | 13.399   | 526.289   | -244.641  | -40.174  |
| 153   | -983.238   | 276.383   | 36.869   | 566.303   | -159.566  | -61.575  |
| 154   | -1012.432  | 194.944   | 58.144   | 744.964   | -77.827   | -81.556  |
| 155   | -1168.026  | 117.011   | 77.194   | 1043.294  | 0.399     | -101.083 |
| 156   | -1430.531  | 42.702    | 96.330   | 1442.527  | 75.032    | -120.217 |
| 157   | -1780.543  | -28.117   | 116.367  | 1923.648  | 145.961   | -140.221 |
| 158   | -2198.652  | -95.043   | 134.727  | 2465.294  | 213.103   | -158.361 |
| 159   | -2663.122  | -158.112  | 152.466  | 3046.803  | 276.112   | -176.004 |
| 160   | -3153.046  | -217.218  | 169.581  | 3682.486  | 370.376   | -192.949 |

COMBINACION 38 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -3117.777 | 432.622   | -193.295 | 2571.932  | -268.375  | 169.998  |
| 2     | -2465.780 | 327.351   | -175.126 | 1948.462  | -201.158  | 151.597  |
| 3     | -1750.657 | 256.111   | -157.415 | 1331.680  | -128.383  | 133.618  |
| 4     | -1056.797 | 179.368   | -138.777 | 751.142   | -50.357   | 114.691  |
| 5     | -413.311  | 97.281    | -119.213 | 305.184   | 29.524    | 95.270   |
| 6     | 82.184    | 13.443    | -99.680  | -110.550  | 117.361   | 75.285   |
| 7     | 533.745   | -78.272   | -79.165  | -409.596  | 210.270   | 54.461   |
| 8     | 855.980   | -174.600  | -57.865  | -565.837  | 307.752   | 32.981   |
| 9     | 1022.759  | -276.001  | -36.460  | -553.988  | 410.200   | 11.515   |
| 10    | 1010.510  | -382.051  | -14.324  | -381.157  | 445.555   | -10.461  |
| 11    | 825.914   | -420.902  | 7.867    | -22.494   | 485.519   | -32.981  |
| 12    | 446.061   | -464.309  | 30.634   | 370.788   | 528.528   | -55.874  |
| 13    | 22.581    | -510.046  | 53.861   | 886.774   | 572.241   | -79.039  |
| 14    | -531.592  | -557.203  | 76.808   | 1528.214  | 617.255   | -102.057 |
| 15    | -1217.795 | -604.898  | 100.059  | 2292.537  | 657.540   | -124.406 |
| 16    | -2032.201 | -647.959  | 124.136  | 3223.765  | 701.921   | -148.528 |
| 17    | -3018.177 | -694.806  | 143.833  | 4236.625  | 750.991   | -168.328 |
| 18    | -4087.845 | -746.152  | 169.104  | 4549.218  | 936.693   | -192.822 |
| 19    | -4459.161 | -933.908  | 190.847  | 6613.248  | 1586.393  | -213.922 |
| 20    | -6582.489 | -1585.492 | 210.917  | 10013.125 | 2133.316  | -224.243 |
| 21    | -2007.894 | 1141.664  | -208.784 | -1418.037 | -484.961  | 205.044  |
| 22    | 1467.251  | 562.052   | -211.053 | -991.762  | 38.211    | 183.844  |
| 23    | 1132.625  | 35.574    | -189.428 | -1086.290 | 51.279    | 161.476  |
| 24    | 1315.716  | 18.901    | -167.486 | -1229.366 | 96.929    | 138.969  |
| 25    | 1541.680  | -30.679   | -144.779 | -1461.255 | 154.361   | 113.709  |
| 26    | 1770.628  | -92.378   | -115.332 | -1591.168 | 188.144   | 85.352   |
| 27    | 2041.488  | -130.607  | -89.329  | -1783.866 | 226.600   | 58.897   |
| 28    | 2285.128  | -173.661  | -63.535  | -1926.179 | 270.270   | 32.832   |
| 29    | 2464.584  | -222.109  | -36.470  | -2053.645 | 323.487   | 5.054    |
| 30    | 2613.860  | -280.111  | -7.653   | -1996.159 | 378.491   | -24.206  |
| 31    | 2562.530  | -339.852  | 20.264   | -1804.131 | 439.408   | -51.736  |
| 32    | 2361.041  | -405.745  | 50.154   | -1507.203 | 505.360   | -82.059  |
| 33    | 2039.404  | -476.421  | 79.666   | -914.690  | 577.995   | -111.575 |
| 34    | 1407.578  | -553.775  | 109.378  | -107.202  | 646.576   | -140.833 |
| 35    | 547.303   | -626.676  | 138.765  | 917.768   | 716.194   | -170.119 |
| 36    | -542.045  | -700.743  | 168.055  | 2110.149  | 791.061   | -198.963 |
| 37    | -1808.260 | -779.579  | 198.605  | 3591.453  | 868.835   | -229.156 |
| 38    | -3371.138 | -861.007  | 225.107  | 4348.660  | 953.329   | -254.492 |
| 39    | -4213.815 | -948.892  | 255.119  | 6822.406  | 1603.727  | -283.418 |
| 40    | -6776.352 | -1602.339 | 279.173  | 11141.220 | 2319.697  | -296.695 |
| 41    | -873.707  | 1155.717  | -217.052 | -2131.078 | -417.791  | 203.701  |
| 42    | 2183.692  | 494.750   | -209.535 | -1406.856 | 143.780   | 182.329  |
| 43    | 1552.589  | -70.138   | -188.174 | -1280.549 | 143.680   | 160.149  |
| 44    | 1515.780  | -73.688   | -165.863 | -1242.479 | 175.480   | 137.263  |
| 45    | 1560.948  | -109.509  | -143.061 | -1212.057 | 159.995   | 113.891  |
| 46    | 2004.758  | -98.243   | -115.415 | -1729.265 | 191.530   | 83.181   |
| 47    | 2185.719  | -134.158  | -87.656  | -1921.640 | 230.643   | 57.287   |
| 48    | 2428.270  | -177.877  | -61.367  | -2059.645 | 274.996   | 30.624   |
| 49    | 2602.803  | -227.243  | -34.179  | -2179.057 | 329.115   | 2.959    |
| 50    | 2743.419  | -285.833  | -6.791   | -2109.197 | 384.586   | -25.138  |
| 51    | 2678.907  | -346.429  | 22.764   | -1902.969 | 446.433   | -54.297  |
| 52    | 2462.657  | -412.924  | 51.258   | -1590.058 | 512.838   | -82.937  |
| 53    | 2123.972  | -484.181  | 81.015   | -978.830  | 585.826   | -113.351 |
| 54    | 1473.116  | -561.888  | 111.471  | -151.444  | 654.689   | -142.966 |

COMBINACION 38 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 55    | 592.485   | -635.041  | 141.158  | 892.911   | 724.421   | -172.159 |
| 56    | -516.773  | -709.034  | 170.784  | 2104.345  | 799.196   | -201.661 |
| 57    | -1802.693 | -787.743  | 198.948  | 3604.659  | 876.999   | -229.697 |
| 58    | -3384.421 | -869.282  | 229.169  | 4380.997  | 961.885   | -258.387 |
| 59    | -4246.534 | -957.551  | 256.422  | 6875.667  | 1612.479  | -284.659 |
| 60    | -6829.726 | -1611.071 | 280.383  | 11214.491 | 2327.798  | -298.081 |
| 61    | -424.328  | 1142.677  | -217.380 | -2594.206 | -404.165  | 204.096  |
| 62    | 2647.215  | 481.113   | -209.139 | -1841.837 | 157.657   | 181.880  |
| 63    | 1988.034  | -83.988   | -187.566 | -1684.299 | 157.966   | 159.544  |
| 64    | 1920.065  | -88.040   | -165.091 | -1613.548 | 190.045   | 136.484  |
| 65    | 1932.645  | -124.088  | -142.219 | -1550.111 | 174.625   | 113.080  |
| 66    | 2343.512  | -112.822  | -116.320 | -2011.148 | 205.049   | 84.103   |
| 67    | 2468.090  | -147.864  | -87.803  | -2173.462 | 244.253   | 57.430   |
| 68    | 2680.837  | -191.495  | -62.078  | -2281.834 | 288.555   | 31.423   |
| 69    | 2825.118  | -240.740  | -35.117  | -2372.135 | 342.436   | 3.810    |
| 70    | 2936.610  | -299.338  | -7.028   | -2273.207 | 397.988   | -25.072  |
| 71    | 2843.086  | -359.675  | 22.902   | -2038.606 | 459.592   | -54.522  |
| 72    | 2598.286  | -426.219  | 51.587   | -1696.897 | 526.090   | -83.190  |
| 73    | 2231.093  | -497.368  | 80.964   | -1056.671 | 599.094   | -113.294 |
| 74    | 1550.746  | -575.063  | 111.499  | -200.206  | 667.878   | -143.046 |
| 75    | 640.859   | -648.338  | 141.455  | 873.402   | 737.705   | -172.481 |
| 76    | -497.219  | -722.288  | 170.527  | 2115.628  | 812.599   | -201.561 |
| 77    | -1814.132 | -801.206  | 199.193  | 3645.055  | 890.309   | -229.891 |
| 78    | -3424.728 | -882.640  | 230.145  | 4451.470  | 975.162   | -259.335 |
| 79    | -4317.050 | -970.767  | 256.146  | 6975.170  | 1625.631  | -284.378 |
| 80    | -6929.249 | -1624.208 | 280.029  | 11343.040 | 2340.984  | -297.625 |
| 81    | -441.857  | 1146.424  | -218.889 | -2586.747 | -407.729  | 205.549  |
| 82    | 2639.704  | 484.719   | -211.246 | -1841.425 | 154.025   | 184.026  |
| 83    | 1987.585  | -80.414   | -189.860 | -1692.241 | 154.182   | 161.821  |
| 84    | 1928.073  | -84.230   | -166.817 | -1630.318 | 186.162   | 138.187  |
| 85    | 1949.448  | -120.174  | -144.376 | -1575.697 | 170.775   | 115.227  |
| 86    | 2368.913  | -109.021  | -114.612 | -2044.299 | 201.145   | 82.465   |
| 87    | 2501.129  | -143.924  | -88.073  | -2215.050 | 240.351   | 57.735   |
| 88    | 2722.503  | -187.683  | -61.083  | -2331.790 | 284.771   | 30.261   |
| 89    | 2875.300  | -236.790  | -33.043  | -2430.319 | 338.572   | 1.651    |
| 90    | 2994.796  | -295.644  | -5.297   | -2339.175 | 394.320   | -26.450  |
| 91    | 2909.238  | -356.173  | 23.029   | -2111.929 | 456.092   | -54.663  |
| 92    | 2671.708  | -422.535  | 53.301   | -1777.879 | 522.420   | -85.132  |
| 93    | 2311.940  | -493.689  | 82.221   | -1146.103 | 595.297   | -114.118 |
| 94    | 1639.993  | -571.218  | 112.365  | -298.386  | 663.932   | -143.919 |
| 95    | 739.132   | -644.272  | 142.157  | 767.219   | 733.731   | -173.345 |
| 96    | -391.406  | -718.424  | 171.693  | 1999.594  | 808.609   | -202.614 |
| 97    | -1698.060 | -797.213  | 200.805  | 3520.557  | 886.451   | -231.461 |
| 98    | -3300.319 | -878.711  | 229.445  | 4318.897  | 971.474   | -258.782 |
| 99    | -4184.426 | -967.133  | 258.485  | 6813.487  | 1603.647  | -286.652 |
| 100   | -6767.654 | -1602.245 | 280.295  | 11111.584 | 2300.543  | -297.785 |
| 101   | -321.028  | 1108.244  | -217.032 | -2642.846 | -388.013  | 203.656  |
| 102   | 2695.725  | 464.970   | -210.208 | -1874.579 | 155.471   | 182.995  |
| 103   | 2020.799  | -81.863   | -188.241 | -1722.065 | 155.735   | 160.179  |
| 104   | 1957.906  | -85.772   | -165.630 | -1656.467 | 187.798   | 137.000  |
| 105   | 1975.650  | -121.817  | -142.788 | -1598.450 | 172.379   | 113.630  |
| 106   | 2391.784  | -110.628  | -114.874 | -2063.979 | 202.773   | 82.667   |
| 107   | 2520.777  | -145.606  | -87.026  | -2232.020 | 241.934   | 56.658   |
| 108   | 2739.363  | -189.194  | -60.526  | -2346.247 | 286.285   | 29.841   |
| 109   | 2889.671  | -238.360  | -34.177  | -2442.167 | 340.178   | 2.837    |



COMBINACION 38 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 110   | 3006.587  | -297.295  | -5.274   | -2348.341 | 396.008   | -26.635  |
| 111   | 2918.361  | -357.717  | 23.268   | -2118.493 | 457.755   | -54.776  |
| 112   | 2678.035  | -424.345  | 52.880   | -1780.865 | 524.343   | -84.572  |
| 113   | 2314.735  | -495.643  | 82.031   | -1144.426 | 597.435   | -114.112 |
| 114   | 1638.072  | -573.548  | 112.416  | -291.041  | 666.390   | -144.033 |
| 115   | 731.548   | -646.741  | 142.312  | 781.035   | 736.256   | -173.483 |
| 116   | -405.675  | -720.921  | 171.799  | 2020.585  | 811.059   | -202.702 |
| 117   | -1719.538 | -799.651  | 201.618  | 3547.584  | 888.589   | -232.208 |
| 118   | -3327.781 | -880.963  | 230.193  | 4350.079  | 973.089   | -259.437 |
| 119   | -4215.958 | -968.704  | 256.338  | 6868.521  | 2233.583  | -284.751 |
| 120   | -6822.521 | -2232.169 | 284.354  | 11231.768 | 2339.046  | -301.884 |
| 121   | -2160.231 | 1178.634  | -203.654 | -2195.379 | -463.650  | -202.132 |
| 122   | 2248.582  | 540.560   | -208.637 | -1575.043 | 97.956    | 181.444  |
| 123   | 1721.637  | -24.418   | -186.844 | -1552.410 | 98.057    | 158.820  |
| 124   | 1788.453  | -28.178   | -164.882 | -1616.646 | 130.177   | 136.277  |
| 125   | 1935.882  | -64.403   | -141.530 | -1687.270 | 115.695   | 112.279  |
| 126   | 2475.993  | -54.025   | -113.450 | -2273.488 | 146.215   | 81.295   |
| 127   | 2729.369  | -89.168   | -86.448  | -2564.479 | 185.491   | 56.062   |
| 128   | 3070.465  | -133.074  | -58.997  | -2799.904 | 230.109   | 28.238   |
| 129   | 3341.337  | -182.448  | -32.443  | -3015.239 | 284.129   | 1.220    |
| 130   | 3576.885  | -241.348  | -4.357   | -3040.406 | 339.738   | -27.673  |
| 131   | 3606.918  | -301.747  | 26.155   | -2928.539 | 401.454   | -57.776  |
| 132   | 3483.621  | -368.320  | 54.692   | -2708.917 | 467.834   | -86.266  |
| 133   | 3237.722  | -439.553  | 84.398   | -2191.647 | 540.833   | -116.618 |
| 134   | 2680.096  | -517.028  | 115.050  | -1458.833 | 609.523   | -146.512 |
| 135   | 1893.575  | -590.249  | 145.045  | -509.093  | 679.519   | -176.291 |
| 136   | 878.736   | -664.406  | 175.010  | 608.496   | 754.731   | -205.970 |
| 137   | -312.742  | -743.638  | 204.957  | 2014.239  | 833.406   | -235.572 |
| 138   | -1798.940 | -825.850  | 234.090  | 2700.551  | 919.979   | -263.372 |
| 139   | -2569.612 | -915.666  | 262.110  | 5108.097  | 2180.067  | -290.444 |
| 140   | -5063.432 | -2178.722 | 288.555  | 9220.549  | 2285.144  | -306.192 |
| 141   | -1072.425 | 1064.538  | -149.562 | -2123.319 | -1068.470 | 151.032  |
| 142   | 1075.277  | 1103.325  | -149.683 | -1495.316 | -446.003  | 133.728  |
| 143   | 422.365   | 483.314   | -133.715 | -1227.295 | 213.280   | 117.001  |
| 144   | 344.508   | -180.283  | -113.670 | -1162.601 | 417.787   | 98.086   |
| 145   | 506.203   | -390.738  | -95.230  | -1165.094 | 308.562   | 79.617   |
| 146   | 2010.359  | -279.614  | -75.712  | -2212.528 | 327.992   | 58.788   |
| 147   | 1667.559  | -302.120  | -56.826  | -2026.462 | 285.102   | 39.373   |
| 148   | 1561.123  | -260.976  | -37.533  | -2070.938 | 248.828   | 14.999   |
| 149   | 1538.125  | -220.056  | -17.608  | -2246.903 | 218.543   | -7.106   |
| 150   | 1574.525  | -180.582  | 2.428    | -2401.017 | 188.005   | -28.585  |
| 151   | 2849.661  | -151.187  | 26.720   | -2722.502 | 167.393   | -52.008  |
| 152   | 3178.037  | -134.053  | 50.403   | -2994.389 | 259.952   | -75.570  |
| 153   | 3445.815  | -230.160  | 73.419   | -3113.849 | 359.914   | -99.571  |
| 154   | 3549.088  | -334.280  | 97.610   | -3022.412 | 466.095   | -123.339 |
| 155   | 3428.580  | -444.129  | 123.651  | -2613.283 | 569.338   | -148.908 |
| 156   | 2977.207  | -551.129  | 148.584  | -2014.250 | 685.281   | -174.116 |
| 157   | 2322.201  | -671.211  | 172.604  | -1116.498 | 806.600   | -198.061 |
| 158   | 1354.455  | -796.388  | 197.517  | 107.725   | 933.091   | -223.113 |
| 159   | 45.844    | -926.904  | 222.363  | 1685.916  | 1064.588  | -247.762 |
| 160   | -1631.172 | -1062.552 | 246.604  | 3682.480  | 1225.930  | -270.880 |



COMBINACION 39 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | 8.463      | 1266.967  | -270.493 | -2718.955  | -1093.068 | 246.450  |
| 2     | 2664.094   | 1095.095  | -246.789 | -5025.483  | -950.926  | 221.654  |
| 3     | 4871.862   | 957.052   | -222.115 | -6893.759  | -813.174  | 196.639  |
| 4     | 6655.664   | 823.293   | -196.949 | -8345.816  | -680.057  | 171.403  |
| 5     | 8037.842   | 694.214   | -172.338 | -9457.600  | -555.408  | 147.089  |
| 6     | 9093.844   | 573.538   | -147.131 | -10159.189 | -437.088  | 121.997  |
| 7     | 9752.963   | 459.036   | -123.472 | -10516.650 | -317.707  | 97.617   |
| 8     | 10081.535  | 343.629   | -96.976  | -10565.094 | -204.061  | 70.151   |
| 9     | 10113.520  | 233.683   | -73.822  | -10375.441 | -98.529   | 48.596   |
| 10    | 9919.885   | 131.713   | -48.488  | -9916.372  | -64.948   | 23.269   |
| 11    | 9467.779   | 101.910   | -26.413  | -7732.236  | -59.037   | 2.309    |
| 12    | 8824.123   | 82.095    | -3.749   | -6939.410  | -55.160   | -17.543  |
| 13    | 7188.512   | 71.102    | 18.430   | -5927.062  | -56.264   | -37.229  |
| 14    | 6197.925   | 71.783    | 38.992   | -4703.045  | -61.587   | -56.644  |
| 15    | 5038.915   | 79.118    | 58.797   | -3277.405  | -71.361   | -75.190  |
| 16    | 3723.860   | 91.993    | 77.443   | -1845.597  | -90.081   | -93.799  |
| 17    | 2262.634   | 108.718   | 96.650   | -35.443    | -105.666  | -111.214 |
| 18    | 664.230    | 130.376   | 114.181  | 1868.422   | 8.892     | -131.470 |
| 19    | -1064.622  | 20.113    | 131.832  | 3690.066   | 576.852   | -147.654 |
| 20    | -2925.975  | -550.316  | 148.688  | 6577.085   | 1025.448  | -147.071 |
| 21    | -15050.808 | 2301.945  | -302.932 | 9695.426   | -1682.942 | 287.556  |
| 22    | -9740.101  | 1684.344  | -289.673 | 5010.791   | -1067.389 | 261.456  |
| 23    | -5141.720  | 1071.606  | -264.213 | 920.377    | -967.576  | 235.040  |
| 24    | -1135.687  | 975.107   | -235.844 | -2554.660  | -836.091  | 205.380  |
| 25    | 2258.850   | 847.272   | -206.420 | -5368.158  | -706.089  | 175.524  |
| 26    | 4921.066   | 721.162   | -173.562 | -7520.547  | -613.271  | 142.231  |
| 27    | 7085.966   | 632.585   | -143.220 | -9210.391  | -525.212  | 111.706  |
| 28    | 8722.120   | 548.991   | -113.967 | -10381.332 | -436.190  | 81.748   |
| 29    | 9852.608   | 464.530   | -83.465  | -10993.676 | -354.694  | 51.221   |
| 30    | 10438.566  | 387.831   | -52.675  | -11195.484 | -282.357  | 20.971   |
| 31    | 10629.361  | 320.434   | -25.218  | -11003.204 | -220.010  | -7.495   |
| 32    | 10441.777  | 262.820   | 6.093    | -9373.104  | -173.562  | -38.449  |
| 33    | 8831.866   | 221.268   | 34.129   | -8558.301  | -140.279  | -64.190  |
| 34    | 8052.533   | 192.641   | 59.585   | -7434.357  | -115.567  | -89.411  |
| 35    | 6978.294   | 172.730   | 85.440   | -6026.044  | -99.584   | -114.921 |
| 36    | 5632.801   | 161.069   | 110.378  | -4356.469  | -90.718   | -139.424 |
| 37    | 4037.367   | 156.531   | 133.309  | -2446.622  | -90.463   | -161.921 |
| 38    | 2210.366   | 160.374   | 156.918  | -314.041   | -85.888   | -184.719 |
| 39    | 167.539    | 159.418   | 177.791  | 2036.793   | 477.440   | -204.823 |
| 40    | -2090.162  | -400.541  | 199.521  | 7071.396   | 1129.605  | -201.142 |
| 41    | -16491.994 | 2345.057  | -297.380 | 11146.772  | -1669.901 | 283.234  |
| 42    | -11192.627 | 1671.293  | -285.724 | 6366.912   | -1016.067 | 257.523  |
| 43    | -6501.031  | 1020.425  | -259.739 | 2182.797   | -929.699  | 230.507  |
| 44    | -2402.650  | 937.408   | -232.189 | -1383.908  | -812.441  | 201.674  |
| 45    | 1082.757   | 823.760   | -202.695 | -3863.591  | -752.140  | 171.693  |
| 46    | 3887.962   | 767.502   | -170.427 | -6584.365  | -658.488  | 139.160  |
| 47    | 6144.144   | 678.116   | -140.882 | -8366.476  | -570.367  | 109.370  |
| 48    | 7872.609   | 594.493   | -111.212 | -9630.211  | -481.323  | 78.905   |
| 49    | 9096.477   | 509.742   | -80.903  | -10336.043 | -399.527  | 48.980   |
| 50    | 9776.480   | 433.072   | -51.870  | -10633.330 | -327.271  | 19.919   |
| 51    | 10063.340  | 365.366   | -22.044  | -10538.015 | -264.688  | -10.648  |
| 52    | 9973.545   | 307.795   | 6.830    | -8972.100  | -222.520  | -39.351  |
| 53    | 8428.443   | 270.375   | 36.321   | -8266.376  | -189.413  | -66.320  |
| 54    | 7759.158   | 241.941   | 62.231   | -7252.828  | -164.942  | -92.034  |

COMBINACION 39 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 55    | 6796.022   | 222.263   | 87.322   | -5955.938  | -149.313  | -116.763 |
| 56    | 5562.497   | 211.052   | 111.392  | -4398.881  | -140.864  | -140.480 |
| 57    | 4079.655   | 206.872   | 135.651  | -2602.151  | -140.794  | -164.253 |
| 58    | 2366.261   | 210.794   | 158.117  | -583.183   | -136.007  | -185.929 |
| 59    | 436.963    | 209.580   | 180.518  | 1653.884   | 427.407   | -207.593 |
| 60    | -1706.927  | -350.449  | 202.526  | 6873.394   | 1110.105  | -203.387 |
| 61    | -16551.359 | 2346.235  | -294.515 | 11202.893  | -1671.199 | 280.287  |
| 62    | -11248.809 | 1672.603  | -284.461 | 6421.362   | -1017.139 | 256.377  |
| 63    | -6555.780  | 1021.532  | -258.644 | 2235.803   | -930.359  | 229.418  |
| 64    | -2456.122  | 938.025   | -231.137 | -1332.068  | -812.835  | 200.636  |
| 65    | 1030.422   | 824.137   | -201.690 | -3812.781  | -752.458  | 170.760  |
| 66    | 3836.583   | 767.830   | -170.685 | -6534.866  | -658.777  | 139.415  |
| 67    | 6093.969   | 678.314   | -140.903 | -8317.693  | -570.667  | 109.441  |
| 68    | 7823.445   | 594.812   | -111.606 | -9582.611  | -481.710  | 79.454   |
| 69    | 9048.293   | 510.344   | -81.480  | -10289.354 | -400.366  | 49.360   |
| 70    | 9729.675   | 433.824   | -51.703  | -10588.453 | -328.160  | 19.561   |
| 71    | 10018.381  | 366.470   | -21.800  | -10495.424 | -265.871  | -10.921  |
| 72    | 9930.824   | 308.915   | 7.010    | -8930.348  | -223.893  | -39.346  |
| 73    | 8386.793   | 271.818   | 35.720   | -8227.703  | -190.792  | -65.746  |
| 74    | 7720.302   | 243.407   | 62.020   | -7217.094  | -166.378  | -91.852  |
| 75    | 6760.248   | 223.611   | 86.719   | -5923.059  | -150.673  | -116.217 |
| 76    | 5529.756   | 212.413   | 111.307  | -4369.222  | -142.076  | -140.418 |
| 77    | 4050.025   | 208.110   | 135.315  | -2575.282  | -142.184  | -163.882 |
| 78    | 2339.621   | 212.081   | 157.452  | -559.860   | -137.360  | -185.293 |
| 79    | 413.652    | 211.015   | 180.556  | 1674.166   | 425.921   | -207.665 |
| 80    | -1727.190  | -348.964  | 202.534  | 6938.068   | 1115.168  | -203.365 |
| 81    | -16680.730 | 2349.844  | -297.557 | 11324.230  | -1674.679 | 283.229  |
| 82    | -11370.230 | 1676.108  | -285.744 | 6534.018   | -1020.665 | 257.512  |
| 83    | -6668.513  | 1025.045  | -259.453 | 2341.032   | -934.094  | 230.240  |
| 84    | -2561.151  | 941.789   | -233.176 | -1235.275  | -816.688  | 202.722  |
| 85    | 933.671    | 828.067   | -203.191 | -3725.057  | -756.328  | 172.162  |
| 86    | 3748.766   | 771.698   | -169.889 | -6455.060  | -662.715  | 138.874  |
| 87    | 6014.213   | 682.264   | -140.676 | -8246.607  | -574.588  | 109.151  |
| 88    | 7752.546   | 598.672   | -110.557 | -9520.289  | -485.540  | 77.996   |
| 89    | 8986.047   | 514.293   | -79.729  | -10235.885 | -404.205  | 47.682   |
| 90    | 9676.056   | 437.467   | -50.708  | -10542.949 | -331.781  | 19.125   |
| 91    | 9973.117   | 370.007   | -22.417  | -10457.988 | -269.396  | -10.457  |
| 92    | 9893.576   | 312.632   | 8.390    | -8901.858  | -227.627  | -40.685  |
| 93    | 8358.396   | 275.550   | 35.793   | -8207.681  | -194.614  | -65.787  |
| 94    | 7700.501   | 247.287   | 62.272   | -7205.702  | -170.348  | -91.966  |
| 95    | 6748.935   | 227.646   | 87.398   | -5920.577  | -154.602  | -116.905 |
| 96    | 5527.025   | 216.278   | 111.851  | -4374.913  | -146.064  | -140.939 |
| 97    | 4055.851   | 212.018   | 135.606  | -2589.706  | -145.956  | -164.207 |
| 98    | 2353.918   | 215.920   | 158.576  | -582.976   | -140.958  | -186.404 |
| 99    | 436.866    | 214.600   | 179.944  | 1621.896   | 403.974   | -207.026 |
| 100   | -1674.968  | -327.048  | 202.738  | 6769.359   | 1075.004  | -203.757 |
| 101   | -16447.375 | 2297.244  | -297.157 | 11188.643  | -1640.532 | 282.749  |
| 102   | -11234.748 | 1641.952  | -283.074 | 6455.519   | -1004.808 | 254.754  |
| 103   | -6589.881  | 1009.188  | -258.338 | 2298.171   | -918.134  | 229.196  |
| 104   | -2518.350  | 925.817   | -231.162 | -1242.814  | -800.609  | 200.647  |
| 105   | 941.187    | 811.969   | -201.639 | -3696.531  | -740.271  | 170.660  |
| 106   | 3720.224   | 755.681   | -169.514 | -6391.100  | -646.697  | 138.339  |
| 107   | 5950.198   | 666.205   | -140.018 | -8145.930  | -558.595  | 108.520  |
| 108   | 7651.929   | 582.736   | -110.389 | -9383.677  | -469.605  | 78.215   |
| 109   | 8849.440   | 498.333   | -80.773  | -10063.391 | -388.241  | 48.604   |



COMBINACION 39 1.35 (G1 + G2) + 1.5 (SCVMAX-IPF) + V\_Pd

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 110   | 9503.730   | 421.529   | -50.454  | -10334.835 | -315.814  | 18.627   |
| 111   | 9765.174   | 354.124   | -21.953  | -10214.396 | -253.375  | -10.743  |
| 112   | 9650.089   | 296.509   | 8.015    | -8622.736  | -211.503  | -40.422  |
| 113   | 8079.617   | 259.495   | 36.179   | -7893.154  | -178.438  | -66.146  |
| 114   | 7386.198   | 231.031   | 62.401   | -6855.746  | -153.996  | -92.144  |
| 115   | 6399.401   | 211.351   | 87.422   | -5535.460  | -138.259  | -116.912 |
| 116   | 5142.352   | 200.060   | 111.667  | -3954.789  | -129.891  | -140.782 |
| 117   | 3636.240   | 195.885   | 135.005  | -2134.638  | -130.116  | -163.590 |
| 118   | 1899.346   | 200.042   | 157.905  | -92.828    | -125.719  | -185.772 |
| 119   | -52.982    | 199.382   | 180.700  | 2167.617   | 1047.567  | -207.736 |
| 120   | -2220.209  | -970.605  | 201.203  | 7152.242   | 1120.472  | -203.600 |
| 121   | -16562.730 | 2337.302  | -294.966 | 11234.719  | -1661.302 | 280.917  |
| 122   | -11280.926 | 1662.719  | -281.327 | 6474.232   | -1007.440 | 253.035  |
| 123   | -6608.857  | 1011.861  | -256.624 | 2310.583   | -920.984  | 227.449  |
| 124   | -2531.055  | 928.777   | -228.208 | -1236.249  | -803.566  | 197.635  |
| 125   | 934.597    | 814.970   | -199.339 | -3701.054  | -742.525  | 168.265  |
| 126   | 3720.627   | 758.155   | -167.202 | -6398.557  | -649.130  | 136.134  |
| 127   | 5958.178   | 668.862   | -137.901 | -8161.435  | -561.368  | 106.305  |
| 128   | 7668.748   | 585.587   | -107.840 | -9409.213  | -472.620  | 75.539   |
| 129   | 8876.761   | 501.535   | -78.114  | -10100.832 | -391.793  | 46.165   |
| 130   | 9543.646   | 425.454   | -48.623  | -10385.910 | -320.242  | 16.572   |
| 131   | 9819.511   | 358.780   | -18.797  | -9096.040  | -258.751  | -16.082  |
| 132   | 8535.557   | 302.192   | 12.063   | -8716.543  | -218.290  | -42.223  |
| 133   | 8178.179   | 266.441   | 38.561   | -8005.172  | -185.937  | -68.597  |
| 134   | 7503.727   | 238.885   | 64.477   | -6987.310  | -162.266  | -94.252  |
| 135   | 6536.857   | 219.856   | 89.566   | -5687.351  | -147.106  | -119.095 |
| 136   | 5300.554   | 209.150   | 114.311  | -4128.087  | -138.879  | -143.390 |
| 137   | 3815.796   | 205.077   | 137.628  | -2329.760  | -138.539  | -166.218 |
| 138   | 2100.417   | 208.710   | 160.524  | -310.051   | -132.393  | -188.381 |
| 139   | 169.270    | 206.244   | 182.695  | 1928.873   | 1040.220  | -209.738 |
| 140   | -1978.089  | -963.177  | 203.909  | 5970.207   | 1092.652  | -207.367 |
| 141   | -14296.500 | 2139.458  | -223.830 | 10879.097  | -2119.896 | 214.475  |
| 142   | -10909.847 | 2120.793  | -217.087 | 8428.414   | -1416.855 | 193.907  |
| 143   | -8518.683  | 1419.634  | -192.413 | 5840.630   | -679.950  | 168.445  |
| 144   | -5989.163  | 684.750   | -172.375 | 2542.155   | -399.840  | 147.682  |
| 145   | -2748.045  | 407.064   | -148.437 | -126.682   | -449.556  | 124.250  |
| 146   | 1382.391   | 459.145   | -124.822 | -3617.436  | -364.534  | 99.572   |
| 147   | 3307.057   | 376.865   | -100.989 | -5232.255  | -347.275  | 75.288   |
| 148   | 4876.938   | 362.565   | -77.193  | -6154.788  | -339.081  | 51.769   |
| 149   | 5761.523   | 357.263   | -54.032  | -7031.567  | -338.117  | 28.957   |
| 150   | 6607.833   | 359.381   | -31.207  | -7627.054  | -346.717  | 6.379    |
| 151   | 7182.256   | 371.400   | -9.098   | -7876.057  | -349.557  | -16.560  |
| 152   | 7419.584   | 377.760   | 13.399   | -6669.086  | -244.641  | -40.174  |
| 153   | 6212.137   | 276.383   | 36.869   | -6472.920  | -159.566  | -61.575  |
| 154   | 6026.790   | 194.944   | 58.144   | -6055.001  | -77.827   | -81.556  |
| 155   | 5631.939   | 117.011   | 77.194   | -5435.005  | 0.399     | -101.083 |
| 156   | 5047.768   | 42.702    | 96.330   | -4632.390  | 75.032    | -120.217 |
| 157   | 4294.374   | -28.117   | 116.367  | -3667.528  | 145.961   | -140.221 |
| 158   | 3392.523   | -95.043   | 134.727  | -2561.067  | 213.103   | -158.361 |
| 159   | 2363.239   | -158.112  | 152.466  | -1334.816  | 276.112   | -176.004 |
| 160   | 1228.573   | -217.218  | 169.581  | -10.001    | 370.376   | -192.949 |

COMBINACION 40 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 1     | 8.455      | 432.622   | -193.295 | -1242.231 | -268.375  | 169.998  |
| 2     | 1348.384   | 327.351   | -175.126 | -2430.226 | -201.158  | 151.597  |
| 3     | 2628.031   | 256.111   | -157.415 | -3542.490 | -128.383  | 133.618  |
| 4     | 3817.373   | 179.368   | -138.777 | -4548.686 | -50.357   | 114.691  |
| 5     | 4886.517   | 97.281    | -119.213 | -5349.462 | 29.524    | 95.270   |
| 6     | 5736.830   | 13.443    | -99.680  | -6048.057 | 117.361   | 75.285   |
| 7     | 6471.251   | -78.272   | -79.165  | -6557.013 | 210.270   | 54.461   |
| 8     | 7003.397   | -174.600  | -57.865  | -6849.279 | 307.752   | 32.981   |
| 9     | 7306.202   | -276.001  | -36.460  | -6898.867 | 410.200   | 11.515   |
| 10    | 7355.389   | -382.051  | -14.324  | -6680.489 | 445.555   | -10.461  |
| 11    | 7125.246   | -420.902  | 7.867    | -6091.760 | 485.519   | -32.981  |
| 12    | 6515.327   | -464.309  | 30.634   | -5274.009 | 528.528   | -55.874  |
| 13    | 5667.377   | -510.046  | 53.861   | -4125.504 | 572.241   | -79.039  |
| 14    | 4480.687   | -557.203  | 76.808   | -2626.857 | 617.255   | -102.057 |
| 15    | 2937.277   | -604.899  | 100.059  | -763.229  | 657.540   | -124.406 |
| 16    | 1023.565   | -647.959  | 124.136  | 1522.731  | 701.921   | -148.528 |
| 17    | -1317.143  | -694.806  | 143.833  | 4147.779  | 750.991   | -168.328 |
| 18    | -3999.000  | -746.152  | 169.104  | 7169.872  | 936.693   | -192.822 |
| 19    | -7079.815  | -933.908  | 190.847  | 10596.879 | 1586.393  | -213.922 |
| 20    | -10566.121 | -1585.492 | 210.917  | 14555.373 | 2133.316  | -224.243 |
| 21    | -6550.140  | 1141.664  | -208.784 | 2379.722  | -484.961  | 205.044  |
| 22    | -2330.508  | 562.052   | -211.053 | 54.844    | 38.211    | 183.844  |
| 23    | 86.019     | 35.574    | -189.428 | -2054.087 | 51.279    | 161.476  |
| 24    | 2283.513   | 18.901    | -167.486 | -3909.708 | 96.929    | 138.969  |
| 25    | 4222.022   | -30.679   | -144.779 | -5574.363 | 154.361   | 113.709  |
| 26    | 5883.736   | -92.378   | -115.332 | -6885.333 | 188.144   | 85.352   |
| 27    | 7335.654   | -130.607  | -89.329  | -7994.598 | 226.600   | 58.897   |
| 28    | 8495.859   | -173.661  | -63.535  | -8797.300 | 270.270   | 32.832   |
| 29    | 9335.705   | -222.109  | -36.470  | -9337.254 | 323.487   | 5.054    |
| 30    | 9897.469   | -280.111  | -7.653   | -9449.953 | 378.491   | -24.206  |
| 31    | 10016.323  | -339.852  | 20.264   | -9185.266 | 439.408   | -51.736  |
| 32    | 9742.176   | -405.745  | 50.154   | -8565.724 | 505.360   | -82.059  |
| 33    | 9097.926   | -476.421  | 79.666   | -7387.022 | 577.995   | -111.575 |
| 34    | 7879.910   | -553.775  | 109.378  | -5709.133 | 646.576   | -140.833 |
| 35    | 6149.234   | -626.676  | 138.765  | -3505.305 | 716.194   | -170.119 |
| 36    | 3881.028   | -700.743  | 168.055  | -801.323  | 791.061   | -198.963 |
| 37    | 1103.211   | -779.579  | 198.605  | 2532.982  | 868.835   | -229.156 |
| 38    | -2312.667  | -861.007  | 225.107  | 6452.608  | 953.329   | -254.492 |
| 39    | -6317.764  | -948.892  | 255.119  | 10980.402 | 1603.727  | -283.418 |
| 40    | -10934.349 | -1602.339 | 279.173  | 16135.289 | 2319.697  | -296.695 |
| 41    | -5867.776  | 1155.717  | -217.052 | 2046.550  | -417.791  | 203.701  |
| 42    | -1993.936  | 494.750   | -209.535 | -255.782  | 143.780   | 182.329  |
| 43    | 401.515    | -70.138   | -188.174 | -2343.176 | 143.680   | 160.149  |
| 44    | 2578.406   | -73.688   | -165.863 | -4177.891 | 175.480   | 137.263  |
| 45    | 4496.360   | -109.509  | -143.061 | -5305.085 | 159.995   | 113.891  |
| 46    | 6097.786   | -98.243   | -115.415 | -7004.670 | 191.530   | 83.181   |
| 47    | 7461.124   | -134.158  | -87.656  | -8109.687 | 230.643   | 57.287   |
| 48    | 8616.316   | -177.877  | -61.367  | -8906.633 | 274.996   | 30.624   |
| 49    | 9449.793   | -227.243  | -34.179  | -9439.426 | 329.115   | 2.959    |
| 50    | 10003.787  | -285.833  | -6.791   | -9542.537 | 384.586   | -25.138  |
| 51    | 10112.246  | -346.429  | 22.764   | -9267.709 | 446.432   | -54.297  |
| 52    | 9827.396   | -412.924  | 51.258   | -8636.854 | 512.838   | -82.937  |
| 53    | 9170.767   | -484.181  | 81.015   | -7443.982 | 585.826   | -113.351 |
| 54    | 7938.268   | -561.888  | 111.471  | -5749.978 | 654.689   | -142.966 |

COMBINACION 40 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 55    | 6191.020   | -635.041  | 141.158  | -3529.258 | 724.421   | -172.159 |
| 56    | 3905.396   | -709.034  | 170.784  | -807.253  | 799.196   | -201.661 |
| 57    | 1108.905   | -787.743  | 198.948  | 2546.111  | 876.999   | -229.697 |
| 58    | -2325.873  | -869.282  | 229.169  | 6484.455  | 961.885   | -258.387 |
| 59    | -6349.992  | -957.551  | 256.422  | 11031.021 | 1612.479  | -284.659 |
| 60    | -10985.080 | -1611.071 | 280.383  | 16203.898 | 2327.799  | -298.081 |
| 61    | -5413.736  | 1142.677  | -217.380 | 1579.913  | -404.165  | 204.096  |
| 62    | -1526.904  | 481.113   | -209.139 | -691.048  | 157.657   | 181.880  |
| 63    | 837.245    | -83.988   | -187.566 | -2747.153 | 157.966   | 159.544  |
| 64    | 2982.919   | -88.040   | -165.091 | -4550.566 | 190.045   | 136.484  |
| 65    | 4869.663   | -124.088  | -142.219 | -5646.534 | 174.625   | 113.080  |
| 66    | 6439.935   | -112.822  | -116.320 | -7291.483 | 205.049   | 84.103   |
| 67    | 7748.426   | -147.864  | -87.803  | -8367.406 | 244.253   | 57.430   |
| 68    | 8874.781   | -191.495  | -62.078  | -9134.996 | 288.555   | 31.423   |
| 69    | 9678.279   | -240.740  | -35.117  | -9638.346 | 342.436   | 3.810    |
| 70    | 10202.820  | -299.338  | -7.028   | -9711.549 | 397.988   | -25.072  |
| 71    | 10281.429  | -359.675  | 22.902   | -9407.199 | 459.592   | -54.522  |
| 72    | 9966.879   | -426.219  | 51.587   | -8746.271 | 526.090   | -83.190  |
| 73    | 9280.467   | -497.368  | 80.964   | -7523.220 | 599.094   | -113.294 |
| 74    | 8017.295   | -575.063  | 111.499  | -5799.216 | 667.878   | -143.046 |
| 75    | 6239.869   | -648.338  | 141.455  | -3548.705 | 737.704   | -172.481 |
| 76    | 3924.888   | -722.288  | 170.527  | -795.797  | 812.599   | -201.561 |
| 77    | 1097.293   | -801.206  | 199.193  | 2586.545  | 890.309   | -229.891 |
| 78    | -2366.219  | -882.640  | 230.145  | 6555.129  | 975.162   | -259.335 |
| 79    | -6420.708  | -970.767  | 256.146  | 11131.511 | 1625.631  | -284.378 |
| 80    | -11085.590 | -1624.208 | 280.029  | 16334.092 | 2340.984  | -297.625 |
| 81    | -5432.908  | 1146.424  | -218.889 | 1588.561  | -407.729  | 205.549  |
| 82    | -1535.604  | 484.719   | -211.246 | -690.542  | 154.025   | 184.026  |
| 83    | 836.702    | -80.414   | -189.860 | -2755.024 | 154.182   | 161.821  |
| 84    | 2990.856   | -84.230   | -166.817 | -4566.871 | 186.162   | 138.187  |
| 85    | 4886.001   | -120.174  | -144.376 | -5671.218 | 170.775   | 115.227  |
| 86    | 6464.433   | -109.021  | -114.612 | -7323.477 | 201.145   | 82.465   |
| 87    | 7780.308   | -143.924  | -88.073  | -8407.825 | 240.351   | 57.735   |
| 88    | 8915.278   | -187.683  | -61.083  | -9184.023 | 284.771   | 30.261   |
| 89    | 9727.533   | -236.790  | -33.043  | -9696.031 | 338.572   | 1.651    |
| 90    | 10260.508  | -295.644  | -5.297   | -9777.549 | 394.320   | -26.450  |
| 91    | 10347.612  | -356.173  | 23.029   | -9481.092 | 456.092   | -54.663  |
| 92    | 10040.871  | -422.535  | 53.301   | -8828.245 | 522.420   | -85.132  |
| 93    | 9362.306   | -493.689  | 82.221   | -7613.865 | 595.297   | -114.118 |
| 94    | 8107.755   | -571.218  | 112.365  | -5898.586 | 663.932   | -143.919 |
| 95    | 6339.333   | -644.272  | 142.157  | -3655.812 | 733.731   | -173.345 |
| 96    | 4031.625   | -718.424  | 171.693  | -912.301  | 808.609   | -202.614 |
| 97    | 1213.834   | -797.213  | 200.805  | 2461.982  | 886.451   | -231.461 |
| 98    | -2241.745  | -878.712  | 229.445  | 6422.288  | 971.475   | -258.782 |
| 99    | -6287.815  | -967.133  | 258.485  | 10968.707 | 1603.647  | -286.652 |
| 100   | -10922.875 | -1602.245 | 280.295  | 16100.963 | 2300.543  | -297.785 |
| 101   | -5310.408  | 1108.244  | -217.032 | 1531.378  | -388.013  | 203.656  |
| 102   | -1478.499  | 464.970   | -210.208 | -723.769  | 155.471   | 182.995  |
| 103   | 869.989    | -81.863   | -188.241 | -2784.893 | 155.735   | 160.179  |
| 104   | 3020.733   | -85.772   | -165.630 | -4593.200 | 187.798   | 137.000  |
| 105   | 4912.382   | -121.817  | -142.788 | -5694.031 | 172.379   | 113.630  |
| 106   | 6487.365   | -110.628  | -114.874 | -7342.673 | 202.773   | 82.667   |
| 107   | 7799.470   | -145.606  | -87.026  | -8423.374 | 241.934   | 56.658   |
| 108   | 8930.717   | -189.194  | -60.526  | -9195.854 | 286.285   | 29.841   |
| 109   | 9739.278   | -238.360  | -34.177  | -9703.953 | 340.178   | 2.837    |

COMBINACION 40 1.35 (G1 + G2) + 1.5 (SCVMIN-IPF) + V\_Pd

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 110   | 10268.373  | -297.295  | -5.274   | -9781.586  | 396.008   | -26.635  |
| 111   | 10351.606  | -357.717  | 23.268   | -9481.642  | 457.755   | -54.776  |
| 112   | 10041.184  | -424.345  | 52.880   | -8824.869  | 524.343   | -84.572  |
| 113   | 9358.739   | -495.643  | 82.031   | -7606.128  | 597.435   | -114.112 |
| 114   | 8099.774   | -573.548  | 112.416  | -5886.176  | 666.390   | -144.033 |
| 115   | 6326.683   | -646.741  | 142.312  | -3638.522  | 736.256   | -173.483 |
| 116   | 4013.882   | -720.921  | 171.799  | -889.669   | 811.059   | -202.702 |
| 117   | 1190.717   | -799.651  | 201.618  | 2489.222   | 888.589   | -232.208 |
| 118   | -2269.418  | -880.963  | 230.193  | 6454.294   | 973.089   | -259.437 |
| 119   | -6320.174  | -968.704  | 256.338  | 11027.054  | 2233.583  | -284.751 |
| 120   | -10981.054 | -2232.169 | 284.354  | 16225.924  | 2339.046  | -301.884 |
| 121   | -7154.387  | 1178.634  | -203.654 | 1981.805   | -463.650  | 202.132  |
| 122   | -1928.603  | 540.560   | -208.637 | -424.052   | 97.956    | 181.444  |
| 123   | 570.645    | -24.418   | -186.844 | -2615.146  | 98.057    | 158.820  |
| 124   | 2851.188   | -28.178   | -164.882 | -4553.194  | 130.177   | 136.277  |
| 125   | 4872.429   | -64.403   | -141.530 | -5787.607  | 115.695   | 112.279  |
| 126   | 6576.330   | -54.025   | -113.450 | -7560.312  | 146.215   | 81.295   |
| 127   | 8016.193   | -89.168   | -86.448  | -8768.434  | 185.491   | 56.062   |
| 128   | 9274.420   | -133.074  | -58.997  | -9667.136  | 230.109   | 28.238   |
| 129   | 10208.569  | -182.448  | -32.443  | -10299.592 | 284.129   | 1.220    |
| 130   | 10861.238  | -241.348  | -4.357   | -10500.449 | 339.738   | -27.673  |
| 131   | 11066.961  | -301.747  | 26.155   | -10321.269 | 401.454   | -57.776  |
| 132   | 10876.350  | -368.320  | 54.692   | -9783.201  | 467.834   | -86.266  |
| 133   | 10312.007  | -439.553  | 84.398   | -8681.789  | 540.833   | -116.618 |
| 134   | 9170.238   | -517.028  | 115.050  | -7077.841  | 609.523   | -146.512 |
| 135   | 7512.584   | -590.249  | 145.045  | -4945.565  | 679.519   | -176.291 |
| 136   | 5315.208   | -664.406  | 175.010  | -2310.543  | 754.731   | -205.970 |
| 137   | 2606.297   | -743.638  | 204.957  | 954.073    | 833.406   | -235.572 |
| 138   | -738.774   | -825.850  | 234.090  | 4803.874   | 919.980   | -263.372 |
| 139   | -4672.935  | -915.666  | 262.110  | 9258.961   | 2180.067  | -290.444 |
| 140   | -9214.296  | -2178.721 | 288.555  | 14145.191  | 2285.144  | -306.192 |
| 141   | -5997.065  | 1064.538  | -149.562 | 2644.564   | -1068.470 | 151.032  |
| 142   | -3692.606  | 1103.325  | -149.683 | 1854.974   | -446.003  | 133.728  |
| 143   | -2927.924  | 483.314   | -133.715 | 665.163    | 213.280   | 117.001  |
| 144   | -1547.950  | -180.283  | -113.670 | -1444.894  | 417.787   | 98.086   |
| 145   | 788.496    | -390.738  | -95.230  | -3165.361  | 308.562   | 79.617   |
| 146   | 4010.626   | -279.614  | -75.712  | -5932.364  | 327.992   | 58.788   |
| 147   | 5387.396   | -302.120  | -56.826  | -7027.487  | 285.102   | 39.373   |
| 148   | 6562.147   | -260.976  | -37.533  | -8059.058  | 248.828   | 14.999   |
| 149   | 7526.245   | -220.056  | -17.608  | -8942.619  | 218.543   | -7.106   |
| 150   | 8270.240   | -180.582  | 2.428    | -9542.090  | 188.005   | -28.585  |
| 151   | 9990.732   | -151.187  | 26.720   | -9990.248  | 167.393   | -52.008  |
| 152   | 10445.783  | -134.053  | 50.403   | -10189.764 | 259.952   | -75.570  |
| 153   | 10641.189  | -230.160  | 73.419   | -10153.070 | 359.914   | -99.571  |
| 154   | 10588.311  | -334.280  | 97.610   | -9822.377  | 466.095   | -123.339 |
| 155   | 10228.545  | -444.129  | 123.651  | -9091.583  | 569.338   | -148.908 |
| 156   | 9455.505   | -551.129  | 148.584  | -8089.167  | 685.281   | -174.116 |
| 157   | 8397.117   | -671.211  | 172.604  | -6707.674  | 806.600   | -198.061 |
| 158   | 6945.631   | -796.388  | 197.517  | -4918.635  | 933.091   | -223.113 |
| 159   | 5072.205   | -926.904  | 222.363  | -2695.704  | 1064.588  | -247.762 |
| 160   | 2750.448   | -1062.552 | 246.604  | -10.008    | 1225.930  | -270.880 |

COMBINACION 41 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -3117.782 | 1126.805  | -115.373 | 1339.246  | -979.133  | 61.426   |
| 2     | -1361.085 | 979.944   | -66.043  | -172.560  | -854.829  | 48.557   |
| 3     | 111.599   | 857.277   | -56.451  | -1356.788 | -733.506  | 38.429   |
| 4     | 1262.067  | 737.569   | -48.784  | -2229.549 | -615.511  | 33.607   |
| 5     | 2106.790  | 621.145   | -46.735  | -2984.186 | -506.565  | 29.217   |
| 6     | 2839.441  | 513.773   | -44.853  | -3384.822 | -402.106  | 10.386   |
| 7     | 3222.928  | 410.762   | -29.181  | -3566.631 | -286.837  | 23.750   |
| 8     | 3393.519  | 297.309   | -44.540  | -3292.360 | -179.217  | 60.856   |
| 9     | 2962.551  | 200.852   | -63.100  | -3069.954 | -87.336   | 41.176   |
| 10    | 2737.250  | 111.549   | -40.633  | -2779.162 | -68.897   | 18.841   |
| 11    | 2451.556  | 95.910    | -20.586  | -2371.788 | -53.546   | -1.198   |
| 12    | 2057.304  | 82.869    | 0.236    | -1941.188 | -43.677   | -21.942  |
| 13    | 1646.569  | 75.869    | 20.040   | -1515.767 | -40.390   | -41.591  |
| 14    | 1247.220  | 74.428    | 39.947   | -1125.365 | -42.781   | -61.351  |
| 15    | 888.706   | 79.294    | 59.349   | -425.476  | -57.997   | -35.501  |
| 16    | 680.247   | 92.442    | 77.630   | -358.580  | -76.562   | -81.697  |
| 17    | 484.968   | 106.056   | 96.279   | -383.345  | -98.957   | -123.809 |
| 18    | 395.384   | 124.495   | 113.859  | -1401.149 | 9.884     | -174.599 |
| 19    | 1371.193  | 14.408    | 132.012  | -924.441  | 579.443   | -200.552 |
| 20    | 909.823   | -554.635  | 144.833  | 3231.089  | 973.367   | -700.281 |
| 21    | -7303.553 | 2051.982  | -266.303 | 4327.385  | -1456.225 | 154.184  |
| 22    | -4344.897 | 1456.792  | -159.593 | 2968.974  | -873.751  | 117.106  |
| 23    | -3020.695 | 875.408   | -125.973 | 1314.134  | -803.374  | 82.435   |
| 24    | -1399.903 | 806.384   | -93.954  | -162.508  | -691.893  | 78.401   |
| 25    | 44.672    | 696.350   | -93.561  | -1356.470 | -578.191  | 56.359   |
| 26    | 1132.115  | 584.181   | -71.917  | -2254.227 | -502.114  | 36.683   |
| 27    | 2081.363  | 509.777   | -58.736  | -3022.488 | -426.673  | 27.765   |
| 28    | 2827.980  | 436.164   | -54.077  | -3573.360 | -340.602  | 54.986   |
| 29    | 2509.894  | 357.490   | -68.829  | -3025.442 | -278.676  | 41.127   |
| 30    | 2620.046  | 302.873   | -41.487  | -3051.662 | -228.701  | 14.188   |
| 31    | 2638.241  | 256.529   | -16.619  | -2936.019 | -184.064  | -10.952  |
| 32    | 2526.002  | 215.337   | 10.734   | -2705.936 | -145.477  | -38.279  |
| 33    | 2310.669  | 180.306   | 35.967   | -2319.731 | -110.463  | -63.141  |
| 34    | 1950.354  | 148.691   | 60.662   | -1968.859 | -86.728   | -87.724  |
| 35    | 1635.771  | 128.492   | 85.735   | -601.329  | -74.161   | -56.922  |
| 36    | 1338.074  | 115.688   | 110.202  | -513.198  | -74.165   | -110.395 |
| 37    | 1100.387  | 109.271   | 132.912  | -365.457  | -82.201   | -190.622 |
| 38    | 685.078   | 114.068   | 156.583  | -1479.243 | -84.520   | -226.661 |
| 39    | 1764.687  | 115.211   | 177.182  | -1223.083 | 474.103   | -257.939 |
| 40    | 1201.739  | -443.482  | 188.070  | 2974.821  | 1055.775  | -791.792 |
| 41    | -8056.227 | 2087.991  | -262.294 | 5102.682  | -1434.199 | 149.210  |
| 42    | -5120.657 | 1434.754  | -154.841 | 3905.129  | -812.172  | 111.844  |
| 43    | -3958.295 | 813.890   | -120.651 | 2345.084  | -754.063  | 76.491   |
| 44    | -2432.495 | 757.145   | -88.446  | 933.396   | -655.674  | 72.464   |
| 45    | -1053.368 | 660.157   | -87.630  | -208.218  | -610.262  | 49.720   |
| 46    | 458.745   | 616.388   | -65.748  | -1660.944 | -532.459  | 30.299   |
| 47    | 1485.750  | 540.304   | -52.839  | -2507.492 | -456.228  | 21.441   |
| 48    | 2310.773  | 465.876   | -47.535  | -2298.580 | -374.361  | 65.718   |
| 49    | 1908.792  | 395.068   | -66.612  | -2505.705 | -315.840  | 39.228   |
| 50    | 2097.080  | 340.382   | -40.700  | -2608.902 | -265.848  | 13.147   |
| 51    | 2192.613  | 293.654   | -13.995  | -2569.585 | -220.923  | -13.510  |
| 52    | 2157.347  | 252.418   | 11.478   | -2416.368 | -182.454  | -38.943  |
| 53    | 2019.289  | 217.403   | 37.543   | -2107.720 | -147.622  | -65.133  |
| 54    | 1737.305  | 185.932   | 63.053   | -1836.412 | -124.072  | -90.040  |

COMBINACION 41 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 55    | 1502.869  | 165.949   | 87.531   | -555.239  | -109.522  | -50.533  |
| 56    | 1287.468  | 153.594   | 111.105  | -337.834  | -109.876  | -144.066 |
| 57    | 925.723   | 147.556   | 174.876  | -482.174  | -119.073  | -184.672 |
| 58    | 811.701   | 154.523   | 157.810  | -1678.599 | -121.112  | -220.591 |
| 59    | 1981.910  | 155.387   | 179.604  | -1503.272 | 437.644   | -252.753 |
| 60    | 1806.930  | -403.458  | 200.929  | 2685.259  | 1026.538  | -800.536 |
| 61    | -8059.241 | 2087.242  | -260.090 | 5036.800  | -1431.986 | 147.237  |
| 62    | -5054.581 | 1432.537  | -153.454 | 3840.704  | -809.673  | 110.826  |
| 63    | -3893.993 | 811.437   | -119.626 | 2285.654  | -751.105  | 75.480   |
| 64    | -2373.263 | 754.130   | -87.416  | 880.818   | -652.383  | 71.431   |
| 65    | -1000.971 | 656.885   | -86.600  | -253.834  | -606.838  | 48.808   |
| 66    | 503.980   | 612.983   | -66.104  | -1698.980 | -528.952  | 30.505   |
| 67    | 1523.584  | 536.675   | -52.850  | -2537.940 | -452.617  | 21.550   |
| 68    | 2341.062  | 462.296   | -47.843  | -2278.398 | -373.128  | 66.261   |
| 69    | 1888.204  | 394.040   | -67.168  | -2483.362 | -315.009  | 39.569   |
| 70    | 2074.631  | 339.446   | -40.650  | -2585.401 | -265.027  | 12.909   |
| 71    | 2169.076  | 293.032   | -13.835  | -2545.697 | -220.387  | -13.716  |
| 72    | 2133.349  | 251.812   | 11.619   | -2392.063 | -181.893  | -38.945  |
| 73    | 1995.081  | 216.909   | 37.103   | -2083.271 | -147.065  | -64.733  |
| 74    | 1712.679  | 185.481   | 62.868   | -1811.586 | -123.618  | -89.846  |
| 75    | 1477.918  | 165.398   | 87.083   | -1549.051 | -107.967  | -113.625 |
| 76    | 1261.817  | 153.050   | 111.019  | -315.109  | -107.170  | -143.899 |
| 77    | 690.788   | 146.969   | 135.574  | -453.315  | -116.490  | -184.288 |
| 78    | 784.009   | 154.008   | 157.310  | -1644.459 | -118.533  | -220.253 |
| 79    | 1953.636  | 155.020   | 179.653  | -1464.074 | 440.110   | -252.793 |
| 80    | 1778.438  | -403.770  | 200.939  | 2731.355  | 1029.397  | -800.269 |
| 81    | -8169.870 | 2090.851  | -262.657 | 5120.175  | -1435.346 | 149.623  |
| 82    | -5138.219 | 1435.928  | -155.241 | 3916.854  | -813.094  | 112.129  |
| 83    | -3970.242 | 814.834   | -120.802 | 2354.596  | -754.694  | 76.765   |
| 84    | -2441.884 | 757.754   | -89.241  | 941.088   | -656.095  | 73.409   |
| 85    | -1061.365 | 660.617   | -88.308  | -202.406  | -610.538  | 50.300   |
| 86    | 452.753   | 616.692   | -65.073  | -1655.807 | -532.722  | 30.022   |
| 87    | 1480.035  | 540.463   | -52.608  | -2502.790 | -456.387  | 21.217   |
| 88    | 2306.227  | 465.999   | -47.081  | -2232.802 | -376.859  | 64.906   |
| 89    | 1842.636  | 397.868   | -65.581  | -2445.877 | -318.740  | 38.046   |
| 90    | 2037.016  | 342.985   | -39.599  | -2555.235 | -268.573  | 12.397   |
| 91    | 2139.147  | 296.465   | -14.104  | -2522.863 | -223.821  | -13.598  |
| 92    | 2110.704  | 255.433   | 12.857   | -2377.258 | -185.504  | -40.304  |
| 93    | 1980.403  | 220.504   | 37.557   | -2076.579 | -150.779  | -64.803  |
| 94    | 1706.171  | 189.260   | 63.122   | -1813.314 | -127.476  | -90.177  |
| 95    | 1479.711  | 169.320   | 87.782   | -1559.647 | -111.795  | -114.409 |
| 96    | 1272.227  | 156.825   | 111.733  | -351.705  | -110.940  | -144.469 |
| 97    | 710.120   | 150.791   | 136.052  | -498.476  | -120.094  | -184.989 |
| 98    | 811.986   | 157.761   | 158.302  | -1697.707 | -121.963  | -221.051 |
| 99    | 1990.107  | 158.519   | 179.286  | -1545.224 | 418.359   | -252.600 |
| 100   | 1842.884  | -381.945  | 201.213  | 2580.903  | 989.162   | -800.436 |
| 101   | -7955.113 | 2040.322  | -261.849 | 5011.824  | -1405.816 | 148.273  |
| 102   | -5030.185 | 1406.387  | -153.079 | 3854.274  | -801.833  | 109.799  |
| 103   | -3907.343 | 803.565   | -119.152 | 2317.170  | -743.320  | 75.325   |
| 104   | -2404.650 | 746.378   | -87.374  | 929.043   | -644.638  | 71.394   |
| 105   | -1049.184 | 649.161   | -86.556  | -189.013  | -599.105  | 48.621   |
| 106   | 439.215   | 605.247   | -64.658  | -1617.475 | -521.295  | 29.268   |
| 107   | 1441.954  | 529.020   | -51.752  | -2439.317 | -444.987  | 20.375   |
| 108   | 2242.642  | 454.661   | -46.459  | -2119.634 | -363.036  | 65.090   |
| 109   | 1729.474  | 384.007   | -66.410  | -2302.712 | -304.867  | 38.788   |

COMBINACION 41 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 110   | 1894.009  | 329.128   | -39.474  | -2382.165 | -254.663  | 12.047   |
| 111   | 1966.197  | 282.671   | -13.761  | -2319.857 | -209.901  | -13.763  |
| 112   | 1907.750  | 241.416   | 12.534   | -2143.200 | -171.384  | -39.937  |
| 113   | 1746.570  | 206.448   | 37.670   | -1811.145 | -136.576  | -65.084  |
| 114   | 1440.892  | 174.963   | 63.208   | -1515.813 | -113.065  | -90.301  |
| 115   | 1182.531  | 154.970   | 87.768   | -302.547  | -98.884   | -51.202  |
| 116   | 942.638   | 142.537   | 111.529  | -61.449   | -99.352   | -144.579 |
| 117   | 349.018   | 136.670   | 135.563  | -181.814  | -108.794  | -184.950 |
| 118   | 418.908   | 143.886   | 157.755  | -1356.463 | -111.239  | -221.059 |
| 119   | 1566.778  | 145.297   | 179.838  | -1160.792 | 1057.415  | -253.252 |
| 120   | 1371.040  | -1023.506 | 200.033  | 3046.477  | 1037.264  | -799.755 |
| 121   | -8137.452 | 2087.473  | -260.059 | 5166.009  | -1441.703 | 145.550  |
| 122   | -5184.399 | 1442.270  | -150.386 | 3949.186  | -819.462  | 107.155  |
| 123   | -4002.375 | 821.212   | -116.563 | 2371.507  | -761.019  | 72.583   |
| 124   | -2459.323 | 764.134   | -84.113  | 943.994   | -662.245  | 68.001   |
| 125   | -1063.989 | 666.747   | -83.491  | -212.925  | -615.773  | 45.573   |
| 126   | 458.848   | 622.029   | -61.649  | -1672.698 | -537.941  | 26.530   |
| 127   | 1497.258  | 545.810   | -49.110  | -2528.767 | -461.786  | 17.628   |
| 128   | 2332.696  | 471.419   | -43.471  | -3162.357 | -374.970  | 43.874   |
| 129   | 1797.976  | 394.197   | -64.067  | -2390.199 | -315.211  | 36.626   |
| 130   | 1983.293  | 339.778   | -37.774  | -2491.679 | -265.691  | 10.112   |
| 131   | 2078.066  | 293.864   | -10.950  | -2454.110 | -221.514  | -16.572  |
| 132   | 2044.758  | 253.256   | 14.390   | -2305.143 | -183.833  | -41.670  |
| 133   | 1911.943  | 218.949   | 39.863   | -2004.857 | -149.673  | -67.371  |
| 134   | 1638.671  | 188.347   | 65.280   | -1745.410 | -126.920  | -92.268  |
| 135   | 1416.470  | 168.988   | 89.821   | -770.312  | -121.469  | -54.914  |
| 136   | 1216.157  | 157.108   | 114.132  | -592.409  | -122.212  | -148.539 |
| 137   | 676.293   | 151.770   | 138.200  | -768.716  | -130.948  | -188.929 |
| 138   | 677.360   | 158.907   | 125.797  | -1993.486 | -131.532  | -225.122 |
| 139   | 1937.378  | 160.969   | 158.615  | -1839.983 | 1036.565  | -257.128 |
| 140   | 1820.330  | -1005.886 | 187.206  | 1621.594  | 1051.953  | -663.640 |
| 141   | -6328.942 | 1912.683  | -197.374 | 4482.715  | -1942.865 | 33.528   |
| 142   | -4494.703 | 1943.222  | -38.630  | 3819.184  | -1261.853 | 26.201   |
| 143   | -3855.398 | 1262.961  | -32.294  | 2950.864  | -543.714  | 19.234   |
| 144   | -3009.605 | 545.592   | -30.266  | 2020.496  | -282.076  | 22.384   |
| 145   | -2102.543 | 285.005   | -34.743  | 1205.353  | -354.007  | -16.559  |
| 146   | 206.939   | 357.768   | 2.326    | -480.267  | -277.501  | 3.823    |
| 147   | 356.650   | 282.440   | -21.945  | -788.086  | -265.529  | 43.058   |
| 148   | 646.546   | 271.692   | -64.144  | -1075.246 | -255.755  | 84.671   |
| 149   | 918.564   | 262.982   | -108.734 | -440.861  | -262.680  | 23.351   |
| 150   | 131.349   | 278.169   | -24.479  | -487.012  | -281.035  | 2.425    |
| 151   | 162.204   | 299.060   | -3.938   | -577.605  | -299.820  | -18.388  |
| 152   | 244.232   | 320.429   | 16.594   | -601.573  | -212.085  | -38.627  |
| 153   | 267.895   | 235.260   | 36.872   | -455.192  | -126.333  | -58.753  |
| 154   | 129.410   | 152.164   | 56.962   | -242.141  | -47.666   | -78.918  |
| 155   | -66.795   | 76.274    | 76.315   | 203.403   | 33.509    | -98.488  |
| 156   | -486.201  | -2.002    | 95.695   | 1465.252  | 105.404   | -74.319  |
| 157   | -1030.420 | -77.949   | 115.446  | 2119.970  | 168.325   | -149.955 |
| 158   | -2061.259 | -146.808  | 134.458  | 2556.403  | 226.920   | -180.238 |
| 159   | -2635.305 | -204.981  | 126.817  | 3068.090  | 283.843   | -207.439 |
| 160   | -3110.525 | -260.411  | 150.882  | 3682.486  | 374.421   | -231.376 |

COMBINACION 42 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | -3117.776 | 409.148   | -232.707 | 2588.714  | -285.308  | 152.352  |
| 2     | -2547.816 | 308.021   | -207.641 | 2078.487  | -223.792  | 127.222  |
| 3     | -2002.254 | 244.960   | -180.531 | 1489.230  | -158.075  | 134.098  |
| 4     | -1543.750 | 180.445   | -150.048 | 427.677   | -82.319   | 114.817  |
| 5     | -867.522  | 111.181   | -74.254  | -11.988   | -5.650    | 95.970   |
| 6     | 289.758   | 36.450    | -98.435  | -426.848  | 78.553    | 76.803   |
| 7     | 730.275   | -50.581   | -78.851  | -694.078  | 165.179   | 56.959   |
| 8     | 1014.151  | -139.508  | -58.762  | -801.939  | 253.598   | 36.865   |
| 9     | 1129.522  | -230.841  | -38.758  | -739.309  | 344.399   | 16.931   |
| 10    | 1066.642  | -324.216  | -18.424  | -462.288  | 366.470   | -3.445   |
| 11    | 781.185   | -348.806  | 2.103    | -173.837  | 391.366   | -23.897  |
| 12    | 1164.520  | -377.310  | 48.900   | -467.559  | 433.015   | -51.788  |
| 13    | 619.080   | -425.712  | 27.904   | 164.370   | 478.410   | -30.232  |
| 14    | -27.801   | -472.713  | 8.851    | 886.314   | 521.516   | -18.066  |
| 15    | -766.853  | -516.740  | -0.446   | 1706.924  | 546.603   | -36.158  |
| 16    | -1606.510 | -542.942  | 21.435   | 2576.399  | 575.169   | -46.791  |
| 17    | -2497.730 | -572.434  | 32.322   | 3466.573  | 607.213   | -51.202  |
| 18    | -3409.119 | -605.363  | 42.349   | 3539.394  | 771.255   | -60.622  |
| 19    | -3504.906 | -770.178  | 53.238   | 5229.977  | 1395.141  | -70.161  |
| 20    | -5218.421 | -1394.794 | 64.730   | 7237.240  | 1860.587  | -193.510 |
| 21    | -2960.261 | 1068.123  | -709.634 | -1272.185 | -501.018  | 189.315  |
| 22    | 1291.182  | 530.718   | -259.445 | -801.439  | 19.520    | 160.630  |
| 23    | 855.763   | 8.869     | -227.245 | -919.472  | 28.961    | 161.667  |
| 24    | 893.975   | -0.936    | -191.062 | -1029.062 | 71.449    | 139.712  |
| 25    | 939.531   | -41.216   | -150.794 | -1689.530 | 126.907   | 115.766  |
| 26    | 1155.290  | -90.333   | -53.234  | -1774.317 | 155.771   | 88.300   |
| 27    | 2097.223  | -114.530  | -90.165  | -1911.173 | 187.707   | 63.202   |
| 28    | 2270.582  | -149.720  | -65.710  | -1995.036 | 223.111   | 38.621   |
| 29    | 2381.091  | -188.600  | -40.397  | -2067.645 | 265.837   | 12.727   |
| 30    | 2469.330  | -234.754  | -13.794  | -1959.020 | 307.738   | -13.570  |
| 31    | 2365.106  | -280.014  | 11.352   | -1723.584 | 351.483   | -38.827  |
| 32    | 2122.891  | -327.318  | 38.316   | -1348.576 | 396.373   | -65.979  |
| 33    | 2629.960  | -382.333  | 55.786   | -1708.104 | 469.464   | -63.300  |
| 34    | 1897.902  | -460.193  | 36.991   | -783.875  | 528.878   | -72.775  |
| 35    | 953.093   | -521.176  | 49.953   | 292.413   | 584.308   | -90.011  |
| 36    | -148.024  | -578.392  | 70.727   | 1471.570  | 642.289   | -110.816 |
| 37    | -1355.139 | -637.871  | 95.985   | 2751.202  | 702.034   | -120.490 |
| 38    | -2666.924 | -698.993  | 107.380  | 3182.244  | 756.344   | -156.062 |
| 39    | -3130.136 | -754.640  | 148.367  | 5156.838  | 1371.979  | -195.801 |
| 40    | -5139.602 | -1371.454 | 189.512  | 7990.777  | 2024.310  | -256.768 |
| 41    | -3064.886 | 1073.225  | -811.982 | -1533.256 | -450.117  | 202.359  |
| 42    | 1311.332  | 484.462   | -255.858 | -843.789  | 110.215   | 181.489  |
| 43    | 623.760   | -75.707   | -224.013 | -730.799  | 107.936   | 159.921  |
| 44    | 486.080   | -72.259   | -187.745 | -687.922  | 136.527   | 137.720  |
| 45    | 394.890   | -98.642   | -147.367 | -1219.238 | 123.178   | 113.634  |
| 46    | 1900.765  | -78.900   | -112.920 | -1787.079 | 153.396   | 86.246   |
| 47    | 2114.392  | -112.243  | -88.552  | -1934.144 | 185.858   | 61.651   |
| 48    | 2297.379  | -148.004  | -63.715  | -2024.687 | 221.859   | 36.513   |
| 49    | 2414.149  | -187.678  | -38.252  | -2100.379 | 265.374   | 10.864   |
| 50    | 2505.039  | -234.290  | -12.900  | -1991.945 | 307.645   | -14.577  |
| 51    | 2400.381  | -280.298  | 13.533   | -1753.960 | 352.045   | -41.067  |
| 52    | 2155.239  | -328.006  | 39.475   | -1375.252 | 397.183   | -66.908  |
| 53    | 1758.001  | -376.665  | 66.033   | -1687.868 | 463.666   | -66.043  |
| 54    | 1878.137  | -454.519  | 39.856   | -773.247  | 523.011   | -75.788  |

COMBINACION 42 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 55    | 943.085   | -515.403  | 53.134   | 291.557   | 578.250   | -92.787  |
| 56    | -146.664  | -572.312  | 73.938   | 1457.077  | 635.811   | -113.771 |
| 57    | -1341.336 | -631.381  | 97.733   | 2722.561  | 695.319   | -122.752 |
| 58    | -2637.747 | -692.340  | 111.337  | 3137.881  | 749.828   | -159.911 |
| 59    | -3086.357 | -748.189  | 151.421  | 5098.337  | 1365.473  | -198.336 |
| 60    | -5081.147 | -1364.931 | 192.099  | 7992.919  | 2025.096  | -258.382 |
| 61    | -2789.481 | 1064.584  | -812.255 | -1883.603 | -439.774  | 202.443  |
| 62    | 1574.319  | 476.611   | -255.041 | -1173.278 | 120.811   | 180.946  |
| 63    | 871.399   | -83.765   | -223.048 | -1036.313 | 118.935   | 159.263  |
| 64    | 715.260   | -80.800   | -186.693 | -968.019  | 147.789   | 136.926  |
| 65    | 604.173   | -107.385  | -146.275 | -1474.841 | 134.546   | 112.786  |
| 66    | 2156.859  | -90.233   | -113.674 | -2017.040 | 164.758   | 87.030   |
| 67    | 2344.705  | -123.765  | -88.727  | -2138.744 | 197.291   | 61.816   |
| 68    | 2502.560  | -159.457  | -64.311  | -2204.361 | 233.250   | 37.264   |
| 69    | 2593.913  | -198.992  | -39.096  | -2255.736 | 276.479   | 11.573   |
| 70    | 2660.478  | -245.549  | -13.177  | -2123.238 | 318.786   | -14.541  |
| 71    | 2531.820  | -291.289  | 13.630   | -1861.761 | 362.956   | -41.259  |
| 72    | 2263.003  | -339.031  | 39.725   | -1459.302 | 408.176   | -67.043  |
| 73    | 1842.279  | -387.583  | 65.965   | -1728.319 | 472.121   | -66.208  |
| 74    | 1918.343  | -462.910  | 39.973   | -795.241  | 531.437   | -75.971  |
| 75    | 964.944   | -523.934  | 53.539   | 287.830   | 586.763   | -93.118  |
| 76    | -143.123  | -580.825  | 73.871   | 1473.372  | 644.449   | -113.916 |
| 77    | -1357.542 | -640.049  | 98.042   | 2757.223  | 703.859   | -123.111 |
| 78    | -2672.210 | -700.927  | 112.056  | 3191.486  | 758.309   | -160.472 |
| 79    | -3140.152 | -756.600  | 151.578  | 5170.145  | 1373.824  | -198.241 |
| 80    | -5152.985 | -1373.276 | 191.943  | 8103.007  | 2036.093  | -258.092 |
| 81    | -2836.820 | 1068.219  | -813.935 | -1860.923 | -443.307  | 203.960  |
| 82    | 1534.688  | 480.112   | -256.925 | -1157.588 | 117.209   | 182.976  |
| 83    | 838.633   | -80.270   | -225.013 | -1028.899 | 115.183   | 161.409  |
| 84    | 690.744   | -77.089   | -188.518 | -969.360  | 143.942   | 138.684  |
| 85    | 588.210   | -103.601  | -148.222 | -1484.838 | 130.747   | 114.796  |
| 86    | 2166.715  | -86.460   | -112.145 | -2035.607 | 160.942   | 85.632   |
| 87    | 2363.148  | -119.927  | -88.753  | -2165.532 | 193.477   | 61.963   |
| 88    | 2529.422  | -155.701  | -63.470  | -2239.329 | 229.521   | 36.065   |
| 89    | 2629.030  | -195.078  | -37.243  | -2298.768 | 272.669   | 9.617    |
| 90    | 2703.478  | -241.967  | -11.495  | -2173.742 | 315.245   | -15.690  |
| 91    | 2582.527  | -287.890  | 13.898   | -1919.475 | 359.551   | -41.512  |
| 92    | 2320.865  | -335.472  | 41.157   | -1524.550 | 404.589   | -68.712  |
| 93    | 1907.517  | -384.000  | 67.149   | -1782.708 | 468.560   | -66.786  |
| 94    | 1972.694  | -459.249  | 40.640   | -858.261  | 527.646   | -76.728  |
| 95    | 1027.797  | -520.073  | 54.109   | 217.173   | 582.960   | -93.975  |
| 96    | -72.613   | -577.095  | 74.947   | 1393.191  | 640.626   | -114.892 |
| 97    | -1277.290 | -636.240  | 99.326   | 2668.596  | 700.173   | -124.070 |
| 98    | -2584.012 | -697.196  | 111.958  | 3095.406  | 754.808   | -160.769 |
| 99    | -3043.581 | -753.139  | 152.768  | 5045.112  | 1352.022  | -199.509 |
| 100   | -5028.245 | -1351.489 | 192.531  | 7889.043  | 1995.747  | -258.354 |
| 101   | -2685.618 | 1025.903  | -812.333 | -1925.738 | -421.801  | 202.108  |
| 102   | 1610.294  | 456.432   | -255.454 | -1195.420 | 120.444   | 181.776  |
| 103   | 882.559   | -85.664   | -223.395 | -1059.381 | 118.526   | 159.780  |
| 104   | 722.370   | -82.589   | -187.013 | -992.143  | 147.368   | 137.369  |
| 105   | 607.329   | -109.181  | -146.601 | -1500.035 | 134.254   | 113.264  |
| 106   | 2181.984  | -89.966   | -112.332 | -2043.501 | 164.454   | 85.718   |
| 107   | 2371.040  | -123.485  | -87.915  | -2166.477 | 196.960   | 61.016   |
| 108   | 2530.254  | -159.111  | -62.924  | -2233.523 | 232.930   | 35.836   |
| 109   | 2623.142  | -198.588  | -38.163  | -2286.024 | 276.202   | 10.619   |



COMBINACION 42 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01  | Cortante01 | Torsor01 | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|------------|----------|-----------|-----------|----------|
| 110   | 2690.760  | -245.508   | -11.607  | -2154.177 | 318.810   | -15.849  |
| 111   | 2562.947  | -291.310   | 14.079   | -1893.142 | 363.095   | -41.568  |
| 112   | 2294.319  | -339.131   | 40.795   | -1490.500 | 408.377   | -68.266  |
| 113   | 1873.308  | -387.784   | 66.964   | -1693.227 | 474.639   | -66.896  |
| 114   | 1883.085  | -465.496   | 40.717   | -755.144  | 534.050   | -76.902  |
| 115   | 924.636   | -526.456   | 54.258   | 334.324   | 589.365   | -94.109  |
| 116   | -189.936  | -583.452   | 75.013   | 1524.110  | 646.824   | -115.041 |
| 117   | -1408.212 | -642.435   | 99.832   | 2812.320  | 706.012   | -124.594 |
| 118   | -2727.909 | -703.095   | 112.453  | 3249.677  | 760.023   | -160.596 |
| 119   | -3198.476 | -758.331   | 151.671  | 5230.031  | 1985.511  | -199.247 |
| 120   | -5212.328 | -1984.968  | 194.410  | 8075.814  | 2036.104  | -261.156 |
| 121   | -3159.249 | 1102.877   | -804.430 | -1523.045 | -491.342  | 200.757  |
| 122   | 1161.018  | 531.972    | -259.539 | -926.883  | 69.010    | 180.411  |
| 123   | 580.925   | -28.215    | -227.631 | -906.983  | 66.906    | 158.561  |
| 124   | 550.296   | -24.914    | -191.483 | -955.924  | 95.782    | 136.592  |
| 125   | 565.035   | -51.619    | -150.960 | -1575.786 | 85.728    | 111.949  |
| 126   | 2253.209  | -41.486    | -110.963 | -2221.649 | 116.072   | 84.444   |
| 127   | 2548.519  | -75.163    | -87.238  | -2449.595 | 148.601   | 60.342   |
| 128   | 2812.394  | -111.023   | -61.529  | -2620.175 | 184.785   | 34.293   |
| 129   | 3008.370  | -150.620   | -36.524  | -2774.995 | 228.076   | 9.143    |
| 130   | 3177.690  | -197.416   | -10.650  | -2745.537 | 270.382   | -16.972  |
| 131   | 3151.771  | -243.119   | 16.634   | -2586.771 | 314.517   | -44.238  |
| 132   | 2984.731  | -290.731   | 42.588   | -2287.950 | 359.384   | -69.873  |
| 133   | 3278.207  | -347.102   | 65.179   | -2444.167 | 433.165   | -73.080  |
| 134   | 2632.126  | -424.014   | 47.107   | -1613.526 | 491.344   | -82.609  |
| 135   | 1780.857  | -483.915   | 60.202   | -640.209  | 545.674   | -99.668  |
| 136   | 782.210   | -539.829   | 80.885   | 412.338   | 601.848   | -120.309 |
| 137   | -298.498  | -597.615   | 105.173  | 1567.063  | 660.838   | -129.488 |
| 138   | -1484.349 | -657.930   | 117.729  | 1867.517  | 715.540   | -165.738 |
| 139   | -1817.312 | -713.855   | 157.623  | 3706.730  | 1939.133  | -204.547 |
| 140   | -3689.836 | -1938.632  | 199.367  | 6292.632  | 1989.012  | -265.136 |
| 141   | -2362.972 | 1009.586   | -713.012 | -1689.944 | -1081.145 | 146.993  |
| 142   | 1704.099  | 1105.134   | -202.396 | -1029.306 | -460.387  | 123.615  |
| 143   | 1067.285  | 483.565    | -177.020 | -790.940  | 199.021   | 116.246  |
| 144   | 782.233   | -174.448   | -124.920 | -843.577  | 406.708   | 97.826   |
| 145   | 718.282   | -378.016   | -82.302  | -868.364  | 297.571   | 79.714   |
| 146   | 2168.841  | -265.423   | -39.961  | -2000.094 | 319.550   | 59.369   |
| 147   | 2232.443  | -283.682   | -61.580  | -1882.786 | 278.967   | 40.337   |
| 148   | 2146.071  | -245.260   | -41.881  | -1875.709 | 239.818   | 20.163   |
| 149   | 2164.822  | -208.506   | -21.481  | -1951.081 | 203.581   | -0.294   |
| 150   | 2259.708  | -174.728   | -1.332   | -2004.886 | 166.059   | -20.470  |
| 151   | 2326.622  | -139.644   | 19.586   | -2229.595 | 136.991   | -41.905  |
| 152   | 2556.240  | -113.067   | 41.132   | -2414.222 | 219.684   | -63.208  |
| 153   | 2737.918  | -198.302   | 62.075   | -2428.813 | 305.605   | -83.927  |
| 154   | 2740.901  | -287.248   | 82.908   | -2256.161 | 395.172   | -105.065 |
| 155   | 2547.398  | -379.438   | 105.424  | -1837.317 | 483.139   | -127.530 |
| 156   | 2098.237  | -470.050   | 127.437  | -1248.339 | 578.909   | -149.119 |
| 157   | 1469.138  | -568.841   | 148.444  | -422.045  | 677.998   | -169.936 |
| 158   | 592.632   | -670.672   | 169.499  | 630.651   | 787.850   | -7.481   |
| 159   | -571.720  | -785.427   | -0.615   | 1967.056  | 908.397   | -13.191  |
| 160   | -1946.272 | -907.638   | 7.484    | 3682.487  | 1044.320  | -52.670  |



COMBINACION 43 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01   | Cortante1 | Torsor1  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 1     | 8.450      | 1118.783  | -115.271 | -2461.258  | -971.975  | 61.324   |
| 2     | 2440.148   | 972.760   | -65.942  | -4526.166  | -848.509  | 48.456   |
| 3     | 4467.246   | 850.876   | -56.363  | -6197.167  | -727.968  | 38.341   |
| 4     | 6105.607   | 731.898   | -48.709  | -7489.320  | -610.704  | 33.532   |
| 5     | 7370.650   | 616.150   | -46.664  | -8594.651  | -502.434  | 29.146   |
| 6     | 8454.737   | 509.401   | -44.803  | -9275.885  | -398.598  | 10.337   |
| 7     | 9119.384   | 406.960   | -29.134  | -9666.931  | -283.900  | 23.703   |
| 8     | 9499.598   | 294.031   | -44.528  | -9529.340  | -176.802  | 60.845   |
| 9     | 9205.525   | 198.045   | -63.070  | -9370.090  | -85.392   | 41.146   |
| 10    | 9043.435   | 109.164   | -40.640  | -9036.283  | -67.376   | 18.847   |
| 11    | 8714.635   | 93.898    | -20.587  | -8401.957  | -52.398   | -1.197   |
| 12    | 8093.191   | 81.184    | 0.221    | -7550.352  | -42.856   | -21.927  |
| 13    | 7261.090   | 74.468    | 20.028   | -6496.026  | -39.854   | -41.579  |
| 14    | 6232.358   | 73.270    | 39.926   | -5251.989  | -42.488   | -61.330  |
| 15    | 5019.634   | 78.337    | 59.323   | -3456.153  | -57.904   | -35.476  |
| 16    | 3714.562   | 91.649    | 77.617   | -2037.513  | -76.632   | -81.684  |
| 17    | 2166.809   | 105.390   | 96.247   | -452.576   | -99.155   | -123.776 |
| 18    | 466.740    | 123.924   | 113.837  | 1237.244   | 9.591     | -174.577 |
| 19    | -1265.886  | 13.901    | 131.987  | 3075.750   | 579.086   | -200.527 |
| 20    | -3089.883  | -555.105  | 144.803  | 7789.477   | 972.972   | -700.251 |
| 21    | -11747.536 | 2039.571  | -266.275 | 8053.587   | -1444.893 | 154.155  |
| 22    | -8070.504  | 1445.442  | -159.540 | 3967.753   | -863.482  | 117.053  |
| 23    | -4017.733  | 865.082   | -125.892 | 318.789    | -794.128  | 82.354   |
| 24    | -401.698   | 797.038   | -93.876  | -2853.443  | -683.627  | 78.323   |
| 25    | 2739.535   | 687.936   | -93.487  | -5466.382  | -570.857  | 56.285   |
| 26    | 5246.937   | 576.647   | -71.849  | -7534.371  | -495.660  | 36.615   |
| 27    | 7367.279   | 503.065   | -58.678  | -9211.086  | -421.041  | 27.706   |
| 28    | 9023.062   | 430.218   | -54.021  | -10416.666 | -335.735  | 54.930   |
| 29    | 9360.222   | 352.246   | -68.784  | -10277.671 | -274.512  | 41.081   |
| 30    | 9879.648   | 298.269   | -41.458  | -10472.304 | -225.177  | 14.158   |
| 31    | 10066.400  | 252.500   | -16.580  | -10283.673 | -181.115  | -10.991  |
| 32    | 9881.111   | 211.821   | 10.746   | -9731.734  | -143.040  | -38.291  |
| 33    | 9343.654   | 177.236   | 35.984   | -8760.834  | -108.473  | -63.158  |
| 34    | 8398.172   | 146.005   | 60.682   | -7541.449  | -85.122   | -87.744  |
| 35    | 7214.415   | 126.128   | 85.743   | -4997.012  | -72.877   | -56.929  |
| 36    | 5738.978   | 113.586   | 110.201  | -3398.988  | -73.143   | -110.394 |
| 37    | 3990.415   | 107.376   | 132.924  | -1399.435  | -81.386   | -190.634 |
| 38    | 1722.191   | 112.326   | 156.579  | 648.769    | -83.858   | -226.657 |
| 39    | -361.379   | 113.571   | 177.189  | 2959.505   | 474.662   | -257.946 |
| 40    | -2980.141  | -445.062  | 188.065  | 7995.116   | 1056.275  | -791.787 |
| 41    | -12940.170 | 2075.243  | -262.278 | 9197.646   | -1422.531 | 149.194  |
| 42    | -9215.010  | 1423.067  | -154.797 | 4998.011   | -801.565  | 111.800  |
| 43    | -5049.395  | 803.225   | -120.589 | 1245.270   | -744.478  | 76.429   |
| 44    | -1329.761  | 747.458   | -88.377  | -2021.544  | -647.067  | 72.395   |
| 45    | 1905.570   | 651.400   | -87.565  | -4306.284  | -602.585  | 49.655   |
| 46    | 4561.797   | 608.506   | -65.683  | -6929.854  | -525.657  | 30.234   |
| 47    | 6760.507   | 533.242   | -52.779  | -8680.216  | -450.247  | 21.380   |
| 48    | 8490.054   | 459.575   | -47.481  | -9123.843  | -369.140  | 65.663   |
| 49    | 8741.143   | 389.466   | -66.565  | -9740.047  | -311.319  | 39.182   |
| 50    | 9338.852   | 335.418   | -40.656  | -10013.689 | -261.963  | 13.103   |
| 51    | 9604.967   | 289.262   | -13.965  | -9904.674  | -217.612  | -13.540  |
| 52    | 9499.931   | 248.535   | 11.509   | -9433.486  | -179.651  | -38.973  |
| 53    | 9043.622   | 213.964   | 37.560   | -8543.889  | -145.264  | -65.150  |
| 54    | 8180.209   | 182.875   | 63.066   | -7407.033  | -122.095  | -90.053  |

COMBINACION 43 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01   | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|-----------|-----------|----------|
| 55    | 7079.557   | 163.211   | 87.543   | -4950.618 | -107.864  | -50.545  |
| 56    | 5688.072   | 151.116   | 111.122  | -3223.508 | -108.479  | -144.084 |
| 57    | 3815.634   | 145.282   | 174.882  | -1515.133 | -117.880  | -184.678 |
| 58    | 1847.792   | 152.401   | 157.823  | 450.876   | -120.070  | -220.604 |
| 59    | -145.625   | 153.367   | 179.612  | 2679.488  | 438.584   | -252.762 |
| 60    | -2375.127  | -405.420  | 200.924  | 7704.569  | 1027.420  | -800.530 |
| 61    | -12935.281 | 2074.408  | -260.101 | 9125.215  | -1420.232 | 147.249  |
| 62    | -9142.383  | 1420.765  | -153.413 | 4930.448  | -798.980  | 110.785  |
| 63    | -4981.951  | 800.686   | -119.566 | 1182.949  | -741.434  | 75.420   |
| 64    | -1267.632  | 744.357   | -87.347  | -2078.206 | -643.690  | 71.362   |
| 65    | 1962.058   | 648.041   | -86.536  | -4357.587 | -599.074  | 48.743   |
| 66    | 4612.727   | 605.017   | -66.041  | -6974.926 | -522.065  | 30.442   |
| 67    | 6805.385   | 529.528   | -52.792  | -8718.483 | -446.550  | 21.492   |
| 68    | 8528.168   | 455.910   | -47.787  | -9111.566 | -367.822  | 66.205   |
| 69    | 8728.466   | 388.353   | -67.120  | -9725.092 | -310.401  | 39.520   |
| 70    | 9323.792   | 334.394   | -40.610  | -9996.542 | -261.055  | 12.869   |
| 71    | 9587.785   | 288.552   | -13.809  | -9885.793 | -216.988  | -13.741  |
| 72    | 9480.941   | 247.840   | 11.648   | -9412.716 | -179.002  | -38.973  |
| 73    | 9022.949   | 213.381   | 37.125   | -8521.590 | -144.617  | -64.756  |
| 74    | 8157.734   | 182.334   | 62.880   | -7383.236 | -121.551  | -89.858  |
| 75    | 7055.634   | 162.570   | 87.102   | -5944.719 | -106.219  | -113.644 |
| 76    | 5662.708   | 150.483   | 111.034  | -3200.755 | -105.684  | -143.914 |
| 77    | 3580.672   | 144.606   | 135.582  | -1486.182 | -115.207  | -184.296 |
| 78    | 1820.004   | 151.796   | 157.330  | 485.475   | -117.401  | -220.273 |
| 79    | -174.357   | 152.911   | 179.661  | 2720.135  | 441.140   | -252.801 |
| 80    | -2405.069  | -405.822  | 200.933  | 7752.974  | 1030.369  | -800.263 |
| 81    | -13046.748 | 2078.015  | -262.654 | 9208.975  | -1423.590 | 149.619  |
| 82    | -9226.407  | 1424.153  | -155.208 | 5005.902  | -802.399  | 112.097  |
| 83    | -5057.503  | 804.081   | -120.754 | 1251.168  | -745.021  | 76.717   |
| 84    | -1335.531  | 747.978   | -89.170  | -2018.257 | -647.400  | 73.338   |
| 85    | 1901.985   | 651.770   | -88.248  | -4306.030 | -602.771  | 50.240   |
| 86    | 4561.371   | 608.722   | -65.007  | -6931.369 | -525.831  | 29.957   |
| 87    | 6761.450   | 533.312   | -52.546  | -8682.926 | -450.317  | 21.155   |
| 88    | 8492.924   | 459.609   | -47.029  | -9065.795 | -371.549  | 64.855   |
| 89    | 8682.723   | 392.177   | -65.539  | -9687.853 | -314.129  | 38.004   |
| 90    | 9286.424   | 337.931   | -39.557  | -9967.147 | -264.599  | 12.355   |
| 91    | 9558.628   | 291.983   | -14.062  | -9864.264 | -220.419  | -13.639  |
| 92    | 9459.600   | 251.458   | 12.877   | -9399.627 | -182.609  | -40.324  |
| 93    | 9009.986   | 216.973   | 37.590   | -8516.829 | -148.328  | -64.836  |
| 94    | 8153.154   | 186.109   | 63.143   | -7386.863 | -125.405  | -90.198  |
| 95    | 7059.323   | 166.489   | 87.801   | -5956.935 | -110.044  | -114.427 |
| 96    | 5674.739   | 154.254   | 111.751  | -3238.512 | -109.449  | -144.487 |
| 97    | 3601.162   | 148.425   | 136.069  | -1532.089 | -118.808  | -185.005 |
| 98    | 1848.728   | 155.546   | 158.316  | 431.285   | -120.828  | -221.065 |
| 99    | -136.945   | 156.406   | 179.306  | 2637.196  | 419.392   | -252.619 |
| 100   | -2338.834  | -384.000  | 201.209  | 7600.188  | 990.136   | -800.432 |
| 101   | -12831.127 | 2027.588  | -261.832 | 9100.119  | -1394.161 | 148.256  |
| 102   | -9117.868  | 1394.714  | -153.064 | 4943.592  | -791.240  | 109.783  |
| 103   | -4994.875  | 792.914   | -119.100 | 1213.814  | -733.748  | 75.273   |
| 104   | -1298.369  | 736.704   | -87.310  | -2030.589 | -636.045  | 71.331   |
| 105   | 1914.454   | 640.416   | -86.497  | -4293.035 | -591.440  | 48.562   |
| 106   | 4548.230   | 597.378   | -64.597  | -6893.111 | -514.506  | 29.207   |
| 107   | 6723.445   | 521.971   | -51.694  | -8618.826 | -439.018  | 20.317   |
| 108   | 8428.712   | 448.373   | -46.407  | -8951.024 | -357.828  | 65.038   |
| 109   | 8567.957   | 378.417   | -66.359  | -9542.013 | -300.358  | 38.738   |



COMBINACION 43 1.35 (G1 + G2) + 1.5 (SCVMAX-EC1) + V\_Pd

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol   | Cortantel | Torsorl  | Momento2   | Cortante2 | Torsor2  |
|-------|------------|-----------|----------|------------|-----------|----------|
| 110   | 9140.741   | 324.175   | -39.437  | -9790.426  | -250.790  | 12.010   |
| 111   | 9382.023   | 278.290   | -13.724  | -9656.943  | -206.600  | -13.800  |
| 112   | 9252.330   | 237.543   | 12.559   | -9161.136  | -168.590  | -39.962  |
| 113   | 8771.717   | 203.018   | 37.698   | -8247.489  | -134.226  | -65.111  |
| 114   | 7883.966   | 171.914   | 63.226   | -7086.673  | -111.095  | -90.319  |
| 115   | 6759.451   | 152.240   | 87.784   | -4698.960  | -97.233   | -51.219  |
| 116   | 5344.270   | 140.066   | 111.546  | -2949.435  | -97.961   | -144.596 |
| 117   | 3241.232   | 134.402   | 135.586  | -1218.249  | -107.606  | -184.973 |
| 118   | 1458.467   | 141.770   | 157.776  | 770.102    | -110.203  | -221.080 |
| 119   | -557.853   | 143.283   | 179.849  | 3021.473   | 1058.349  | -253.264 |
| 120   | -2810.526  | -1025.462 | 200.048  | 8066.853   | 1038.140  | -799.770 |
| 121   | -13021.479 | 2075.076  | -260.044 | 9259.742   | -1430.386 | 145.536  |
| 122   | -9277.520  | 1430.935  | -150.372 | 5040.402   | -809.207  | 107.141  |
| 123   | -5091.803  | 810.898   | -116.513 | 1269.198   | -751.784  | 72.533   |
| 124   | -1354.086  | 754.797   | -84.067  | -2015.260  | -653.987  | 67.955   |
| 125   | 1899.271   | 658.337   | -83.441  | -4322.262  | -608.443  | 45.523   |
| 126   | 4573.176   | 614.493   | -61.596  | -6957.770  | -531.485  | 26.477   |
| 127   | 6788.177   | 539.091   | -49.060  | -8722.921  | -456.147  | 17.579   |
| 128   | 8533.393   | 465.458   | -43.429  | -10014.133 | -370.089  | 43.831   |
| 129   | 8656.820   | 388.932   | -64.026  | -9655.533  | -311.027  | 36.585   |
| 130   | 9256.025   | 335.147   | -37.739  | -9930.896  | -262.139  | 10.077   |
| 131   | 9524.805   | 289.801   | -10.926  | -9825.606  | -218.532  | -16.596  |
| 132   | 9423.695   | 249.697   | 14.418   | -9358.846  | -181.354  | -41.697  |
| 133   | 8972.791   | 215.830   | 39.888   | -8475.759  | -147.634  | -67.395  |
| 134   | 8116.230   | 185.604   | 65.302   | -7346.879  | -125.258  | -92.290  |
| 135   | 7023.920   | 166.561   | 89.844   | -5190.980  | -120.122  | -54.937  |
| 136   | 5641.959   | 154.937   | 114.153  | -3497.110  | -121.121  | -148.560 |
| 137   | 3585.140   | 149.799   | 138.227  | -1815.473  | -130.058  | -188.957 |
| 138   | 1727.162   | 157.085   | 125.825  | 123.086    | -130.790  | -225.150 |
| 139   | -177.326   | 159.247   | 158.644  | 2324.920   | 1037.207  | -257.157 |
| 140   | -2343.920  | -1007.551 | 187.233  | 6562.154   | 1052.538  | -663.667 |
| 141   | -11155.311 | 1901.313  | -197.380 | 9172.010   | -1932.359 | 33.534   |
| 142   | -9183.587  | 1932.704  | -38.604  | 7108.632   | -1252.199 | 26.175   |
| 143   | -7143.649  | 1253.270  | -32.295  | 4797.948   | -534.887  | 19.236   |
| 144   | -4854.715  | 536.700   | -30.230  | 1706.089   | -274.048  | 22.349   |
| 145   | -1785.402  | 276.883   | -34.712  | -815.923   | -346.748  | -16.590  |
| 146   | 2231.669   | 350.381   | 2.363    | -4212.046  | -270.978  | 3.786    |
| 147   | 4092.551   | 275.754   | -21.911  | -5793.918  | -259.707  | 43.024   |
| 148   | 5657.095   | 265.669   | -64.112  | -7062.828  | -250.596  | 84.638   |
| 149   | 6911.366   | 257.581   | -108.703 | -7132.315  | -258.143  | 23.320   |
| 150   | 6828.426   | 273.348   | -24.449  | -7621.545  | -277.078  | 2.395    |
| 151   | 7302.643   | 294.776   | -3.911   | -7837.781  | -296.400  | -18.415  |
| 152   | 7510.470   | 316.634   | 16.620   | -7789.386  | -209.154  | -38.653  |
| 153   | 7461.776   | 231.909   | 36.899   | -7487.665  | -123.845  | -58.780  |
| 154   | 7167.808   | 149.206   | 56.990   | -7036.735  | -45.572   | -78.946  |
| 155   | 6733.417   | 73.659    | 76.343   | -6271.215  | 35.260    | -98.516  |
| 156   | 5993.558   | -4.324    | 95.728   | -4607.722  | 106.861   | -74.352  |
| 157   | 5047.042   | -80.030   | 115.483  | -3470.782  | 169.542   | -149.992 |
| 158   | 3533.143   | -148.701  | 134.499  | -2470.553  | 227.949   | -180.279 |
| 159   | 2394.276   | -206.740  | 126.862  | -1314.362  | 284.738   | -207.484 |
| 160   | 1273.336   | -262.088  | 150.930  | -10.001    | 375.234   | -231.424 |

COMBINACION 44 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 1     | 8.456     | 409.148   | -232.707 | -1225.449 | -285.308  | 152.352  |
| 2     | 1266.347  | 308.021   | -207.641 | -2300.201 | -223.792  | 127.222  |
| 3     | 2376.434  | 244.960   | -180.531 | -3384.939 | -158.075  | 134.098  |
| 4     | 3330.419  | 180.445   | -150.048 | -4872.152 | -82.319   | 114.817  |
| 5     | 4432.306  | 111.181   | -74.254  | -5666.634 | -5.650    | 95.970   |
| 6     | 5944.404  | 36.450    | -98.435  | -6364.355 | 78.553    | 76.803   |
| 7     | 6667.782  | -50.581   | -78.851  | -6841.495 | 165.179   | 56.959   |
| 8     | 7161.568  | -139.508  | -58.762  | -7085.381 | 253.598   | 36.865   |
| 9     | 7412.964  | -230.841  | -38.758  | -7084.188 | 344.399   | 16.931   |
| 10    | 7411.521  | -324.216  | -18.424  | -6761.620 | 366.470   | -3.445   |
| 11    | 7080.518  | -348.806  | 2.103    | -6243.103 | 391.366   | -23.897  |
| 12    | 7233.786  | -377.310  | 48.900   | -6112.356 | 433.015   | -51.788  |
| 13    | 6263.877  | -425.712  | 27.904   | -4847.909 | 478.410   | -30.232  |
| 14    | 4984.478  | -472.713  | 8.851    | -3268.758 | 521.516   | -18.066  |
| 15    | 3388.219  | -516.740  | -0.446   | -1348.842 | 546.603   | -36.158  |
| 16    | 1449.256  | -542.942  | 21.435   | 875.365   | 575.169   | -46.791  |
| 17    | -796.696  | -572.434  | 32.322   | 3377.728  | 607.213   | -51.202  |
| 18    | -3320.273 | -605.363  | 42.349   | 6160.049  | 771.255   | -60.622  |
| 19    | -6125.561 | -770.178  | 53.238   | 9213.608  | 1395.141  | -70.161  |
| 20    | -9202.053 | -1394.794 | 64.730   | 11779.486 | 1860.587  | -193.510 |
| 21    | -7502.507 | 1068.123  | -709.634 | 2525.574  | -501.018  | 189.315  |
| 22    | -2506.577 | 530.718   | -259.445 | 245.167   | 19.520    | 160.630  |
| 23    | -190.843  | 8.869     | -227.245 | -1887.269 | 28.961    | 161.667  |
| 24    | 1861.772  | -0.936    | -191.062 | -3709.404 | 71.449    | 139.712  |
| 25    | 3619.873  | -41.216   | -150.794 | -5802.638 | 126.907   | 115.766  |
| 26    | 5268.398  | -90.332   | -53.234  | -7068.482 | 155.771   | 88.300   |
| 27    | 7391.389  | -114.530  | -90.165  | -8121.905 | 187.707   | 63.202   |
| 28    | 8481.313  | -149.720  | -65.710  | -8866.157 | 223.111   | 38.621   |
| 29    | 9252.212  | -188.600  | -40.397  | -9351.254 | 265.837   | 12.727   |
| 30    | 9752.939  | -234.754  | -13.794  | -9412.812 | 307.738   | -13.570  |
| 31    | 9818.898  | -280.014  | 11.352   | -9104.719 | 351.483   | -38.827  |
| 32    | 9504.026  | -327.318  | 38.316   | -8407.098 | 396.373   | -65.979  |
| 33    | 9688.481  | -382.333  | 55.786   | -8180.436 | 469.465   | -63.300  |
| 34    | 8370.234  | -460.193  | 36.991   | -6385.806 | 528.878   | -72.775  |
| 35    | 6555.023  | -521.176  | 49.953   | -4130.660 | 584.308   | -90.011  |
| 36    | 4275.049  | -578.392  | 70.727   | -1439.902 | 642.289   | -110.816 |
| 37    | 1556.333  | -637.871  | 95.985   | 1692.731  | 702.034   | -120.490 |
| 38    | -1608.453 | -698.993  | 107.380  | 5286.191  | 756.344   | -156.062 |
| 39    | -5234.085 | -754.641  | 148.367  | 9314.834  | 1371.979  | -195.801 |
| 40    | -9297.598 | -1371.454 | 189.512  | 12984.846 | 2024.310  | -256.768 |
| 41    | -8058.956 | 1073.225  | -811.982 | 2644.372  | -450.117  | 202.359  |
| 42    | -2866.296 | 484.462   | -255.858 | 307.285   | 110.215   | 181.489  |
| 43    | -527.314  | -75.707   | -224.013 | -1793.426 | 107.936   | 159.921  |
| 44    | 1548.706  | -72.259   | -187.745 | -3623.334 | 136.527   | 137.720  |
| 45    | 3330.302  | -98.642   | -147.367 | -5312.266 | 123.178   | 113.634  |
| 46    | 5993.793  | -78.900   | -112.920 | -7062.484 | 153.396   | 86.246   |
| 47    | 7389.797  | -112.243  | -88.552  | -8122.191 | 185.858   | 61.651   |
| 48    | 8485.426  | -148.004  | -63.715  | -8871.676 | 221.859   | 36.513   |
| 49    | 9261.138  | -187.678  | -38.252  | -9360.748 | 265.374   | 10.864   |
| 50    | 9765.408  | -234.290  | -12.900  | -9425.285 | 307.645   | -14.577  |
| 51    | 9833.721  | -280.298  | 13.533   | -9118.701 | 352.045   | -41.067  |
| 52    | 9519.979  | -328.006  | 39.475   | -8422.047 | 397.183   | -66.908  |
| 53    | 8804.795  | -376.665  | 66.033   | -8153.020 | 463.666   | -66.043  |
| 54    | 8343.289  | -454.519  | 39.856   | -6371.781 | 523.011   | -75.788  |

COMBINACION 44 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + V\_Pd

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|----------|-----------|-----------|----------|
| 55    | 6541.619  | -515.403  | 53.134   | -4130.612 | 578.250   | -92.787  |
| 56    | 4275.505  | -572.312  | 73.938   | -1454.521 | 635.811   | -113.771 |
| 57    | 1570.262  | -631.381  | 97.733   | 1664.013  | 695.319   | -122.752 |
| 58    | -1579.199 | -692.340  | 111.337  | 5241.339  | 749.828   | -159.911 |
| 59    | -5189.815 | -748.188  | 151.421  | 9253.691  | 1365.473  | -198.336 |
| 60    | -9236.502 | -1364.931 | 192.099  | 12982.326 | 2025.096  | -258.382 |
| 61    | -7778.888 | 1064.584  | -812.255 | 2290.516  | -439.774  | 202.443  |
| 62    | -2599.800 | 476.611   | -255.041 | -22.489   | 120.811   | 180.946  |
| 63    | -279.390  | -83.765   | -223.048 | -2099.167 | 118.935   | 159.263  |
| 64    | 1778.114  | -80.800   | -186.693 | -3905.037 | 147.789   | 136.926  |
| 65    | 3541.191  | -107.385  | -146.275 | -5571.264 | 134.546   | 112.786  |
| 66    | 6253.282  | -90.233   | -113.674 | -7297.375 | 164.758   | 87.030   |
| 67    | 7625.040  | -123.765  | -88.727  | -8332.688 | 197.291   | 61.816   |
| 68    | 8696.504  | -159.457  | -64.311  | -9057.523 | 233.250   | 37.264   |
| 69    | 9447.075  | -198.992  | -39.096  | -9521.945 | 276.479   | 11.573   |
| 70    | 9926.688  | -245.549  | -13.177  | -9561.580 | 318.786   | -14.541  |
| 71    | 9970.162  | -291.289  | 13.630   | -9230.354 | 362.956   | -41.259  |
| 72    | 9631.596  | -339.031  | 39.725   | -8508.676 | 408.176   | -67.043  |
| 73    | 8891.652  | -387.583  | 65.965   | -8194.867 | 472.121   | -66.208  |
| 74    | 8384.892  | -462.910  | 39.973   | -6394.251 | 531.437   | -75.971  |
| 75    | 6563.954  | -523.934  | 53.539   | -4134.277 | 586.763   | -93.118  |
| 76    | 4278.984  | -580.825  | 73.871   | -1438.054 | 644.448   | -113.916 |
| 77    | 1553.883  | -640.049  | 98.042   | 1698.713  | 703.859   | -123.111 |
| 78    | -1613.701 | -700.927  | 112.056  | 5295.145  | 758.309   | -160.472 |
| 79    | -5243.811 | -756.600  | 151.578  | 9326.485  | 1373.824  | -198.241 |
| 80    | -9309.326 | -1373.276 | 191.943  | 13094.060 | 2036.093  | -258.092 |
| 81    | -7827.871 | 1068.219  | -813.935 | 2314.385  | -443.307  | 203.960  |
| 82    | -2640.620 | 480.112   | -256.925 | -6.706    | 117.209   | 182.976  |
| 83    | -312.250  | -80.270   | -225.013 | -2091.682 | 115.183   | 161.409  |
| 84    | 1753.527  | -77.089   | -188.518 | -3905.913 | 143.942   | 138.684  |
| 85    | 3524.763  | -103.601  | -148.222 | -5580.358 | 130.747   | 114.796  |
| 86    | 6262.235  | -86.460   | -112.145 | -7314.785 | 160.942   | 85.632   |
| 87    | 7642.326  | -119.927  | -88.753  | -8358.307 | 193.477   | 61.963   |
| 88    | 8722.197  | -155.701  | -63.470  | -9091.562 | 229.521   | 36.065   |
| 89    | 9481.263  | -195.078  | -37.243  | -9564.479 | 272.669   | 9.617    |
| 90    | 9969.189  | -241.967  | -11.495  | -9612.116 | 315.245   | -15.690  |
| 91    | 10020.900 | -287.890  | 13.898   | -9288.639 | 359.550   | -41.512  |
| 92    | 9690.028  | -335.472  | 41.157   | -8574.916 | 404.589   | -68.712  |
| 93    | 8957.883  | -384.000  | 67.149   | -8250.470 | 468.560   | -66.786  |
| 94    | 8440.456  | -459.249  | 40.640   | -6458.461 | 527.646   | -76.728  |
| 95    | 6627.998  | -520.073  | 54.109   | -4205.858 | 582.960   | -93.975  |
| 96    | 4350.418  | -577.095  | 74.947   | -1518.703 | 640.626   | -114.892 |
| 97    | 1634.604  | -636.240  | 99.326   | 1610.021  | 700.173   | -124.070 |
| 98    | -1525.438 | -697.196  | 111.958  | 5198.796  | 754.808   | -160.769 |
| 99    | -5146.971 | -753.139  | 152.768  | 9200.332  | 1352.022  | -199.509 |
| 100   | -9183.465 | -1351.489 | 192.531  | 12878.422 | 1995.747  | -258.354 |
| 101   | -7674.998 | 1025.903  | -812.333 | 2248.486  | -421.801  | 202.108  |
| 102   | -2563.930 | 456.432   | -255.454 | -44.610   | 120.444   | 181.776  |
| 103   | -268.251  | -85.664   | -223.395 | -2122.208 | 118.526   | 159.780  |
| 104   | 1785.197  | -82.589   | -187.013 | -3928.876 | 147.368   | 137.369  |
| 105   | 3544.062  | -109.181  | -146.601 | -5595.616 | 134.254   | 113.264  |
| 106   | 6277.565  | -89.966   | -112.332 | -7322.193 | 164.454   | 85.718   |
| 107   | 7649.732  | -123.485  | -87.915  | -8357.831 | 196.960   | 61.016   |
| 108   | 8721.607  | -159.111  | -62.924  | -9083.130 | 232.930   | 35.836   |
| 109   | 9472.748  | -198.588  | -38.163  | -9547.811 | 276.202   | 10.619   |

COMBINACION 44 1.35 (G1 + G2) + 1.5 (SCVMIN-EC1) + V\_Pd

ESFUERZOS EN EXTREMO DE BARRA

| Barra | Moment01  | Cortante01 | Torsor01 | Momento2   | Cortante2 | Torsor2  |
|-------|-----------|------------|----------|------------|-----------|----------|
| 110   | 9952.546  | -245.508   | -11.607  | -9587.422  | 318.810   | -15.849  |
| 111   | 9996.191  | -291.310   | 14.079   | -9256.291  | 363.095   | -41.568  |
| 112   | 9657.469  | -339.131   | 40.795   | -8534.504  | 408.377   | -68.266  |
| 113   | 8917.312  | -387.784   | 66.964   | -8154.930  | 474.639   | -66.896  |
| 114   | 8344.787  | -465.496   | 40.717   | -6350.279  | 534.050   | -76.902  |
| 115   | 6519.771  | -526.456   | 54.258   | -4085.234  | 589.365   | -94.109  |
| 116   | 4229.621  | -583.452   | 75.013   | -1386.145  | 646.824   | -115.041 |
| 117   | 1502.043  | -642.435   | 99.832   | 1753.957   | 706.012   | -124.594 |
| 118   | -1669.547 | -703.095   | 112.453  | 5353.892   | 760.023   | -160.596 |
| 119   | -5302.691 | -758.331   | 151.671  | 9388.563   | 1985.512  | -199.247 |
| 120   | -9370.859 | -1984.968  | 194.410  | 13069.971  | 2036.104  | -261.156 |
| 121   | -8153.404 | 1102.877   | -804.430 | 2654.139   | -491.342  | 200.757  |
| 122   | -3016.166 | 531.972    | -259.539 | 224.109    | 69.010    | 180.411  |
| 123   | -570.067  | -28.215    | -227.631 | -1969.719  | 66.906    | 158.561  |
| 124   | 1613.032  | -24.914    | -191.483 | -3892.471  | 95.782    | 136.592  |
| 125   | 3501.582  | -51.619    | -150.960 | -5676.123  | 85.728    | 111.949  |
| 126   | 6353.546  | -41.486    | -110.963 | -7508.473  | 116.072   | 84.444   |
| 127   | 7835.343  | -75.163    | -87.238  | -8653.550  | 148.601   | 60.342   |
| 128   | 9016.349  | -111.023   | -61.529  | -9487.406  | 184.785   | 34.293   |
| 129   | 9875.603  | -150.620   | -36.524  | -10059.348 | 228.076   | 9.143    |
| 130   | 10462.041 | -197.416   | -10.650  | -10205.580 | 270.382   | -16.972  |
| 131   | 10611.814 | -243.119   | 16.634   | -9979.500  | 314.517   | -44.238  |
| 132   | 10377.461 | -290.731   | 42.588   | -9362.234  | 359.384   | -69.873  |
| 133   | 10352.492 | -347.102   | 65.179   | -8934.309  | 433.165   | -73.080  |
| 134   | 9122.268  | -424.014   | 47.107   | -7232.534  | 491.344   | -82.609  |
| 135   | 7399.866  | -483.915   | 60.202   | -5076.682  | 545.674   | -99.668  |
| 136   | 5218.682  | -539.829   | 80.885   | -2506.701  | 601.847   | -120.309 |
| 137   | 2620.541  | -597.615   | 105.173  | 506.897    | 660.838   | -129.488 |
| 138   | -424.183  | -657.930   | 117.729  | 3970.840   | 715.540   | -165.738 |
| 139   | -3920.635 | -713.855   | 157.623  | 7857.595   | 1939.133  | -204.547 |
| 140   | -7840.700 | -1938.632  | 199.367  | 11217.273  | 1989.012  | -265.136 |
| 141   | -7287.613 | 1009.586   | -713.012 | 3077.939   | -1081.145 | 146.993  |
| 142   | -3063.784 | 1105.134   | -202.396 | 2320.984   | -460.387  | 123.615  |
| 143   | -2283.004 | 483.565    | -177.020 | 1101.518   | 199.021   | 116.246  |
| 144   | -1110.225 | -174.448   | -124.920 | -1125.870  | 406.708   | 97.826   |
| 145   | 1000.575  | -378.016   | -82.302  | -2868.631  | 297.571   | 79.714   |
| 146   | 4169.108  | -265.423   | -39.961  | -5719.930  | 319.550   | 59.369   |
| 147   | 5952.279  | -283.682   | -61.580  | -6883.811  | 278.967   | 40.337   |
| 148   | 7147.096  | -245.260   | -41.881  | -7863.829  | 239.818   | 20.163   |
| 149   | 8152.941  | -208.506   | -21.481  | -8646.797  | 203.581   | -0.294   |
| 150   | 8955.425  | -174.728   | -1.332   | -9145.959  | 166.059   | -20.470  |
| 151   | 9467.693  | -139.644   | 19.586   | -9497.342  | 136.991   | -41.905  |
| 152   | 9823.986  | -113.067   | 41.132   | -9609.597  | 219.684   | -63.208  |
| 153   | 9933.293  | -198.302   | 62.075   | -9468.035  | 305.605   | -83.927  |
| 154   | 9780.123  | -287.248   | 82.908   | -9056.125  | 395.172   | -105.065 |
| 155   | 9347.363  | -379.438   | 105.424  | -8315.616  | 483.139   | -127.530 |
| 156   | 8576.536  | -470.050   | 127.437  | -7323.256  | 578.909   | -149.119 |
| 157   | 7544.055  | -568.841   | 148.444  | -6013.221  | 677.998   | -169.936 |
| 158   | 6183.808  | -670.672   | 169.499  | -4395.710  | 787.849   | -7.481   |
| 159   | 4454.641  | -785.427   | -0.615   | -2414.563  | 908.397   | -13.191  |
| 160   | 2435.347  | -907.638   | 7.484    | -10.000    | 1044.320  | -52.670  |

DIMENSIONAMIENTO A CORTANTE SEGUN NORMATIVA EHE

Angulo de la biela comprimida(sex.) = 35.00

| SEC | Vd<br>(T) | Nd<br>(T) | Vul<br>(T) | Vcu<br>(T) | Vsu<br>(T) | Asc<br>(cm2/m) | Dec<br>(m) | th   | the  | rho  | psi  | d<br>(m) |
|-----|-----------|-----------|------------|------------|------------|----------------|------------|------|------|------|------|----------|
| 1   | 1267.     | 4481.     | 2573.      | 139.       | 1128.      | 78.3           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 2   | 1095.     | 4597.     | 2573.      | 142.       | 953.       | 66.2           | 0.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 3   | 957.      | 4606.     | 2573.      | 142.       | 815.       | 56.6           | 1.6        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 4   | 823.      | 4617.     | 2573.      | 143.       | 681.       | 47.3           | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 5   | 694.      | 4631.     | 2573.      | 143.       | 551.       | 38.3           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 6   | 574.      | 4645.     | 2573.      | 144.       | 430.       | 29.9           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 7   | 459.      | 4661.     | 2573.      | 144.       | 315.       | 21.9           | 2.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 8   | 344.      | 4676.     | 2573.      | 144.       | 235.       | 16.3           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 9   | 276.      | 4692.     | 2573.      | 145.       | 235.       | 16.3           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 10  | 382.      | 4708.     | 2573.      | 145.       | 237.       | 16.5           | 2.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 11  | 421.      | 4744.     | 2573.      | 146.       | 275.       | 19.1           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 12  | 464.      | 4793.     | 2573.      | 147.       | 317.       | 22.0           | 2.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 13  | 510.      | 4855.     | 2573.      | 149.       | 361.       | 25.1           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 14  | 557.      | 4927.     | 2573.      | 151.       | 406.       | 28.2           | 0.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 15  | 605.      | 5006.     | 2573.      | 153.       | 452.       | 31.4           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 16  | 648.      | 5086.     | 2573.      | 155.       | 493.       | 34.2           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 17  | 695.      | 5157.     | 2573.      | 157.       | 538.       | 37.4           | 1.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 18  | 746.      | 5231.     | 2573.      | 159.       | 587.       | 40.8           | 1.4        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 19  | 934.      | 5260.     | 2573.      | 143.       | 791.       | 54.9           | 1.6        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 20  | 1585.     | 5343.     | 2573.      | 145.       | 1440.      | 100.0          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 21  | 2302.     | 5486.     | 2573.      | 149.       | 2153.      | 149.6          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 22  | 1684.     | 5348.     | 2573.      | 145.       | 1539.      | 106.9          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 23  | 1072.     | 5283.     | 2573.      | 160.       | 911.       | 63.3           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 24  | 975.      | 5257.     | 2573.      | 160.       | 816.       | 56.6           | 1.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 25  | 847.      | 5201.     | 2573.      | 158.       | 689.       | 47.9           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 26  | 721.      | 5170.     | 2573.      | 157.       | 564.       | 39.2           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 27  | 633.      | 5165.     | 2573.      | 157.       | 475.       | 33.0           | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 28  | 549.      | 5161.     | 2573.      | 157.       | 392.       | 27.2           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 29  | 465.      | 5164.     | 2573.      | 157.       | 307.       | 21.4           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 30  | 388.      | 5176.     | 2573.      | 157.       | 235.       | 16.3           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 31  | 340.      | 5203.     | 2573.      | 158.       | 235.       | 16.3           | 2.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 32  | 406.      | 5246.     | 2573.      | 159.       | 246.       | 17.1           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 33  | 476.      | 5304.     | 2573.      | 161.       | 316.       | 21.9           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 34  | 554.      | 5379.     | 2573.      | 163.       | 391.       | 27.2           | 2.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 35  | 627.      | 5466.     | 2573.      | 165.       | 462.       | 32.1           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 36  | 701.      | 5559.     | 2573.      | 168.       | 533.       | 37.0           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 37  | 780.      | 5650.     | 2573.      | 170.       | 610.       | 42.4           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 38  | 861.      | 5750.     | 2573.      | 173.       | 688.       | 47.8           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 39  | 949.      | 5785.     | 2573.      | 155.       | 793.       | 55.1           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 40  | 1602.     | 5855.     | 2573.      | 157.       | 1445.      | 100.4          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 41  | 2345.     | 6031.     | 2573.      | 161.       | 2184.      | 151.7          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 42  | 1671.     | 5883.     | 2573.      | 158.       | 1514.      | 105.1          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 43  | 1020.     | 5810.     | 2573.      | 174.       | 846.       | 58.8           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 44  | 937.      | 5772.     | 2573.      | 173.       | 764.       | 53.1           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 45  | 824.      | 5696.     | 2573.      | 171.       | 653.       | 45.3           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 46  | 768.      | 5145.     | 2573.      | 157.       | 611.       | 42.4           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 47  | 678.      | 5147.     | 2573.      | 157.       | 521.       | 36.2           | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 48  | 594.      | 5143.     | 2573.      | 157.       | 438.       | 30.4           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 49  | 510.      | 5145.     | 2573.      | 157.       | 353.       | 24.5           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 50  | 433.      | 5160.     | 2573.      | 157.       | 276.       | 19.2           | 2.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 51  | 365.      | 5189.     | 2573.      | 158.       | 235.       | 16.3           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 52  | 413.      | 5234.     | 2573.      | 159.       | 254.       | 17.6           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 53  | 484.      | 5296.     | 2573.      | 161.       | 324.       | 22.5           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 54  | 562.      | 5373.     | 2573.      | 163.       | 399.       | 27.7           | 2.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 55  | 635.      | 5462.     | 2573.      | 165.       | 470.       | 32.7           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |

DIMENSIONAMIENTO A CORTANTE SEGUN NORMATIVA EHE

Angulo de la biela comprimida(sex.) = 35.00

| SEC | Vd<br>(T) | Nd<br>(T) | Vul<br>(T) | Vcu<br>(T) | Vsu<br>(T) | Asc<br>(cm2/m) | Dec<br>(m) | th   | the  | rho  | psi  | d<br>(m) |
|-----|-----------|-----------|------------|------------|------------|----------------|------------|------|------|------|------|----------|
| 56  | 709.      | 5558.     | 2573.      | 168.       | 542.       | 37.6           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 57  | 788.      | 5650.     | 2573.      | 170.       | 618.       | 42.9           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 58  | 869.      | 5750.     | 2573.      | 173.       | 697.       | 48.4           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 59  | 958.      | 5783.     | 2573.      | 155.       | 802.       | 55.7           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 60  | 1611.     | 5851.     | 2573.      | 157.       | 1454.      | 101.0          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 61  | 2346.     | 6026.     | 2573.      | 161.       | 2185.      | 151.8          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 62  | 1673.     | 5878.     | 2573.      | 158.       | 1515.      | 105.2          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 63  | 1022.     | 5809.     | 2573.      | 174.       | 847.       | 58.9           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 64  | 938.      | 5773.     | 2573.      | 173.       | 765.       | 53.1           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 65  | 824.      | 5699.     | 2573.      | 171.       | 653.       | 45.4           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 66  | 768.      | 5149.     | 2573.      | 157.       | 611.       | 42.4           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 67  | 678.      | 5152.     | 2573.      | 157.       | 521.       | 36.2           | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 68  | 595.      | 5148.     | 2573.      | 157.       | 438.       | 30.4           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 69  | 510.      | 5150.     | 2573.      | 157.       | 354.       | 24.6           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 70  | 434.      | 5164.     | 2573.      | 157.       | 277.       | 19.2           | 2.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 71  | 366.      | 5192.     | 2573.      | 158.       | 235.       | 16.3           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 72  | 426.      | 5237.     | 2573.      | 159.       | 267.       | 18.6           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 73  | 497.      | 5298.     | 2573.      | 161.       | 337.       | 23.4           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 74  | 575.      | 5374.     | 2573.      | 163.       | 412.       | 28.6           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 75  | 648.      | 5463.     | 2573.      | 165.       | 483.       | 33.6           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 76  | 722.      | 5558.     | 2573.      | 167.       | 555.       | 38.5           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 77  | 801.      | 5650.     | 2573.      | 170.       | 631.       | 43.9           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 78  | 883.      | 5750.     | 2573.      | 173.       | 710.       | 49.3           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 79  | 971.      | 5784.     | 2573.      | 155.       | 815.       | 56.6           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 80  | 1624.     | 5853.     | 2573.      | 157.       | 1467.      | 101.9          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 81  | 2350.     | 6028.     | 2573.      | 161.       | 2189.      | 152.0          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 82  | 1676.     | 5879.     | 2573.      | 158.       | 1518.      | 105.5          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 83  | 1025.     | 5810.     | 2573.      | 174.       | 851.       | 59.1           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 84  | 942.      | 5773.     | 2573.      | 173.       | 769.       | 53.4           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 85  | 828.      | 5698.     | 2573.      | 171.       | 657.       | 45.6           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 86  | 772.      | 5148.     | 2573.      | 157.       | 615.       | 42.7           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 87  | 682.      | 5151.     | 2573.      | 157.       | 525.       | 36.5           | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 88  | 599.      | 5147.     | 2573.      | 157.       | 442.       | 30.7           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 89  | 514.      | 5149.     | 2573.      | 157.       | 358.       | 24.8           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 90  | 437.      | 5164.     | 2573.      | 157.       | 280.       | 19.5           | 2.2        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 91  | 370.      | 5192.     | 2573.      | 158.       | 235.       | 16.3           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 92  | 423.      | 5237.     | 2573.      | 159.       | 263.       | 18.3           | 2.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 93  | 494.      | 5298.     | 2573.      | 161.       | 333.       | 23.1           | 2.1        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 94  | 571.      | 5375.     | 2573.      | 163.       | 409.       | 28.4           | 1.9        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 95  | 644.      | 5464.     | 2573.      | 165.       | 479.       | 33.3           | 1.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 96  | 718.      | 5559.     | 2573.      | 168.       | 551.       | 38.3           | 0.8        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 97  | 797.      | 5651.     | 2573.      | 170.       | 627.       | 43.6           | 1.0        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 98  | 879.      | 5750.     | 2573.      | 173.       | 706.       | 49.1           | 1.3        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 99  | 967.      | 5783.     | 2573.      | 155.       | 812.       | 56.4           | 1.5        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 100 | 1602.     | 5851.     | 2573.      | 157.       | 1445.      | 100.4          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 101 | 2297.     | 6026.     | 2573.      | 161.       | 2136.      | 148.4          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2.80     |
| 102 | 1642.     | 5878.     | 2573.      | 158.       | 1484.      | 103.1          | 1.7        | 35.0 | 26.6 | 0.02 | 1.27 | 2        |

# COMPROBACIÓN DEL CORTANTE POR ASIENTO.

- Sección 161

$$V_d = 1226 \text{ T}$$

$$\Delta V_d = 1'35 \cdot 62 = 83'7 \text{ T}$$

$$V = 1310 \text{ T}$$

$$b_o = 2 \cdot 600 - 4 \cdot 120 = 720 \text{ mm}$$

$$d = 2800 \text{ mm} \Rightarrow \xi = 1 + \sqrt{\frac{200}{d}} = 1'27$$

$$\sigma_{cd} = \frac{N_d}{A_c} = \frac{-5280}{9'67} = -5'45 \text{ N/mm}^2$$

$$f_t = 0'02 \quad f_{ck} = 50 \text{ N/mm}^2$$

$$\theta = 35^\circ \Rightarrow \beta = 0'619$$

$$V_{cu} = \left[ 0'10 \xi (100 / f_{ck})^{1/3} - 0'15 \cdot \sigma_{cd} \right] \cdot b_o \cdot d \cdot \beta = 176 \text{ T}$$

$$A_{s, \text{rec}} = \frac{V - V_{cu}}{0'9 \cdot d \cdot \cot \theta} \cdot \frac{1}{f_{yd}} = 78'8 \text{ cm}^2/\text{m}$$

$$A_{s, \text{real}} = 4 \phi 25 \text{ cada } 0'15 = 261'3 \text{ cm}^2/\text{m} > A_{s, \text{rec}} \quad \checkmark$$

- Sección 150.

$$V_d = 359 \text{ T}$$

$$\Delta V_d = 1'35 \cdot 12 = 83'7 \text{ T}$$

$$V = 443 \text{ T}$$

$$b_o = 720 \text{ mm}$$

$$d = 2800 \text{ mm} \Rightarrow \xi = 1'27$$

$$\sigma_{cd} = \frac{N_d}{A_c} = \frac{-5383}{9'67} = -5'57 \text{ N/mm}^2$$

$$f_t = 0'02 \quad f_{ck} = 50 \text{ N/mm}^2$$

$$\theta = 35^\circ \Rightarrow \beta = 0'619$$

$$V_{cu} = 178 \text{ T} \Rightarrow A_{s, \text{rec}} \geq 18'4 \text{ cm}^2/\text{m}$$

$$A_{s, \text{real}} = 2 \phi 20 \text{ a } 0'15 = 83'8 \text{ cm}^2/\text{m} > A_{s, \text{rec}} \quad \text{o.k.}$$



- Sección 141.

$$V = 2139 \text{ T}$$

$$\Delta V_d = 83'77$$

$$V = 2223 \text{ T}$$

$$\sigma_{cd} = \frac{N_c}{A_c} = \frac{-5948}{10'975} = -5'42 \text{ N/mm}^2$$

$$V_{cu} = 175 \text{ T}$$

$$A_{s, \text{req}} = 142'3 \text{ cm}^2/\text{m}$$

$$A_{s, \text{real}} = 4c\phi 25 \text{ cada } 0'15 = 261'3 \text{ cm}^2/\text{m}$$

$$\Rightarrow A_{s, \text{real}} > A_{s, \text{req}} \quad \checkmark$$



## 7.2 EVALUACIÓN DEL E.L.U. DE TORSIÓN

En este apartado se comprueba el Estado Límite Último de rotura por esfuerzo torsor de acuerdo con los criterios de la Normativa española vigente (EHE artículo 45)

Los cálculos realizados han sido los siguientes:

- Cálculo de la envolvente de esfuerzos cortantes para las distintas acciones consideradas en el proyecto del tablero. Los esfuerzos de cálculo se han combinado de acuerdo con los criterios del apartado 2 de este Anejo.
- La envolvente de esfuerzos flectores positivos se muestra en los listados adjuntos con la notación  $T_d$ , conjuntamente con el esfuerzo flector y cortante concomitantes.
- Cálculo de  $T_{u1}$  (esfuerzo torsor de agotamiento que pueden resistir las bielas comprimidas).
- Dimensionamiento de las armaduras transversal  $A_{st}$  y longitudinal  $A_{sl}$  requeridas para resistir el esfuerzo torsor  $T_d$ , a partir del cálculo de  $T_{u2}$  (esfuerzo torsor que pueden resistir las armaduras transversales) y  $T_{u3}$  (esfuerzo torsor que pueden resistir las armaduras longitudinales).
- Comprobación de la interacción torsor-cortante (artículo 45.3.2.2) en cada una de las secciones en que se ha discretizado el tablero para el máximo esfuerzo cortante y el torsor concomitante y viceversa.



COMBINACION 45 1.35 (G1 + G2) + 1.5 (SCTMAX-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 1     | -3117.859 | 801.231   | 904.562  | 1895.111  | -667.045  | -830.371  |
| 2     | -1919.237 | 667.946   | 837.153  | 833.458   | -568.437  | -751.170  |
| 3     | -901.360  | 571.145   | 761.604  | 2.440     | -471.802  | -675.470  |
| 4     | -107.381  | 476.314   | 690.401  | -608.918  | -377.401  | -604.404  |
| 5     | 473.347   | 383.625   | 623.582  | -1038.202 | -287.045  | -542.522  |
| 6     | 877.922   | 294.989   | 566.005  | -1249.942 | -199.727  | -488.975  |
| 7     | 1071.133  | 209.329   | 516.423  | -1277.376 | -111.780  | -433.082  |
| 8     | 1085.772  | 123.365   | 465.131  | -1131.891 | -26.448   | -382.692  |
| 9     | 933.170   | 39.525    | 417.878  | -825.350  | 56.745    | -336.378  |
| 10    | 646.213   | -40.785   | 376.348  | -423.814  | 69.297    | -298.257  |
| 11    | 215.305   | -53.666   | 341.941  | 4.197     | 75.792    | -268.572  |
| 12    | -179.514  | -57.475   | 316.302  | 455.972   | 79.527    | -236.922  |
| 13    | -633.510  | -59.993   | 288.761  | 3.406     | -11.651   | -222.805  |
| 14    | -1011.624 | -55.282   | 265.730  | 221.610   | -24.831   | -224.490  |
| 15    | -1396.555 | -23.356   | 255.302  | 391.294   | -41.573   | -226.123  |
| 16    | -1651.509 | -6.774    | 257.498  | 405.241   | -63.051   | -240.069  |
| 17    | -1726.646 | 15.537    | 261.138  | 442.746   | -84.139   | -242.069  |
| 18    | -1765.674 | 39.251    | 270.950  | -430.998  | 28.469    | -246.174  |
| 19    | -856.229  | -69.848   | 283.555  | 230.911   | 602.709   | -258.699  |
| 20    | -1464.744 | -640.433  | 299.209  | 1997.214  | 1119.594  | -472.120  |
| 21    | -3989.955 | 1675.068  | 930.314  | 896.740   | -1022.641 | -1008.828 |
| 22    | -916.637  | 1023.262  | 1015.657 | 341.501   | -458.026  | -915.851  |
| 23    | -399.655  | 459.859   | 927.589  | -518.485  | -407.791  | -828.168  |
| 24    | 423.720   | 411.108   | 845.045  | -1224.979 | -327.056  | -738.440  |
| 25    | 1094.770  | 331.989   | 760.675  | -1723.928 | -244.768  | -658.551  |
| 26    | 1483.434  | 251.398   | 689.882  | -1943.961 | -195.872  | -590.934  |
| 27    | 1752.340  | 204.353   | 624.677  | -2103.628 | -149.330  | -525.698  |
| 28    | 1888.743  | 159.814   | 563.741  | -2126.724 | -102.129  | -458.070  |
| 29    | 1894.019  | 114.582   | 502.009  | -1983.249 | -58.457   | -402.352  |
| 30    | 1738.870  | 73.058    | 451.900  | -1740.246 | -19.506   | -355.756  |
| 31    | 1491.153  | 36.314    | 409.333  | -1383.137 | 15.409    | -314.108  |
| 32    | 1155.309  | 4.787     | 374.152  | -917.675  | 47.165    | -273.575  |
| 33    | 678.580   | -26.221   | 338.059  | -848.912  | -5.930    | -261.469  |
| 34    | -75.003   | -43.362   | 312.689  | -591.357  | -0.619    | -273.945  |
| 35    | -456.062  | -49.527   | 310.092  | -335.688  | 0.327     | -286.679  |
| 36    | -814.335  | -50.607   | 312.247  | -18.475   | 1.738     | -289.729  |
| 37    | -1154.361 | -48.900   | 320.030  | 165.400   | -5.306    | -303.191  |
| 38    | -1395.902 | -40.284   | 331.104  | -664.813  | -4.445    | -316.686  |
| 39    | -596.963  | -39.047   | 348.141  | -83.046   | 558.329   | -333.454  |
| 40    | -1164.400 | -598.550  | 368.599  | 2101.080  | 1227.573  | -551.208  |
| 41    | -4053.488 | 1691.737  | 919.500  | 1101.732  | -983.382  | -1011.008 |
| 42    | -1122.162 | 983.982   | 1017.812 | 785.130   | -380.474  | -917.975  |
| 43    | -844.467  | 382.380   | 929.621  | 88.234    | -343.625  | -830.214  |
| 44    | -185.232  | 347.030   | 847.110  | -492.918  | -277.020  | -740.574  |
| 45    | 360.328   | 281.990   | 762.850  | -877.188  | -264.308  | -660.847  |
| 46    | 1111.302  | 271.089   | 691.936  | -1607.992 | -214.414  | -592.980  |
| 47    | 1414.057  | 223.069   | 626.161  | -1807.123 | -167.648  | -527.138  |
| 48    | 1589.550  | 178.317   | 565.666  | -1867.218 | -120.220  | -460.052  |
| 49    | 1632.225  | 132.628   | 503.919  | -1758.750 | -76.110   | -404.092  |
| 50    | 1512.459  | 90.990    | 452.848  | -1549.978 | -37.084   | -356.853  |
| 51    | 1299.158  | 53.821    | 411.430  | -1226.183 | -1.843    | -316.181  |
| 52    | 977.718   | 20.861    | 375.405  | -771.848  | 31.189    | -274.796  |
| 53    | 554.252   | -8.860    | 339.530  | -760.413  | -22.772   | -264.477  |
| 54    | -164.501  | -26.028   | 315.449  | -537.461  | -17.560   | -276.899  |

COMBINACION 45 1.35 (G1 + G2) + 1.5 (SCTMAX-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momentol  | Cortantel | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| 55    | -504.744  | -31.860   | 312.933  | -318.201  | -16.790   | -289.268  |
| 56    | -864.524  | -34.247   | 315.529  | -37.734   | -15.688   | -292.742  |
| 57    | -1127.896 | -30.721   | 322.304  | 105.045   | -22.909   | -305.737  |
| 58    | -1342.331 | -22.583   | 334.732  | -763.921  | -21.746   | -319.761  |
| 59    | -498.081  | -21.453   | 351.487  | -219.847  | 541.147   | -336.884  |
| 60    | -1027.497 | -581.056  | 372.034  | 1925.927  | 1209.939  | -554.740  |
| 61    | -3975.876 | 1689.404  | 920.098  | 1027.780  | -981.348  | -1012.175 |
| 62    | -1044.597 | 981.847   | 1018.845 | 710.322   | -378.098  | -918.960  |
| 63    | -764.513  | 379.873   | 930.624  | 14.531    | -340.676  | -831.216  |
| 64    | -106.464  | 343.829   | 848.134  | -563.445  | -273.598  | -741.597  |
| 65    | 430.676   | 278.555   | 763.869  | -938.849  | -260.809  | -661.828  |
| 66    | 1195.232  | 266.676   | 691.355  | -1681.450 | -209.994  | -592.347  |
| 67    | 1519.413  | 217.044   | 626.064  | -1898.990 | -161.744  | -527.015  |
| 68    | 1681.469  | 172.440   | 565.147  | -1946.287 | -114.420  | -459.429  |
| 69    | 1710.955  | 126.980   | 503.299  | -1825.476 | -70.649   | -403.632  |
| 70    | 1578.952  | 85.396    | 452.716  | -1604.995 | -31.611   | -356.836  |
| 71    | 1354.120  | 48.523    | 411.393  | -1270.278 | 3.379     | -316.181  |
| 72    | 1021.727  | 15.572    | 375.361  | -805.034  | 36.438    | -274.710  |
| 73    | 578.438   | -14.608   | 339.310  | -777.600  | -17.299   | -264.430  |
| 74    | -111.499  | -29.612   | 315.190  | -543.228  | -12.099   | -276.717  |
| 75    | -554.685  | -39.974   | 312.948  | -311.921  | -11.241   | -289.375  |
| 76    | -854.290  | -39.123   | 315.196  | -19.121   | -10.018   | -292.695  |
| 77    | -1149.739 | -36.520   | 322.079  | 137.059   | -17.301   | -305.618  |
| 78    | -1382.409 | -28.543   | 334.777  | -719.667  | -16.169   | -319.762  |
| 79    | -550.810  | -27.219   | 351.364  | -164.230  | 546.573   | -337.018  |
| 80    | -1092.545 | -586.762  | 371.845  | 1993.287  | 1215.489  | -554.789  |
| 81    | -4088.489 | 1694.802  | 918.048  | 1128.800  | -986.595  | -1010.200 |
| 82    | -1149.367 | 987.243   | 1017.005 | 803.555   | -383.528  | -917.163  |
| 83    | -862.567  | 385.446   | 928.851  | 100.087   | -346.450  | -829.462  |
| 84    | -176.017  | 349.073   | 846.318  | -505.875  | -278.924  | -739.775  |
| 85    | 358.551   | 284.498   | 761.952  | -880.361  | -266.703  | -659.926  |
| 86    | 1202.394  | 269.806   | 692.631  | -1695.587 | -213.163  | -593.517  |
| 87    | 1501.684  | 221.726   | 626.058  | -1891.582 | -166.394  | -527.049  |
| 88    | 1673.868  | 177.012   | 566.135  | -1948.595 | -118.959  | -460.601  |
| 89    | 1727.411  | 130.840   | 504.837  | -1849.927 | -74.426   | -405.117  |
| 90    | 1603.484  | 88.987    | 453.823  | -1637.080 | -35.189   | -357.636  |
| 91    | 1386.348  | 51.991    | 411.670  | -1309.680 | -0.084    | -316.517  |
| 92    | 1061.813  | 19.100    | 376.406  | -852.627  | 32.910    | -275.808  |
| 93    | 613.159   | -11.784   | 340.194  | -810.239  | -20.835   | -265.007  |
| 94    | -110.376  | -29.090   | 316.117  | -583.957  | -15.774   | -277.516  |
| 95    | -468.380  | -35.450   | 313.559  | -360.751  | -14.895   | -290.127  |
| 96    | -825.908  | -37.579   | 315.990  | -76.086   | -13.664   | -293.446  |
| 97    | -1120.407 | -35.029   | 323.150  | 72.779    | -20.785   | -306.605  |
| 98    | -1344.197 | -26.904   | 335.005  | -792.043  | -19.506   | -320.429  |
| 99    | -515.293  | -26.079   | 351.940  | -263.698  | 524.995   | -337.304  |
| 100   | -1031.387 | -567.150  | 372.124  | 1824.402  | 1175.364  | -555.208  |
| 101   | -3923.330 | 1649.714  | 918.912  | 1043.846  | -959.982  | -1011.107 |
| 102   | -1064.161 | 960.621   | 1018.145 | 756.974   | -375.196  | -918.373  |
| 103   | -816.138  | 377.110   | 929.891  | 72.518    | -338.010  | -830.470  |
| 104   | -157.325  | 340.946   | 847.366  | -506.404  | -270.705  | -740.814  |
| 105   | 373.662   | 275.701   | 763.105  | -875.959  | -257.948  | -661.061  |
| 106   | 1193.878  | 261.236   | 692.181  | -1668.568 | -204.606  | -593.126  |
| 107   | 1478.636  | 212.953   | 626.370  | -1849.502 | -157.691  | -527.372  |
| 108   | 1631.923  | 168.372   | 565.957  | -1888.280 | -110.323  | -460.245  |
| 109   | 1653.129  | 122.973   | 503.660  | -1759.126 | -66.537   | -403.997  |



COMBINACION 45 1.35 (G1 + G2) + 1.5 (SCTMAX-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2   |
|-------|-----------|-----------|----------|-----------|-----------|-----------|
| ===== |           |           |          |           |           |           |
| 110   | 1529.488  | 79.948    | 453.534  | -1543.903 | -26.098   | -357.446  |
| 111   | 1293.656  | 42.994    | 411.460  | -1197.826 | 9.004     | -316.229  |
| 112   | 949.385   | 9.995     | 375.902  | -720.435  | 42.110    | -275.270  |
| 113   | 481.388   | -20.951   | 339.785  | -663.252  | -12.162   | -265.015  |
| 114   | -262.717  | -38.455   | 315.631  | -416.929  | -6.906    | -277.484  |
| 115   | -684.862  | -46.913   | 313.038  | -173.493  | -6.001    | -290.000  |
| 116   | -1078.713 | -49.425   | 315.333  | 131.629   | -4.919    | -293.151  |
| 117   | -1409.686 | -47.164   | 322.851  | 300.257   | -12.343   | -306.383  |
| 118   | -1661.005 | -38.789   | 334.664  | -546.474  | -11.640   | -320.264  |
| 119   | -857.719  | -37.274   | 351.045  | 18.232    | 1161.112  | -337.365  |
| 120   | -1424.931 | -1206.970 | 372.184  | 2185.073  | 1220.349  | -555.096  |
| 121   | -4296.414 | 1716.646  | 910.526  | 1288.812  | -1007.883 | -1002.504 |
| 122   | -1309.185 | 1008.507  | 1009.541 | 916.524   | -404.980  | -909.734  |
| 123   | -969.623  | 406.706   | 921.169  | 159.029   | -367.815  | -821.757  |
| 124   | -256.081  | 371.252   | 838.694  | -475.679  | -301.017  | -732.171  |
| 125   | 349.072   | 305.753   | 754.571  | -918.356  | -287.266  | -652.583  |
| 126   | 1232.180  | 290.646   | 683.707  | -1771.118 | -233.961  | -584.567  |
| 127   | 1577.086  | 242.662   | 617.385  | -2011.952 | -187.467  | -518.462  |
| 128   | 1814.546  | 197.111   | 557.634  | -2132.564 | -139.208  | -451.961  |
| 129   | 1898.155  | 151.930   | 495.405  | -2066.544 | -95.785   | -395.568  |
| 130   | 1826.828  | 110.198   | 444.730  | -1906.673 | -56.790   | -348.759  |
| 131   | 1657.969  | 73.710    | 403.644  | -1629.664 | -22.229   | -308.325  |
| 132   | 1382.945  | 41.375    | 367.490  | -1225.908 | 9.962     | -266.736  |
| 133   | 988.800   | 11.187    | 331.535  | -1191.055 | -42.250   | -266.951  |
| 134   | 319.576   | -5.567    | 308.100  | -1014.047 | -37.565   | -279.491  |
| 135   | -25.333   | -13.476   | 305.775  | -842.778  | -36.991   | -292.370  |
| 136   | -338.925  | -15.557   | 308.293  | -612.628  | -35.897   | -295.813  |
| 137   | -588.225  | -13.344   | 315.837  | -517.809  | -42.567   | -309.081  |
| 138   | -758.945  | -5.600    | 327.952  | -1433.688 | -40.054   | -323.161  |
| 139   | 118.784   | -5.982    | 344.930  | -931.365  | 1132.119  | -340.377  |
| 140   | -382.164  | -1175.165 | 366.008  | 1030.752  | 1191.249  | -554.279  |
| 141   | -2977.166 | 1599.739  | 721.466  | 790.782   | -1538.474 | -820.279  |
| 142   | -797.200  | 1538.658  | 826.450  | 723.221   | -879.004  | -738.771  |
| 143   | -769.742  | 880.442   | 749.057  | 460.283   | -185.548  | -661.518  |
| 144   | -503.130  | 186.884   | 675.186  | 88.424    | 52.062    | -582.282  |
| 145   | -187.203  | -48.568   | 600.400  | -186.457  | -34.236   | -522.873  |
| 146   | 1649.564  | 36.142    | 546.653  | -1449.398 | 12.533    | -454.269  |
| 147   | 1325.046  | -7.527    | 480.622  | -1320.668 | -8.816    | -388.645  |
| 148   | 1182.557  | 14.833    | 419.453  | -1060.289 | -34.840   | -341.584  |
| 149   | 892.633   | 42.563    | 376.410  | -957.878  | -64.707   | -299.027  |
| 150   | 771.264   | 74.038    | 337.729  | -885.343  | -99.500   | -268.166  |
| 151   | 710.064   | 109.181   | 311.172  | -398.308  | -126.989  | -248.173  |
| 152   | 690.446   | 141.497   | 280.397  | -434.967  | -64.144   | -249.386  |
| 153   | 447.187   | 63.339    | 255.233  | -340.256  | -0.570    | -251.149  |
| 154   | 352.211   | -0.447    | 257.543  | -110.294  | 63.769    | -253.863  |
| 155   | 121.632   | -64.819   | 260.044  | 140.013   | 122.865   | -267.697  |
| 156   | -129.488  | -123.953  | 274.530  | 637.845   | 188.086   | -270.089  |
| 157   | -629.041  | -189.359  | 278.500  | 1278.453  | 253.736   | -274.048  |
| 158   | -1271.249 | -255.062  | 281.528  | 2282.549  | 328.928   | -236.984  |
| 159   | -2177.565 | -327.694  | 260.522  | 2912.350  | 383.318   | -262.776  |
| 160   | -2882.021 | -385.112  | 276.785  | 3682.479  | 473.019   | -288.516  |

COMBINACION 46 1.35 (G1 + G2) + 1.5 (SCTMIN-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 1     | -3117.781 | 505.001   | -296.190  | 2340.948  | -404.258  | 282.388  |
| 2     | -2343.737 | 402.697   | -273.159  | 1509.299  | -336.671  | 284.045  |
| 3     | -1514.467 | 335.228   | -276.065  | 702.322   | -264.416  | 280.813  |
| 4     | -709.605  | 263.117   | -272.946  | 50.765    | -192.612  | 277.474  |
| 5     | -59.818   | 191.360   | -269.709  | -331.013  | -126.953  | 262.833  |
| 6     | 320.786   | 125.769   | -255.734  | -612.225  | -61.849   | 260.833  |
| 7     | 678.265   | 54.812    | -253.124  | -914.747  | 13.905    | 273.721  |
| 8     | 888.717   | -15.263   | -250.809  | -1089.552 | 91.624    | 291.506  |
| 9     | 955.001   | -84.901   | -249.030  | -1132.354 | 171.188   | 316.065  |
| 10    | 1313.569  | -160.080  | -268.390  | -1035.574 | 185.163   | 337.341  |
| 11    | 1231.311  | -174.289  | -294.692  | -870.393  | 197.906   | 371.810  |
| 12    | 1052.047  | -188.885  | -332.752  | -693.271  | 210.927   | 411.525  |
| 13    | 866.112   | -202.642  | -376.986  | -477.771  | 222.024   | 457.398  |
| 14    | 582.912   | -217.720  | -426.766  | -172.006  | 234.377   | 508.818  |
| 15    | 274.009   | -230.264  | -482.425  | 144.314   | 241.808   | 558.879  |
| 16    | 10.421    | -236.128  | -536.549  | 422.362   | 247.765   | 618.035  |
| 17    | -387.751  | -246.600  | -600.518  | 795.206   | 258.132   | 686.700  |
| 18    | -723.248  | -255.784  | -672.423  | 289.102   | 401.600   | 759.545  |
| 19    | -256.240  | -400.570  | -749.545  | 1431.466  | 1008.477  | 837.644  |
| 20    | -1417.695 | -1008.089 | -831.816  | 3779.751  | 1577.183  | 785.578  |
| 21    | -1992.861 | 1240.254  | -555.719  | 1289.945  | -678.520  | 379.916  |
| 22    | 408.469   | 624.076   | -341.893  | 1323.125  | -154.514  | 361.922  |
| 23    | 317.519   | 98.095    | -324.680  | 873.327   | -142.003  | 349.589  |
| 24    | 661.306   | 84.999    | -310.472  | 408.584   | -98.362   | 342.560  |
| 25    | 975.414   | 42.453    | -297.372  | -61.581   | -46.785   | 345.357  |
| 26    | 1233.718  | -8.443    | -290.826  | -343.127  | -24.059   | 348.074  |
| 27    | 1367.952  | -26.178   | -277.664  | -683.179  | 0.683     | 359.591  |
| 28    | 903.850   | 22.640    | -289.803  | -982.675  | 27.858    | 377.659  |
| 29    | 1219.635  | -6.701    | -312.778  | -1264.852 | 60.326    | 407.982  |
| 30    | 1511.185  | -41.288   | -347.951  | -1416.090 | 92.201    | 438.533  |
| 31    | 1665.833  | -75.091   | -384.946  | -1469.496 | 124.885   | 476.636  |
| 32    | 1697.467  | -111.240  | -426.690  | -1437.550 | 159.844   | 520.508  |
| 33    | 1671.776  | -147.085  | -476.967  | -1270.656 | 194.986   | 579.341  |
| 34    | 1487.578  | -184.361  | -541.196  | -1003.819 | 225.923   | 637.277  |
| 35    | 1154.931  | -219.098  | -604.003  | -602.324  | 257.059   | 700.805  |
| 36    | 718.885   | -252.354  | -672.915  | -140.588  | 289.329   | 773.394  |
| 37    | 279.734   | -284.044  | -751.087  | 370.005   | 318.326   | 857.634  |
| 38    | -285.478  | -315.321  | -841.091  | 13.632    | 355.365   | 941.314  |
| 39    | 46.213    | -353.393  | -929.451  | 1191.338  | 955.866   | 1031.019 |
| 40    | -1175.447 | -955.420  | -1024.541 | 4045.488  | 1683.457  | 981.170  |
| 41    | -2102.886 | 1257.834  | -557.126  | 1673.533  | -644.539  | 388.458  |
| 42    | 166.865   | 585.783   | -339.355  | 1925.079  | -81.956   | 370.580  |
| 43    | -156.303  | 21.398    | -322.424  | 1618.455  | -82.467   | 358.153  |
| 44    | 30.193    | 21.565    | -308.329  | 1259.054  | -52.624   | 351.432  |
| 45    | 225.194   | -7.082    | -295.101  | 882.708   | -70.168   | 354.040  |
| 46    | 852.240   | 11.477    | -288.703  | 73.421    | -46.029   | 357.007  |
| 47    | 127.572   | 71.300    | -281.960  | -321.420  | -20.737   | 368.883  |
| 48    | 544.425   | 43.994    | -298.970  | -671.831  | 7.055     | 386.766  |
| 49    | 910.971   | 13.863    | -322.007  | -1002.047 | 40.335    | 417.243  |
| 50    | 1250.464  | -21.178   | -357.986  | -1197.901 | 72.537    | 448.481  |
| 51    | 1448.052  | -55.862   | -393.937  | -1291.626 | 106.024   | 485.583  |
| 52    | 1537.970  | -91.233   | -436.934  | -1319.763 | 140.042   | 530.837  |
| 53    | 1535.834  | -128.556  | -486.789  | -1173.135 | 176.497   | 588.915  |
| 54    | 1387.248  | -166.205  | -550.379  | -941.375  | 207.729   | 646.458  |

COMBINACION 46 1.35 (G1 + G2) + 1.5 (SCTMIN-IPF) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| 55    | 1089.205  | -201.206  | -613.400  | -575.088  | 239.010   | 710.407  |
| 56    | 740.706   | -232.221  | -682.814  | -206.946  | 269.033   | 783.294  |
| 57    | 297.654   | -265.589  | -761.017  | 310.722   | 299.869   | 867.473  |
| 58    | -213.840  | -296.463  | -850.524  | -99.881   | 336.796   | 950.822  |
| 59    | 153.093   | -335.120  | -938.894  | 1044.570  | 937.704   | 1040.483 |
| 60    | -1028.024 | -937.215  | -1033.901 | 3857.766  | 1664.738  | 989.861  |
| 61    | -1928.105 | 1252.271  | -556.391  | 1401.591  | -635.939  | 388.083  |
| 62    | 331.618   | 580.729   | -338.493  | 1673.708  | -73.246   | 370.418  |
| 63    | -0.342    | 16.109    | -321.489  | 1386.635  | -73.322   | 357.916  |
| 64    | 174.027   | 15.754    | -307.333  | 1057.670  | -43.557   | 351.089  |
| 65    | 355.248   | -13.109   | -294.074  | 701.958   | -61.045   | 353.650  |
| 66    | 968.082   | 5.458     | -289.089  | -72.756   | -37.662   | 357.864  |
| 67    | 235.631   | 64.562    | -282.658  | -414.615  | -14.099   | 369.589  |
| 68    | 637.951   | 37.377    | -299.792  | -750.960  | 13.608    | 387.654  |
| 69    | 990.097   | 7.375     | -322.962  | -1067.599 | 46.665    | 418.104  |
| 70    | 1315.803  | -27.690   | -358.632  | -1249.815 | 78.954    | 449.007  |
| 71    | 1497.366  | -62.332   | -394.398  | -1327.564 | 112.421   | 485.975  |
| 72    | 1573.863  | -97.746   | -437.275  | -1342.083 | 146.520   | 531.198  |
| 73    | 1567.749  | -134.408  | -487.461  | -1192.588 | 182.407   | 589.602  |
| 74    | 1386.949  | -173.058  | -550.898  | -926.399  | 214.601   | 646.936  |
| 75    | 1146.422  | -204.826  | -614.026  | -624.895  | 242.630   | 710.954  |
| 76    | 708.143   | -239.265  | -683.274  | -158.223  | 276.196   | 783.715  |
| 77    | 280.102   | -271.594  | -761.460  | 341.355   | 305.750   | 867.882  |
| 78    | -239.222  | -302.210  | -850.856  | -61.869   | 342.458   | 951.196  |
| 79    | 115.362   | -340.720  | -939.239  | 1094.197  | 943.250   | 1040.819 |
| 80    | -1077.410 | -942.737  | -1034.288 | 3919.166  | 1670.353  | 990.271  |
| 81    | -1993.036 | 1255.747  | -558.106  | 1420.896  | -637.513  | 390.079  |
| 82    | 273.787   | 584.052   | -340.301  | 1690.357  | -74.854   | 372.082  |
| 83    | -51.665   | 19.463    | -323.332  | 1399.688  | -75.087   | 359.573  |
| 84    | 129.466   | 19.366    | -309.259  | 1077.097  | -45.825   | 353.124  |
| 85    | 319.701   | -9.446    | -295.912  | 702.951   | -62.721   | 355.498  |
| 86    | 940.151   | 9.102     | -288.093  | -8.554    | -42.416   | 357.155  |
| 87    | 209.855   | 67.552    | -282.069  | -395.277  | -17.047   | 368.987  |
| 88    | 606.718   | 40.840    | -298.933  | -727.220  | 10.173    | 386.745  |
| 89    | 963.027   | 11.215    | -321.780  | -1048.404 | 42.901    | 416.897  |
| 90    | 1296.815  | -24.087   | -357.551  | -1238.356 | 75.359    | 448.149  |
| 91    | 1489.350  | -58.575   | -394.170  | -1327.355 | 108.661   | 485.772  |
| 92    | 1574.059  | -93.820   | -436.047  | -1350.587 | 142.607   | 529.867  |
| 93    | 1585.574  | -129.975  | -486.769  | -1220.365 | 177.876   | 589.162  |
| 94    | 1437.990  | -167.252  | -550.395  | -990.526  | 208.709   | 646.455  |
| 95    | 1147.295  | -201.748  | -613.308  | -632.148  | 239.623   | 710.210  |
| 96    | 780.948   | -233.612  | -682.485  | -244.479  | 270.447   | 782.934  |
| 97    | 372.594   | -265.621  | -760.632  | 235.501   | 299.903   | 867.108  |
| 98    | -143.169  | -296.653  | -850.283  | -170.109  | 337.128   | 950.577  |
| 99    | 229.271   | -335.235  | -938.751  | 947.549   | 919.423   | 1040.338 |
| 100   | -930.495  | -918.938  | -1033.935 | 3698.205  | 1628.067  | 989.966  |
| 101   | -1821.868 | 1210.778  | -556.540  | 1323.610  | -610.862  | 388.552  |
| 102   | 364.954   | 557.561   | -338.808  | 1627.927  | -66.351   | 370.236  |
| 103   | 1.515     | 11.227    | -321.905  | 1356.418  | -66.454   | 358.137  |
| 104   | 164.902   | 10.979    | -307.740  | 1038.798  | -36.549   | 351.393  |
| 105   | 335.459   | -17.875   | -294.465  | 698.390   | -54.026   | 354.003  |
| 106   | 936.681   | 0.721     | -288.007  | 6.754     | -33.750   | 356.901  |
| 107   | 194.139   | 58.880    | -281.752  | -360.956  | -8.466    | 368.653  |
| 108   | 567.468   | 32.616    | -298.681  | -670.467  | 18.394    | 386.522  |
| 109   | 908.317   | 2.805     | -322.073  | -975.885  | 51.341    | 417.220  |

COMBINACION 46 1.35 (G1 + G2) + 1.5 (SCTMIN-IPF) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1   | Momento2  | Cortante2 | Torsor2  |
|-------|-----------|-----------|-----------|-----------|-----------|----------|
| ===== |           |           |           |           |           |          |
| 110   | 1219.141  | -32.228   | -357.408  | -1143.488 | 83.559    | 447.956  |
| 111   | 1394.491  | -66.641   | -393.958  | -1215.283 | 116.837   | 485.629  |
| 112   | 1461.612  | -102.082  | -436.306  | -1220.161 | 150.963   | 530.203  |
| 113   | 1455.163  | -138.299  | -486.768  | -1071.237 | 186.363   | 589.059  |
| 114   | 1288.703  | -175.887  | -550.368  | -821.712  | 217.460   | 646.358  |
| 115   | 1015.803  | -208.777  | -613.242  | -484.236  | 246.703   | 710.165  |
| 116   | 649.616   | -239.940  | -682.526  | -97.917   | 276.731   | 782.967  |
| 117   | 230.397   | -271.693  | -760.734  | 391.740   | 305.682   | 867.219  |
| 118   | -294.747  | -302.346  | -850.433  | -6.820    | 342.197   | 950.751  |
| 119   | 66.390    | -340.256  | -938.818  | 1141.259  | 1552.799  | 1040.315 |
| 120   | -1120.997 | -1552.178 | -1033.292 | 3961.412  | 1669.982  | 989.318  |
| 121   | -2184.028 | 1276.604  | -553.718  | 1560.985  | -658.303  | 385.927  |
| 122   | 129.301   | 604.574   | -335.979  | 1780.823  | -95.689   | 367.639  |
| 123   | -150.711  | 40.128    | -319.165  | 1448.551  | -96.196   | 355.566  |
| 124   | 78.168    | 40.094    | -304.993  | 1058.641  | -66.050   | 348.514  |
| 125   | 314.009   | 11.134    | -291.819  | 659.422   | -82.908   | 351.376  |
| 126   | 975.548   | 28.977    | -285.189  | -95.266   | -62.363   | 354.275  |
| 127   | 295.927   | 87.451    | -279.237  | -523.927  | -37.047   | 366.088  |
| 128   | 723.282   | 61.324    | -295.903  | -887.362  | -10.382   | 383.730  |
| 129   | 1125.282  | 31.392    | -319.209  | -1253.044 | 22.588    | 414.442  |
| 130   | 1497.975  | -3.593    | -354.976  | -1482.869 | 54.571    | 445.418  |
| 131   | 1732.043  | -37.769   | -390.542  | -1614.196 | 87.575    | 482.176  |
| 132   | 1858.517  | -72.983   | -433.591  | -1679.829 | 121.344   | 527.517  |
| 133   | 1912.504  | -108.906  | -483.674  | -1593.583 | 156.426   | 585.867  |
| 134   | 1808.730  | -145.944  | -547.269  | -1408.844 | 187.122   | 643.400  |
| 135   | 1600.397  | -178.645  | -610.232  | -1138.263 | 216.288   | 707.076  |
| 136   | 1301.337  | -209.609  | -678.969  | -819.588  | 246.540   | 779.420  |
| 137   | 949.773   | -241.687  | -757.152  | -396.329  | 276.475   | 863.643  |
| 138   | 491.392   | -273.143  | -846.650  | -855.750  | 314.987   | 946.958  |
| 139   | 913.646   | -313.064  | -934.880  | 238.338   | 1525.136  | 1036.405 |
| 140   | -218.450  | -1524.567 | -1029.375 | 2865.042  | 1642.149  | 986.717  |
| 141   | -1034.830 | 1158.688  | -474.613  | 1160.159  | -1180.884 | 319.608  |
| 142   | 550.417   | 1129.197  | -260.939  | 1608.452  | -557.333  | 306.301  |
| 143   | 100.807   | 502.908   | -248.410  | 1707.225  | 102.718   | 297.023  |
| 144   | -45.323   | -158.734  | -244.616  | 1643.959  | 306.520   | 294.564  |
| 145   | -42.350   | -363.730  | -241.540  | 1555.298  | 194.845   | 292.301  |
| 146   | 32.747    | -169.895  | -227.029  | 451.776   | 210.183   | 297.611  |
| 147   | -309.143  | -188.205  | -237.525  | 546.456   | 164.039   | 309.173  |
| 148   | -428.277  | -141.446  | -253.366  | 563.930   | 116.639   | 326.117  |
| 149   | -405.876  | -96.518   | -274.426  | 461.919   | 72.359    | 348.493  |
| 150   | -272.573  | -54.682   | -300.642  | 322.146   | 28.330    | 368.926  |
| 151   | -134.297  | -11.542   | -325.296  | 29.196    | -10.075   | 401.129  |
| 152   | 171.311   | 24.782    | -361.571  | -257.124  | 63.137    | 438.927  |
| 153   | 455.824   | -50.041   | -403.369  | -401.131  | 138.883   | 482.281  |
| 154   | 592.708   | -127.592  | -450.815  | -390.143  | 217.381   | 531.031  |
| 155   | 569.168   | -207.685  | -503.612  | -175.767  | 294.308   | 574.975  |
| 156   | 336.118   | -286.223  | -551.735  | 177.783   | 377.463   | 634.450  |
| 157   | -42.494   | -371.309  | -615.009  | 724.672   | 463.233   | 699.271  |
| 158   | -619.766  | -458.722  | -684.681  | 1476.292  | 551.403   | 769.827  |
| 159   | -1408.493 | -548.647  | -759.578  | 2445.974  | 641.797   | 845.458  |
| 160   | -2421.606 | -640.930  | -839.773  | 3682.578  | 764.499   | 914.256  |

## COMBINACION 47 1.35 (G1 + G2) + 1.5 (SCTMAX-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|-----------|-----------|----------|
| 1     | -3117.837  | 1506.035  | 654.309 | 698.452   | -1315.715 | -637.808 |
| 2     | -748.210   | 1317.554  | 638.241 | -1310.914 | -1138.301 | -586.327 |
| 3     | 1171.578   | 1143.859  | 587.048 | -2840.440 | -967.719  | -540.520 |
| 4     | 2624.477   | 976.898   | 541.866 | -3926.383 | -804.246  | -496.437 |
| 5     | 3647.035   | 817.088   | 497.679 | -4794.763 | -655.543  | -459.493 |
| 6     | 4464.827   | 671.986   | 462.023 | -5130.891 | -521.722  | -444.665 |
| 7     | 4762.424   | 541.619   | 446.324 | -5133.642 | -377.991  | -402.293 |
| 8     | 4738.975   | 401.517   | 406.409 | -4851.916 | -242.459  | -367.227 |
| 9     | 4442.322   | 269.329   | 367.728 | -4369.545 | -117.421  | -332.437 |
| 10    | 3956.314   | 147.511   | 336.981 | -3699.002 | -66.659   | -307.046 |
| 11    | 3292.117   | 100.185   | 308.981 | -1624.136 | -53.387   | -307.479 |
| 12    | 2756.040   | 72.692    | 311.526 | -966.919  | -35.458   | -285.592 |
| 13    | 1253.527   | 47.340    | 292.500 | -299.697  | -24.609   | -269.431 |
| 14    | 605.067    | 35.789    | 277.652 | 344.370   | -19.981   | -258.781 |
| 15    | 22.565     | 32.910    | 267.892 | 930.403   | -21.637   | -253.667 |
| 16    | 289.134    | 65.026    | 266.367 | 1169.365  | -36.541   | -266.123 |
| 17    | -730.294   | 50.084    | 276.814 | 1598.596  | -46.414   | -268.777 |
| 18    | -954.962   | 65.739    | 280.176 | 996.159   | 72.484    | -281.050 |
| 19    | -183.142   | -49.075   | 290.247 | 1625.890  | 643.466   | -294.418 |
| 20    | -858.333   | -622.715  | 304.708 | 4091.810  | 856.264   | -825.073 |
| 21    | -11242.371 | 2516.722  | 578.230 | 6627.820  | -2010.164 | -742.208 |
| 22    | -6668.336  | 2011.438  | 740.989 | 4063.179  | -1360.035 | -687.906 |
| 23    | -4181.933  | 1363.858  | 686.598 | 1476.440  | -1226.620 | -638.927 |
| 24    | -1671.733  | 1233.449  | 640.035 | -680.240  | -1051.475 | -570.104 |
| 25    | 411.928    | 1061.619  | 571.581 | -2227.393 | -884.524  | -530.910 |
| 26    | 1814.666   | 898.195   | 535.972 | -3356.118 | -762.967  | -506.295 |
| 27    | 2961.930   | 780.482   | 509.011 | -4193.341 | -647.753  | -482.096 |
| 28    | 3750.460   | 669.325   | 484.206 | -4683.659 | -522.018  | -429.767 |
| 29    | 4204.087   | 547.718   | 432.993 | -4623.811 | -415.645  | -406.557 |
| 30    | 4120.294   | 445.703   | 410.644 | -4491.674 | -322.521  | -385.740 |
| 31    | 3978.197   | 357.066   | 387.760 | -4158.399 | -241.236  | -368.525 |
| 32    | 3649.116   | 280.069   | 373.869 | -2441.095 | -169.291  | -336.430 |
| 33    | 1950.170   | 212.566   | 339.595 | -1937.488 | -121.862  | -328.587 |
| 34    | 1478.735   | 169.351   | 332.070 | -1393.653 | -84.783   | -325.276 |
| 35    | 979.933    | 136.643   | 329.961 | -867.939  | -58.155   | -327.022 |
| 36    | 512.468    | 113.973   | 331.766 | -322.818  | -36.747   | -321.214 |
| 37    | 784.202    | 125.315   | 327.541 | -1.144    | -29.979   | -332.866 |
| 38    | -212.761   | 93.414    | 338.327 | -784.723  | -20.272   | -350.014 |
| 39    | 651.868    | 86.967    | 354.281 | -263.638  | 546.963   | -369.796 |
| 40    | 215.246    | -477.210  | 376.122 | 4134.557  | 965.064   | -901.057 |
| 41    | -12145.150 | 2557.482  | 583.655 | 7597.899  | -1994.095 | -747.095 |
| 42    | -7639.486  | 1995.356  | 745.524 | 5221.763  | -1305.739 | -692.489 |
| 43    | -5343.413  | 1309.690  | 691.691 | 2749.115  | -1185.862 | -644.206 |
| 44    | -2948.531  | 1192.856  | 644.474 | 669.984   | -1025.006 | -574.696 |
| 45    | -943.145   | 1035.272  | 576.194 | -808.182  | -927.918  | -535.655 |
| 46    | 867.440    | 941.851   | 540.054 | -2495.647 | -805.656  | -510.155 |
| 47    | 2096.350   | 823.464   | 512.173 | -3421.120 | -690.513  | -485.343 |
| 48    | 2973.147   | 712.404   | 487.854 | -3998.040 | -564.823  | -433.708 |
| 49    | 3513.911   | 590.583   | 436.669 | -4022.679 | -458.323  | -409.580 |
| 50    | 3515.131   | 488.765   | 412.294 | -3976.769 | -365.399  | -387.926 |
| 51    | 3459.725   | 399.942   | 391.972 | -3730.459 | -283.975  | -372.701 |
| 52    | 3218.459   | 323.080   | 375.732 | -2066.875 | -216.462  | -338.506 |
| 53    | 1573.701   | 259.866   | 342.895 | -1662.999 | -169.305  | -331.896 |
| 54    | 1202.908   | 216.942   | 335.882 | -1221.561 | -132.559  | -329.020 |

## COMBINACION 47 1.35 (G1 + G2) + 1.5 (SCTMAX-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|-----------|-----------|----------|
| 55    | 807.209    | 184.556   | 333.008 | -801.133  | -106.380  | -330.285 |
| 56    | 444.270    | 162.382   | 334.241 | -362.794  | -85.418   | -323.629 |
| 57    | 829.836    | 174.111   | 330.882 | -152.845  | -78.936   | -336.524 |
| 58    | -61.268    | 142.426   | 340.953 | -1046.113 | -69.027   | -352.885 |
| 59    | 913.652    | 135.764   | 358.581 | -633.846  | 498.265   | -373.669 |
| 60    | 585.746    | -428.458  | 380.223 | 3954.123  | 947.190   | -904.673 |
| 61    | -12263.580 | 2560.412  | 586.715 | 7636.873  | -1994.863 | -750.201 |
| 62    | -7678.513  | 1996.137  | 747.045 | 5257.365  | -1306.293 | -693.761 |
| 63    | -5379.284  | 1310.278  | 692.919 | 2784.658  | -1185.994 | -645.409 |
| 64    | -2984.498  | 1192.948  | 645.649 | 707.222   | -1024.850 | -575.824 |
| 65    | -980.827   | 1035.099  | 577.292 | -768.583  | -927.665  | -536.494 |
| 66    | 827.332    | 941.613   | 539.703 | -2454.338 | -805.316  | -509.917 |
| 67    | 2054.417   | 823.031   | 512.160 | -3377.996 | -690.190  | -485.227 |
| 68    | 2929.693   | 712.099   | 487.435 | -3954.460 | -564.625  | -432.948 |
| 69    | 3469.811   | 590.591   | 435.884 | -3978.846 | -458.641  | -409.221 |
| 70    | 3471.173   | 488.993   | 412.449 | -3934.252 | -365.784  | -388.421 |
| 71    | 3417.168   | 400.538   | 392.361 | -3690.272 | -284.679  | -373.069 |
| 72    | 3178.147   | 323.718   | 376.018 | -2027.748 | -217.372  | -338.488 |
| 73    | 1534.772   | 260.834   | 342.309 | -1627.180 | -170.217  | -331.330 |
| 74    | 1167.052   | 217.911   | 335.661 | -1188.674 | -133.498  | -328.841 |
| 75    | 774.295    | 185.407   | 332.434 | -770.595  | -107.235  | -329.732 |
| 76    | 414.096    | 163.241   | 334.116 | -334.634  | -86.147   | -323.388 |
| 77    | 798.643    | 174.741   | 330.569 | -125.566  | -79.798   | -336.200 |
| 78    | -88.444    | 143.185   | 340.353 | -1021.186 | -69.851   | -352.243 |
| 79    | 889.061    | 136.705   | 358.576 | -611.934  | 497.282   | -373.467 |
| 80    | 563.916    | -427.460  | 379.955 | 4020.992  | 952.797   | -904.384 |
| 81    | -12420.540 | 2565.394  | 583.574 | 7754.650  | -1998.308 | -747.160 |
| 82    | -7796.370  | 1999.605  | 745.569 | 5367.255  | -1309.782 | -692.595 |
| 83    | -5489.245  | 1313.755  | 692.062 | 2887.487  | -1189.700 | -644.642 |
| 84    | -3087.139  | 1196.680  | 643.716 | 801.277   | -1028.703 | -573.780 |
| 85    | -1074.842  | 1039.023  | 575.814 | -684.192  | -931.605  | -535.321 |
| 86    | 742.847    | 945.551   | 540.743 | -2378.213 | -809.316  | -510.308 |
| 87    | 1978.346   | 827.042   | 512.262 | -3310.950 | -694.173  | -485.397 |
| 88    | 2862.814   | 716.020   | 488.315 | -3895.857 | -568.531  | -434.844 |
| 89    | 3411.691   | 594.595   | 438.065 | -3929.146 | -462.518  | -411.166 |
| 90    | 3421.352   | 492.673   | 413.761 | -3892.258 | -369.405  | -388.661 |
| 91    | 3375.409   | 404.077   | 391.594 | -3655.808 | -288.214  | -372.666 |
| 92    | 3144.440   | 327.382   | 377.377 | -2002.383 | -221.083  | -339.828 |
| 93    | 1509.099   | 264.595   | 342.444 | -1609.886 | -174.068  | -331.417 |
| 94    | 1150.148   | 221.789   | 335.947 | -1180.217 | -137.467  | -328.982 |
| 95    | 765.937    | 189.426   | 333.105 | -771.240  | -111.140  | -330.345 |
| 96    | 414.268    | 167.059   | 334.607 | -343.645  | -90.082   | -323.996 |
| 97    | 784.496    | 177.178   | 330.955 | -142.689  | -83.513   | -336.377 |
| 98    | -71.173    | 146.992   | 341.265 | -1046.817 | -73.413   | -353.218 |
| 99    | 914.212    | 140.191   | 357.930 | -664.992  | 475.440   | -373.049 |
| 100   | 617.302    | -405.588  | 380.318 | 3852.045  | 912.679   | -904.579 |
| 101   | -12196.684 | 2513.191  | 583.596 | 7623.153  | -1964.683 | -747.591 |
| 102   | -7664.975  | 1965.972  | 748.065 | 5290.967  | -1294.479 | -695.325 |
| 103   | -5412.835  | 1298.451  | 693.229 | 2845.690  | -1174.317 | -645.633 |
| 104   | -3045.401  | 1181.285  | 645.635 | 793.465   | -1013.271 | -575.844 |
| 105   | -1067.051  | 1023.573  | 577.371 | -657.543  | -916.199  | -536.804 |
| 106   | 716.186    | 930.181   | 541.094 | -2318.424 | -794.042  | -511.074 |
| 107   | 1918.508   | 811.727   | 513.143 | -3216.958 | -678.936  | -486.312 |
| 108   | 2768.875   | 700.844   | 488.795 | -3769.354 | -553.375  | -434.287 |
| 109   | 3284.774   | 579.436   | 436.715 | -3770.070 | -447.415  | -410.133 |

COMBINACION 47 1.35 (G1 + G2) + 1.5 (SCTMAX-EC1) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1   | Cortante1 | Torsor1 | Momento2  | Cortante2 | Torsor2  |
|-------|------------|-----------|---------|-----------|-----------|----------|
| ===== |            |           |         |           |           |          |
| 110   | 3263.196   | 477.539   | 413.842 | -3701.718 | -354.310  | -389.306 |
| 111   | 3184.982   | 389.069   | 392.206 | -3433.071 | -273.093  | -372.968 |
| 112   | 2921.325   | 312.208   | 377.045 | -1746.591 | -205.922  | -339.670 |
| 113   | 1253.961   | 249.457   | 342.902 | -1320.991 | -158.835  | -331.868 |
| 114   | 861.188    | 206.520   | 336.178 | -857.002  | -122.132  | -329.241 |
| 115   | 443.215    | 174.113   | 333.220 | -413.531  | -95.789   | -330.430 |
| 116   | 56.957     | 151.833   | 334.506 | 49.209    | -74.886   | -324.072 |
| 117   | 324.493    | 159.196   | 330.235 | 285.158   | -68.605   | -336.223 |
| 118   | -498.577   | 132.044   | 341.055 | -585.070  | -59.057   | -352.544 |
| 119   | 452.966    | 125.918   | 358.557 | -150.096  | 1118.166  | -373.887 |
| 120   | 102.389    | -1048.359 | 379.086 | 4206.513  | 957.886   | -904.298 |
| 121   | -12334.360 | 2555.873  | 578.293 | 7678.378  | -1987.063 | -747.608 |
| 122   | -7720.293  | 1988.350  | 748.003 | 5321.002  | -1299.284 | -694.846 |
| 123   | -5442.778  | 1303.282  | 692.741 | 2866.254  | -1180.001 | -644.723 |
| 124   | -13066.232 | 1187.071  | 645.878 | 802.473   | -1019.817 | -575.790 |
| 125   | -1076.086  | 1030.155  | 576.632 | -664.656  | -923.448  | -535.482 |
| 126   | 719.157    | 937.635   | 539.699 | -2340.412 | -802.535  | -508.780 |
| 127   | 1940.968   | 820.429   | 510.769 | -3263.211 | -688.993  | -483.501 |
| 128   | 2816.329   | 710.958   | 486.306 | -3847.725 | -565.000  | -431.550 |
| 129   | 3364.763   | 591.229   | 433.968 | -3898.226 | -461.802  | -406.042 |
| 130   | 3393.373   | 492.296   | 409.173 | -3884.137 | -371.197  | -384.515 |
| 131   | 3370.596   | 406.137   | 388.489 | -2639.435 | -279.300  | -340.368 |
| 132   | 2131.047   | 318.708   | 343.216 | -2196.480 | -235.262  | -315.037 |
| 133   | 1707.608   | 277.131   | 322.283 | -1847.661 | -189.125  | -315.217 |
| 134   | 1392.824   | 237.148   | 319.182 | -1456.596 | -153.044  | -315.624 |
| 135   | 1048.024   | 205.269   | 319.650 | -961.697  | -122.001  | -304.850 |
| 136   | 779.492    | 184.306   | 318.945 | -669.578  | -105.024  | -314.280 |
| 137   | 577.047    | 171.505   | 325.559 | -485.689  | -97.329   | -327.252 |
| 138   | 277.719    | 161.007   | 332.096 | -1398.770 | -85.197   | -344.396 |
| 139   | 1271.060   | 152.191   | 349.853 | -962.993  | 1093.177  | -361.457 |
| 140   | 918.317    | -1023.296 | 367.322 | 2463.832  | 963.746   | -765.558 |
| 141   | -10128.488 | 2365.042  | 479.885 | 8543.976  | -2517.746 | -618.816 |
| 142   | -8571.485  | 2518.550  | 617.059 | 6892.372  | -1786.054 | -563.479 |
| 143   | -6974.612  | 1788.584  | 566.019 | 5162.572  | -1017.471 | -512.999 |
| 144   | -5296.960  | 1021.810  | 510.792 | 3472.568  | -702.620  | -458.150 |
| 145   | -3659.313  | 709.177   | 459.450 | 1990.722  | -735.655  | -444.048 |
| 146   | -710.839   | 744.349   | 446.035 | -249.017  | -610.532  | -374.195 |
| 147   | -32.506    | 621.716   | 375.786 | -1420.571 | -472.644  | -305.613 |
| 148   | 981.533    | 491.502   | 327.616 | -1432.697 | -446.565  | -283.130 |
| 149   | 948.923    | 468.929   | 307.998 | -1666.312 | -430.336  | -268.210 |
| 150   | 1141.402   | 456.713   | 295.943 | -1808.423 | -422.327  | -250.793 |
| 151   | 1272.162   | 452.073   | 281.569 | -1896.818 | -408.340  | -237.309 |
| 152   | 1332.344   | 443.198   | 270.760 | -677.941  | -288.096  | -227.531 |
| 153   | 111.753    | 327.435   | 263.716 | -519.400  | -188.516  | -218.362 |
| 154   | -33.309    | 232.337   | 257.606 | -239.090  | -95.486   | -216.237 |
| 155   | -284.842   | 143.990   | 258.151 | 229.020   | -4.346    | -212.152 |
| 156   | -708.463   | 57.698    | 256.574 | 819.332   | 82.324    | -210.310 |
| 157   | -1238.335  | -24.153   | 258.533 | 1883.215  | 159.912   | -215.082 |
| 158   | -1991.294  | -107.519  | 239.480 | 2429.068  | 227.467   | -241.516 |
| 159   | -2540.821  | -174.801  | 256.068 | 3023.278  | 291.315   | -267.929 |
| 160   | -3101.677  | -237.109  | 275.206 | 3682.478  | 386.752   | -294.105 |

COMBINACION 48 1.35 (G1 + G2) + 1.5 (SCTMIN-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Moment01  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====   |
| 1     | -3117.774 | 505.008   | -291.436 | 2356.750  | -405.761  | 279.314 |
| 2     | -2375.368 | 403.871   | -268.940 | 1589.137  | -340.836  | 266.601 |
| 3     | -1617.761 | 339.340   | -256.247 | 880.843   | -273.084  | 263.612 |
| 4     | -915.348  | 271.890   | -249.181 | 255.329   | -203.131  | 260.575 |
| 5     | -283.879  | 201.630   | -247.731 | -199.794  | -134.702  | 255.255 |
| 6     | 122.490   | 135.607   | -236.827 | -585.374  | -62.821   | 258.147 |
| 7     | 552.660   | 61.384    | -244.569 | -886.375  | 14.337    | 264.584 |
| 8     | 874.441   | -15.070   | -258.292 | -1086.041 | 93.396    | 283.926 |
| 9     | 1073.965  | -94.208   | -278.128 | -1150.602 | 175.077   | 309.461 |
| 10    | 1137.573  | -175.918  | -304.215 | -1097.282 | 181.708   | 312.621 |
| 11    | 1085.478  | -182.371  | -307.718 | -834.594  | 194.597   | 347.195 |
| 12    | 823.373   | -195.333  | -342.898 | -686.967  | 209.410   | 388.274 |
| 13    | 676.556   | -209.600  | -384.370 | -493.599  | 222.983   | 435.584 |
| 14    | 483.998   | -223.531  | -432.424 | -260.555  | 235.853   | 489.256 |
| 15    | 252.341   | -236.136  | -486.545 | 3.346     | 235.778   | 514.385 |
| 16    | -10.213   | -236.075  | -511.513 | 373.024   | 238.625   | 559.071 |
| 17    | -378.928  | -238.836  | -558.052 | 654.489   | 244.436   | 614.470 |
| 18    | -658.063  | -244.571  | -612.612 | 96.446    | 383.028   | 670.124 |
| 19    | -99.225   | -383.111  | -668.892 | 1142.776  | 983.134   | 734.091 |
| 20    | -1143.757 | -983.158  | -733.472 | 2999.821  | 1462.010  | 539.255 |
| 21    | -3405.802 | 1135.423  | -824.594 | 997.457   | -668.775  | 374.477 |
| 22    | -998.690  | 666.756   | -362.633 | 1019.539  | -143.693  | 354.314 |
| 23    | -1023.357 | 141.741   | -343.085 | 581.536   | -130.698  | 338.197 |
| 24    | -587.611  | 128.836   | -327.667 | 149.598   | -87.337   | 326.615 |
| 25    | -157.887  | 85.598    | -316.698 | -353.817  | -33.384   | 334.355 |
| 26    | 266.250   | 31.673    | -321.784 | -576.446  | -11.957   | 331.609 |
| 27    | 564.552   | 10.390    | -322.592 | -845.637  | 10.596    | 336.573 |
| 28    | 832.348   | -11.987   | -328.553 | -1066.723 | 34.697    | 346.951 |
| 29    | 1052.546  | -36.033   | -339.299 | -1375.020 | 69.353    | 386.767 |
| 30    | 1360.140  | -70.524   | -379.618 | -1449.494 | 96.999    | 409.039 |
| 31    | 1434.635  | -97.907   | -402.927 | -1437.951 | 125.212   | 436.634 |
| 32    | 1422.322  | -126.139  | -430.790 | -1486.630 | 155.132   | 471.909 |
| 33    | 1472.473  | -155.896  | -466.879 | -1279.245 | 194.451   | 535.325 |
| 34    | 1266.125  | -195.185  | -530.965 | -985.037  | 220.818   | 571.494 |
| 35    | 973.277   | -221.250  | -567.960 | -616.922  | 245.070   | 608.429 |
| 36    | 606.905   | -245.552  | -605.534 | -284.964  | 275.041   | 656.532 |
| 37    | 277.014   | -275.345  | -653.806 | 228.519   | 307.982   | 733.111 |
| 38    | -234.727  | -308.144  | -731.748 | -156.034  | 339.493   | 787.871 |
| 39    | 152.733   | -339.608  | -786.604 | 994.424   | 934.643   | 848.316 |
| 40    | -996.195  | -934.711  | -847.509 | 3173.088  | 1568.527  | 655.023 |
| 41    | -3802.701 | 1148.879  | -930.195 | 1595.276  | -641.309  | 380.127 |
| 42    | -1596.585 | 639.263   | -368.366 | 1872.765  | -79.327   | 360.059 |
| 43    | -1876.670 | 77.377    | -349.036 | 1601.751  | -80.886   | 344.247 |
| 44    | -1608.012 | 79.067    | -333.820 | 1285.628  | -52.546   | 332.861 |
| 45    | -1294.097 | 50.768    | -322.940 | 880.430   | -68.910   | 340.559 |
| 46    | -491.044  | 67.237    | -328.268 | 111.135   | -46.482   | 338.161 |
| 47    | -123.188  | 44.986    | -329.467 | -241.449  | -23.306   | 343.366 |
| 48    | 227.909   | 21.976    | -335.202 | -549.891  | 1.893     | 353.223 |
| 49    | 535.442   | -3.363    | -345.669 | -958.466  | 39.066    | 392.431 |
| 50    | 943.495   | -40.033   | -385.557 | -1120.271 | 68.654    | 414.294 |
| 51    | 1104.844  | -69.785   | -407.989 | -1184.548 | 98.986    | 441.084 |
| 52    | 1169.671  | -99.807   | -435.514 | -1307.413 | 131.171   | 476.199 |
| 53    | 1292.307  | -132.005  | -471.249 | -1157.461 | 171.910   | 538.439 |
| 54    | 1144.360  | -172.669  | -534.093 | -915.281  | 199.430   | 574.003 |

COMBINACION 48 1.35 (G1 + G2) + 1.5 (SCTMIN-EC1) + PRETD

## ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Moment01  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| ===== | =====     | =====     | =====    | =====     | =====     | =====   |
| 55    | 903.720   | -199.902  | -570.358 | -594.882  | 224.640   | 610.898 |
| 56    | 584.972   | -225.015  | -607.718 | -307.482  | 255.683   | 658.029 |
| 57    | 299.347   | -255.948  | -655.863 | 164.999   | 289.320   | 734.408 |
| 58    | -170.881  | -289.505  | -732.435 | -257.596  | 321.819   | 788.475 |
| 59    | 253.948   | -321.977  | -786.938 | 858.885   | 917.689   | 848.370 |
| 60    | -860.390  | -917.729  | -847.463 | 2991.656  | 1550.195  | 660.462 |
| 61    | -3633.246 | 1143.080  | -930.299 | 1440.969  | -636.513  | 379.359 |
| 62    | -1442.235 | 634.475   | -367.468 | 1729.123  | -74.361   | 359.376 |
| 63    | -1732.927 | 72.428    | -348.309 | 1470.984  | -75.553   | 343.517 |
| 64    | -1477.195 | 73.662    | -333.033 | 1168.597  | -46.979   | 332.048 |
| 65    | -1177.059 | 45.210    | -322.115 | 777.118   | -63.337   | 339.621 |
| 66    | -387.746  | 61.742    | -328.662 | 20.644    | -41.006   | 338.607 |
| 67    | -32.711   | 39.405    | -329.708 | -319.738  | -17.821   | 343.629 |
| 68    | 306.298   | 16.511    | -335.574 | -616.650  | 7.307     | 353.646 |
| 69    | 602.139   | -8.659    | -346.069 | -1014.691 | 44.256    | 392.761 |
| 70    | 999.544   | -45.377   | -385.883 | -1165.869 | 73.917    | 414.398 |
| 71    | 1150.364  | -74.903   | -408.085 | -1219.935 | 104.087   | 441.066 |
| 72    | 1204.993  | -104.993  | -435.489 | -1332.513 | 136.347   | 476.302 |
| 73    | 1318.193  | -137.080  | -471.369 | -1172.728 | 177.070   | 538.570 |
| 74    | 1159.520  | -177.770  | -534.362 | -919.771  | 204.607   | 574.191 |
| 75    | 908.036   | -205.178  | -570.331 | -588.141  | 229.978   | 610.841 |
| 76    | 578.180   | -230.358  | -607.944 | -288.463  | 261.179   | 657.986 |
| 77    | 280.444   | -261.451  | -655.776 | 196.120   | 294.744   | 734.414 |
| 78    | -201.945  | -294.991  | -732.325 | -214.351  | 327.239   | 788.430 |
| 79    | 210.707   | -327.335  | -786.792 | 913.597   | 923.023   | 848.232 |
| 80    | -914.946  | -923.055  | -847.382 | 3054.002  | 1555.769  | 660.732 |
| 81    | -3698.456 | 1146.588  | -932.112 | 1499.258  | -639.885  | 381.133 |
| 82    | -1500.682 | 637.869   | -369.328 | 1780.952  | -77.807   | 360.953 |
| 83    | -1784.881 | 75.858    | -349.885 | 1515.189  | -79.158   | 345.306 |
| 84    | -1522.447 | 77.349    | -334.917 | 1205.533  | -50.703   | 333.973 |
| 85    | -1213.234 | 48.916    | -323.988 | 804.880   | -67.016   | 341.595 |
| 86    | -416.230  | 65.445    | -327.880 | 40.898    | -44.702   | 337.774 |
| 87    | -53.077   | 43.115    | -329.123 | -307.428  | -21.491   | 343.018 |
| 88    | 293.993   | 20.094    | -334.722 | -612.166  | 3.751     | 352.742 |
| 89    | 597.723   | -4.935    | -345.104 | -1017.943 | 40.595    | 391.642 |
| 90    | 1002.873  | -41.893   | -384.751 | -1176.332 | 70.468    | 413.720 |
| 91    | 1161.327  | -71.510   | -407.462 | -1237.954 | 100.712   | 440.424 |
| 92    | 1223.125  | -101.500  | -434.762 | -1358.061 | 132.832   | 475.233 |
| 93    | 1343.885  | -133.605  | -470.222 | -1206.189 | 173.496   | 538.083 |
| 94    | 1192.981  | -174.100  | -533.756 | -961.532  | 200.853   | 573.507 |
| 95    | 949.711   | -201.357  | -569.842 | -637.935  | 226.173   | 610.103 |
| 96    | 627.875   | -226.636  | -607.053 | -347.048  | 257.376   | 657.275 |
| 97    | 338.959   | -257.680  | -654.891 | 129.143   | 291.106   | 733.549 |
| 98    | -135.047  | -291.303  | -731.803 | -289.218  | 323.778   | 787.653 |
| 99    | 285.657   | -323.907  | -786.335 | 810.701   | 901.279   | 847.884 |
| 100   | -812.105  | -901.321  | -846.901 | 2847.228  | 1514.090  | 660.378 |
| 101   | -3527.207 | 1101.635  | -930.659 | 1407.965  | -613.419  | 379.364 |
| 102   | -1409.373 | 611.386   | -367.650 | 1727.803  | -69.595   | 359.266 |
| 103   | -1731.611 | 67.628    | -348.250 | 1480.551  | -70.830   | 343.724 |
| 104   | -1486.860 | 68.970    | -333.257 | 1188.821  | -42.262   | 332.318 |
| 105   | -1197.252 | 40.498    | -322.389 | 807.593   | -58.607   | 340.013 |
| 106   | -419.496  | 57.044    | -327.649 | 62.366    | -36.321   | 337.580 |
| 107   | -74.429   | 34.714    | -328.784 | -268.087  | -13.172   | 342.689 |
| 108   | 254.705   | 11.878    | -334.503 | -555.304  | 11.965    | 352.552 |
| 109   | 540.853   | -13.218   | -345.130 | -943.521  | 48.927    | 391.786 |



COMBINACION 48 1.35 (G1 + G2) + 1.5 (SCTMIN-EC1) + PRETD

ESFUERZOS EN EXTREMO DE BARRA

=====

| Barra | Momento1  | Cortante1 | Torsor1  | Momento2  | Cortante2 | Torsor2 |
|-------|-----------|-----------|----------|-----------|-----------|---------|
| ===== |           |           |          |           |           |         |
| 110   | 928.576   | -50.257   | -384.749 | -1084.381 | 78.872    | 413.527 |
| 111   | 1069.416  | -79.810   | -407.267 | -1128.208 | 109.136   | 440.385 |
| 112   | 1113.374  | -109.968  | -434.758 | -1229.714 | 141.477   | 475.384 |
| 113   | 1215.557  | -142.183  | -470.391 | -1058.568 | 182.244   | 537.968 |
| 114   | 1045.355  | -182.968  | -533.731 | -793.731  | 209.863   | 573.419 |
| 115   | 781.999   | -210.332  | -569.815 | -449.258  | 235.209   | 610.070 |
| 116   | 439.210   | -235.600  | -607.114 | -136.757  | 266.326   | 657.434 |
| 117   | 128.692   | -266.628  | -654.913 | 360.107   | 299.763   | 733.737 |
| 118   | -366.028  | -300.008  | -732.035 | -39.787   | 331.863   | 788.011 |
| 119   | 36.123    | -331.969  | -786.481 | 1098.131  | 1537.669  | 847.597 |
| 120   | -1099.350 | -1537.708 | -846.801 | 3138.097  | 1556.901  | 659.982 |
| 121   | -3894.383 | 1167.589  | -927.590 | 1647.800  | -660.960  | 376.753 |
| 122   | -1649.212 | 658.919   | -365.031 | 1883.011  | -99.052   | 356.669 |
| 123   | -1886.940 | 97.093    | -345.734 | 1569.199  | -100.479  | 340.989 |
| 124   | -1575.460 | 98.650    | -330.464 | 1210.668  | -71.890   | 329.531 |
| 125   | -1219.340 | 70.070    | -319.657 | 763.920   | -87.341   | 337.390 |
| 126   | -380.022  | 85.839    | -325.030 | -39.535   | -64.964   | 334.900 |
| 127   | 27.419    | 63.428    | -326.224 | -430.969  | -41.805   | 340.119 |
| 128   | 417.602   | 40.388    | -331.736 | -778.166  | -16.541   | 349.765 |
| 129   | 763.745   | 15.268    | -342.301 | -1224.867 | 20.391    | 389.082 |
| 130   | 1209.972  | -21.544   | -382.130 | -1425.216 | 49.940    | 410.755 |
| 131   | 1410.238  | -50.894   | -404.184 | -1528.918 | 79.895    | 437.195 |
| 132   | 1514.092  | -80.734   | -431.650 | -1690.561 | 111.869   | 472.566 |
| 133   | 1676.344  | -112.696  | -467.456 | -1582.281 | 152.307   | 534.906 |
| 134   | 1569.260  | -152.939  | -530.439 | -1382.493 | 179.578   | 570.390 |
| 135   | 1370.969  | -180.090  | -566.595 | -1105.463 | 204.764   | 606.794 |
| 136   | 1095.533  | -205.140  | -603.620 | -859.591  | 236.206   | 653.818 |
| 137   | 851.693   | -236.547  | -651.252 | -429.382  | 270.571   | 730.081 |
| 138   | 423.671   | -270.767  | -728.135 | -890.161  | 304.658   | 784.106 |
| 139   | 886.638   | -304.737  | -782.430 | 193.547   | 1510.036  | 843.745 |
| 140   | -194.819  | -1510.090 | -842.645 | 2016.942  | 1528.561  | 656.589 |
| 141   | -2797.351 | 1048.962  | -852.017 | 1253.593  | -1183.613 | 307.107 |
| 142   | -1254.521 | 1181.961  | -297.557 | 1705.765  | -560.336  | 292.552 |
| 143   | -1708.458 | 558.734   | -283.690 | 1815.310  | 99.183    | 283.795 |
| 144   | -1819.820 | -100.756  | -275.699 | 1737.095  | 303.270   | 281.292 |
| 145   | -1742.815 | -304.674  | -273.392 | 1707.251  | 189.221   | 269.308 |
| 146   | -200.058  | -190.637  | -260.575 | 560.534   | 205.883   | 273.918 |
| 147   | -569.090  | -207.174  | -266.988 | 651.389   | 159.563   | 285.558 |
| 148   | -661.241  | -160.692  | -279.141 | 617.453   | 114.161   | 302.938 |
| 149   | -628.290  | -115.330  | -297.134 | 483.203   | 71.275    | 326.086 |
| 150   | -494.873  | -72.457   | -320.530 | 441.645   | 21.689    | 327.629 |
| 151   | -453.493  | -22.689   | -322.823 | 123.311   | -15.878   | 359.322 |
| 152   | -135.408  | 15.021    | -355.053 | -183.489  | 58.011    | 397.047 |
| 153   | 171.568   | -58.763   | -392.982 | -350.756  | 134.902   | 440.595 |
| 154   | 339.287   | -135.667  | -436.930 | -363.921  | 214.927   | 489.608 |
| 155   | 353.233   | -215.517  | -487.121 | -70.147   | 282.544   | 505.754 |
| 156   | 60.449    | -282.939  | -503.574 | 252.921   | 367.065   | 561.169 |
| 157   | -261.090  | -367.500  | -558.339 | 771.112   | 454.581   | 616.692 |
| 158   | -777.548  | -454.818  | -615.762 | 1499.227  | 544.983   | 673.926 |
| 159   | -1503.392 | -545.083  | -673.582 | 2452.615  | 637.997   | 733.202 |
| 160   | -2454.194 | -638.097  | -733.658 | 3682.553  | 747.198   | 756.557 |

DIMENSIONAMIENTO A TORSION SEGUN NORMATIVA EHE

Angulo de la biela comprimida(sex.) = 35.00

| SECC | Td<br>(mT) | Tu1<br>(mT) | T-V  | Asl<br>(cm2/m) | Ast<br>(cm2/m) | theta | thetae |
|------|------------|-------------|------|----------------|----------------|-------|--------|
| 1    | 904.56     | 12789.03    | 0.63 | 10.69          | 5.24           | 35.00 | 26.57  |
| 2    | 837.15     | 12789.03    | 0.56 | 9.90           | 4.85           | 35.00 | 26.57  |
| 3    | 761.60     | 12789.03    | 0.51 | 9.00           | 4.41           | 35.00 | 26.57  |
| 4    | 690.40     | 12789.03    | 0.45 | 8.16           | 4.00           | 35.00 | 26.57  |
| 5    | 623.58     | 12789.03    | 0.40 | 7.37           | 3.61           | 35.00 | 26.57  |
| 6    | 566.01     | 12789.03    | 0.35 | 6.69           | 3.28           | 35.00 | 26.57  |
| 7    | 516.42     | 12789.03    | 0.29 | 6.11           | 2.99           | 35.00 | 26.57  |
| 8    | 465.13     | 12789.03    | 0.23 | 5.50           | 2.70           | 35.00 | 26.57  |
| 9    | 417.88     | 12789.03    | 0.19 | 4.94           | 2.42           | 35.00 | 26.57  |
| 10   | 376.35     | 12789.03    | 0.23 | 4.45           | 2.18           | 35.00 | 26.57  |
| 11   | 341.94     | 12789.03    | 0.25 | 4.04           | 1.98           | 35.00 | 26.57  |
| 12   | 342.90     | 12789.03    | 0.28 | 4.05           | 1.99           | 35.00 | 26.57  |
| 13   | 384.37     | 12789.03    | 0.30 | 4.54           | 2.23           | 35.00 | 26.57  |
| 14   | 432.42     | 12789.03    | 0.33 | 5.11           | 2.51           | 35.00 | 26.57  |
| 15   | 486.55     | 12789.03    | 0.35 | 5.75           | 2.82           | 35.00 | 26.57  |
| 16   | 536.55     | 12789.03    | 0.37 | 6.34           | 3.11           | 35.00 | 26.57  |
| 17   | 600.52     | 12789.03    | 0.39 | 7.10           | 3.48           | 35.00 | 26.57  |
| 18   | 672.42     | 12789.03    | 0.42 | 7.95           | 3.90           | 35.00 | 26.57  |
| 19   | 749.54     | 12238.51    | 0.50 | 9.26           | 4.54           | 35.00 | 26.57  |
| 20   | 831.82     | 12238.51    | 0.73 | 10.28          | 5.04           | 35.00 | 26.57  |
| 21   | 930.31     | 12238.51    | 0.97 | 11.49          | 5.64           | 35.00 | 26.57  |
| 22   | 1015.66    | 12238.51    | 0.78 | 12.55          | 6.15           | 35.00 | 26.57  |
| 23   | 927.59     | 12789.03    | 0.56 | 10.97          | 5.38           | 35.00 | 26.57  |
| 24   | 845.04     | 12789.03    | 0.52 | 9.99           | 4.90           | 35.00 | 26.57  |
| 25   | 760.67     | 12789.03    | 0.46 | 8.99           | 4.41           | 35.00 | 26.57  |
| 26   | 689.88     | 12789.03    | 0.41 | 8.16           | 4.00           | 35.00 | 26.57  |
| 27   | 624.68     | 12789.03    | 0.37 | 7.39           | 3.62           | 35.00 | 26.57  |
| 28   | 563.74     | 12789.03    | 0.33 | 6.66           | 3.27           | 35.00 | 26.57  |
| 29   | 502.01     | 12789.03    | 0.29 | 5.93           | 2.91           | 35.00 | 26.57  |
| 30   | 451.90     | 12789.03    | 0.25 | 5.34           | 2.62           | 35.00 | 26.57  |
| 31   | 409.33     | 12789.03    | 0.22 | 4.84           | 2.37           | 35.00 | 26.57  |
| 32   | 430.79     | 12789.03    | 0.25 | 5.09           | 2.50           | 35.00 | 26.57  |
| 33   | 476.97     | 12789.03    | 0.29 | 5.64           | 2.76           | 35.00 | 26.57  |
| 34   | 541.20     | 12789.03    | 0.33 | 6.40           | 3.14           | 35.00 | 26.57  |
| 35   | 604.00     | 12789.03    | 0.37 | 7.14           | 3.50           | 35.00 | 26.57  |
| 36   | 672.91     | 12789.03    | 0.40 | 7.96           | 3.90           | 35.00 | 26.57  |
| 37   | 751.09     | 12789.03    | 0.44 | 8.88           | 4.35           | 35.00 | 26.57  |
| 38   | 841.09     | 12789.03    | 0.47 | 9.94           | 4.88           | 35.00 | 26.57  |
| 39   | 929.45     | 12238.51    | 0.51 | 11.48          | 5.63           | 35.00 | 26.57  |
| 40   | 1024.54    | 12238.51    | 0.75 | 12.66          | 6.21           | 35.00 | 26.57  |
| 41   | 930.19     | 12238.51    | 0.99 | 11.49          | 5.63           | 35.00 | 26.57  |
| 42   | 1017.81    | 12238.51    | 0.77 | 12.57          | 6.17           | 35.00 | 26.57  |
| 43   | 929.62     | 12789.03    | 0.54 | 10.99          | 5.39           | 35.00 | 26.57  |
| 44   | 847.11     | 12789.03    | 0.50 | 10.01          | 4.91           | 35.00 | 26.57  |
| 45   | 762.85     | 12789.03    | 0.46 | 9.02           | 4.42           | 35.00 | 26.57  |
| 46   | 691.94     | 12789.03    | 0.43 | 8.18           | 4.01           | 35.00 | 26.57  |
| 47   | 626.16     | 12789.03    | 0.39 | 7.40           | 3.63           | 35.00 | 26.57  |
| 48   | 565.67     | 12789.03    | 0.35 | 6.69           | 3.28           | 35.00 | 26.57  |
| 49   | 503.92     | 12789.03    | 0.31 | 5.96           | 2.92           | 35.00 | 26.57  |
| 50   | 452.85     | 12789.03    | 0.27 | 5.35           | 2.62           | 35.00 | 26.57  |
| 51   | 411.43     | 12789.03    | 0.23 | 4.86           | 2.38           | 35.00 | 26.57  |
| 52   | 436.93     | 12789.03    | 0.26 | 5.17           | 2.53           | 35.00 | 26.57  |
| 53   | 486.79     | 12789.03    | 0.29 | 5.76           | 2.82           | 35.00 | 26.57  |
| 54   | 550.38     | 12789.03    | 0.33 | 6.51           | 3.19           | 35.00 | 26.57  |
| 55   | 613.40     | 12789.03    | 0.37 | 7.25           | 3.56           | 35.00 | 26.57  |

DIMENSIONAMIENTO A TORSION SEGUN NORMATIVA EHE

Angulo de la biela comprimida(sex.) = 35.00

| SECC | Td<br>(mT) | Tu1<br>(mT) | T-V  | Asl<br>(cm2/m) | Ast<br>(cm2/m) | theta | thetae |
|------|------------|-------------|------|----------------|----------------|-------|--------|
| 56   | 682.81     | 12789.03    | 0.40 | 8.07           | 3.96           | 35.00 | 26.57  |
| 57   | 761.02     | 12789.03    | 0.44 | 9.00           | 4.41           | 35.00 | 26.57  |
| 58   | 850.52     | 12789.03    | 0.48 | 10.06          | 4.93           | 35.00 | 26.57  |
| 59   | 938.89     | 12238.51    | 0.52 | 11.60          | 5.69           | 35.00 | 26.57  |
| 60   | 1033.90    | 12238.51    | 0.75 | 12.77          | 6.26           | 35.00 | 26.57  |
| 61   | 930.30     | 12238.51    | 0.99 | 11.49          | 5.63           | 35.00 | 26.57  |
| 62   | 1018.85    | 12238.51    | 0.77 | 12.59          | 6.17           | 35.00 | 26.57  |
| 63   | 930.62     | 12789.03    | 0.54 | 11.00          | 5.39           | 35.00 | 26.57  |
| 64   | 848.13     | 12789.03    | 0.50 | 10.03          | 4.92           | 35.00 | 26.57  |
| 65   | 763.87     | 12789.03    | 0.46 | 9.03           | 4.43           | 35.00 | 26.57  |
| 66   | 691.36     | 12789.03    | 0.43 | 8.17           | 4.01           | 35.00 | 26.57  |
| 67   | 626.06     | 12789.03    | 0.39 | 7.40           | 3.63           | 35.00 | 26.57  |
| 68   | 565.15     | 12789.03    | 0.35 | 6.68           | 3.28           | 35.00 | 26.57  |
| 69   | 503.30     | 12789.03    | 0.31 | 5.95           | 2.92           | 35.00 | 26.57  |
| 70   | 452.72     | 12789.03    | 0.27 | 5.35           | 2.62           | 35.00 | 26.57  |
| 71   | 411.39     | 12789.03    | 0.23 | 4.86           | 2.38           | 35.00 | 26.57  |
| 72   | 437.28     | 12789.03    | 0.26 | 5.17           | 2.53           | 35.00 | 26.57  |
| 73   | 487.46     | 12789.03    | 0.30 | 5.76           | 2.83           | 35.00 | 26.57  |
| 74   | 550.90     | 12789.03    | 0.34 | 6.51           | 3.19           | 35.00 | 26.57  |
| 75   | 614.03     | 12789.03    | 0.38 | 7.26           | 3.56           | 35.00 | 26.57  |
| 76   | 683.27     | 12789.03    | 0.41 | 8.08           | 3.96           | 35.00 | 26.57  |
| 77   | 761.46     | 12789.03    | 0.45 | 9.00           | 4.41           | 35.00 | 26.57  |
| 78   | 850.86     | 12789.03    | 0.48 | 10.06          | 4.93           | 35.00 | 26.57  |
| 79   | 939.24     | 12238.51    | 0.52 | 11.60          | 5.69           | 35.00 | 26.57  |
| 80   | 1034.29    | 12238.51    | 0.75 | 12.78          | 6.26           | 35.00 | 26.57  |
| 81   | 932.11     | 12238.51    | 0.99 | 11.52          | 5.65           | 35.00 | 26.57  |
| 82   | 1017.00    | 12238.51    | 0.77 | 12.56          | 6.16           | 35.00 | 26.57  |
| 83   | 928.85     | 12789.03    | 0.54 | 10.98          | 5.38           | 35.00 | 26.57  |
| 84   | 846.32     | 12789.03    | 0.51 | 10.01          | 4.91           | 35.00 | 26.57  |
| 85   | 761.95     | 12789.03    | 0.46 | 9.01           | 4.42           | 35.00 | 26.57  |
| 86   | 692.63     | 12789.03    | 0.43 | 8.19           | 4.01           | 35.00 | 26.57  |
| 87   | 626.06     | 12789.03    | 0.39 | 7.40           | 3.63           | 35.00 | 26.57  |
| 88   | 566.13     | 12789.03    | 0.35 | 6.69           | 3.28           | 35.00 | 26.57  |
| 89   | 504.84     | 12789.03    | 0.31 | 5.97           | 2.93           | 35.00 | 26.57  |
| 90   | 453.82     | 12789.03    | 0.27 | 5.37           | 2.63           | 35.00 | 26.57  |
| 91   | 411.67     | 12789.03    | 0.23 | 4.87           | 2.39           | 35.00 | 26.57  |
| 92   | 436.05     | 12789.03    | 0.26 | 5.16           | 2.53           | 35.00 | 26.57  |
| 93   | 486.77     | 12789.03    | 0.30 | 5.75           | 2.82           | 35.00 | 26.57  |
| 94   | 550.40     | 12789.03    | 0.34 | 6.51           | 3.19           | 35.00 | 26.57  |
| 95   | 613.31     | 12789.03    | 0.37 | 7.25           | 3.55           | 35.00 | 26.57  |
| 96   | 682.48     | 12789.03    | 0.41 | 8.07           | 3.96           | 35.00 | 26.57  |
| 97   | 760.63     | 12789.03    | 0.44 | 8.99           | 4.41           | 35.00 | 26.57  |
| 98   | 850.28     | 12789.03    | 0.48 | 10.05          | 4.93           | 35.00 | 26.57  |
| 99   | 938.75     | 12238.51    | 0.52 | 11.60          | 5.69           | 35.00 | 26.57  |
| 100  | 1033.94    | 12238.51    | 0.75 | 12.77          | 6.26           | 35.00 | 26.57  |
| 101  | 930.66     | 12238.51    | 0.97 | 11.50          | 5.64           | 35.00 | 26.57  |
| 102  | 1018.15    | 12238.51    | 0.76 | 12.58          | 6.17           | 35.00 | 26.57  |
| 103  | 929.89     | 12789.03    | 0.53 | 10.99          | 5.39           | 35.00 | 26.57  |
| 104  | 847.37     | 12789.03    | 0.50 | 10.02          | 4.91           | 35.00 | 26.57  |
| 105  | 763.11     | 12789.03    | 0.45 | 9.02           | 4.42           | 35.00 | 26.57  |
| 106  | 692.18     | 12789.03    | 0.42 | 8.18           | 4.01           | 35.00 | 26.57  |
| 107  | 626.37     | 12789.03    | 0.38 | 7.41           | 3.63           | 35.00 | 26.57  |
| 108  | 565.96     | 12789.03    | 0.34 | 6.69           | 3.28           | 35.00 | 26.57  |
| 109  | 503.66     | 12789.03    | 0.30 | 5.95           | 2.92           | 35.00 | 26.57  |
| 110  | 453.53     | 12789.03    | 0.26 | 5.36           | 2.63           | 35.00 | 26.57  |



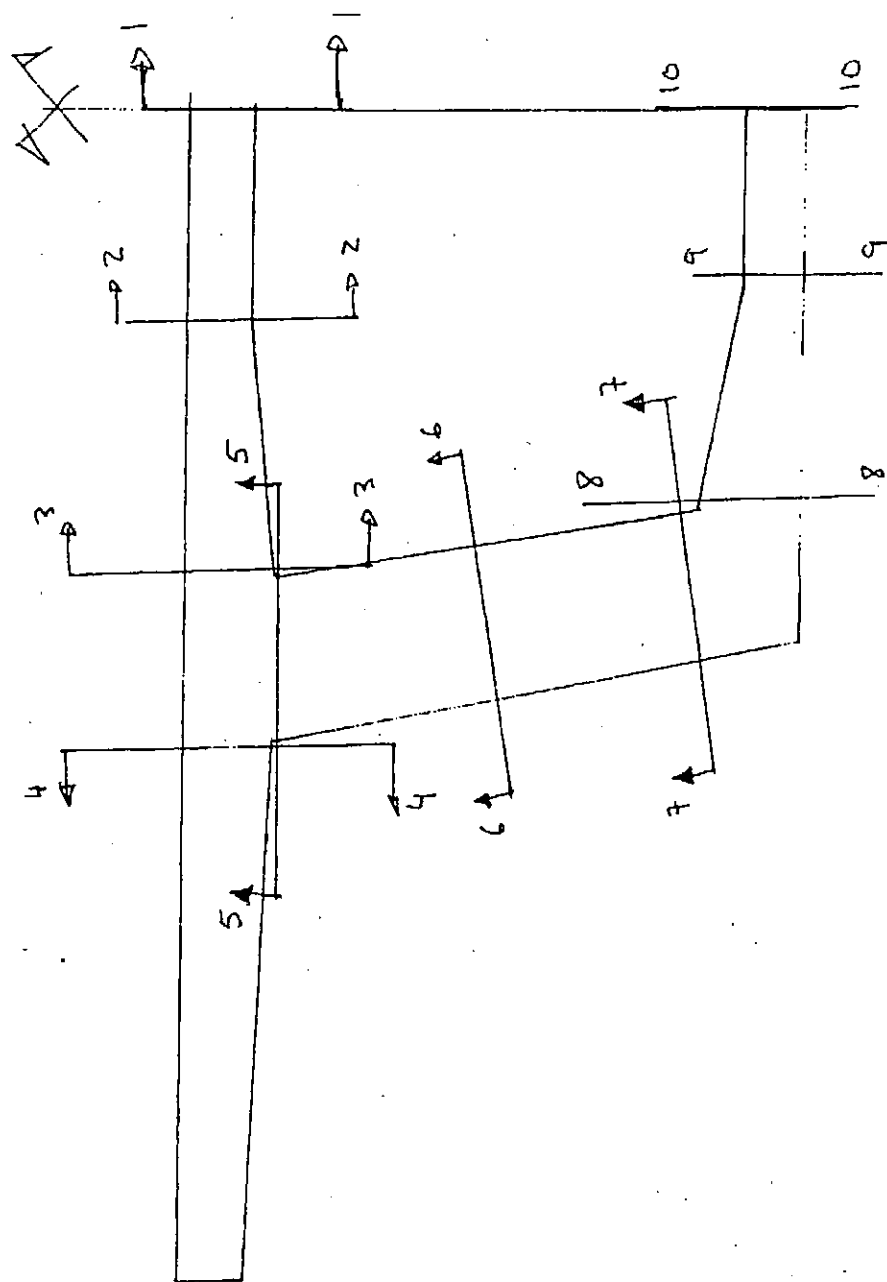
DIMENSIONAMIENTO A TORSION SEGUN NORMATIVA EHE

Angulo de la biela comprimida(sex.) = 35.00

| SECC | Td      | Tu1      | T-V  | Asl     | Ast     | theta | thetae |
|------|---------|----------|------|---------|---------|-------|--------|
|      | (mT)    | (mT)     |      | (cm2/m) | (cm2/m) |       |        |
| 111  | 411.46  | 12789.03 | 0.23 | 4.86    | 2.38    | 35.00 | 26.57  |
| 112  | 436.31  | 12789.03 | 0.26 | 5.16    | 2.53    | 35.00 | 26.57  |
| 113  | 486.77  | 12789.03 | 0.30 | 5.75    | 2.82    | 35.00 | 26.57  |
| 114  | 550.37  | 12789.03 | 0.34 | 6.51    | 3.19    | 35.00 | 26.57  |
| 115  | 613.24  | 12789.03 | 0.37 | 7.25    | 3.55    | 35.00 | 26.57  |
| 116  | 682.53  | 12789.03 | 0.41 | 8.07    | 3.96    | 35.00 | 26.57  |
| 117  | 760.73  | 12789.03 | 0.45 | 8.99    | 4.41    | 35.00 | 26.57  |
| 118  | 850.43  | 12789.03 | 0.48 | 10.05   | 4.93    | 35.00 | 26.57  |
| 119  | 938.82  | 12238.51 | 0.52 | 11.60   | 5.69    | 35.00 | 26.57  |
| 120  | 1033.29 | 12238.51 | 0.95 | 12.77   | 6.26    | 35.00 | 26.57  |
| 121  | 927.59  | 12238.51 | 0.98 | 11.46   | 5.62    | 35.00 | 26.57  |
| 122  | 1009.54 | 12238.51 | 0.77 | 12.47   | 6.11    | 35.00 | 26.57  |
| 123  | 921.17  | 12789.03 | 0.53 | 10.89   | 5.34    | 35.00 | 26.57  |
| 124  | 838.69  | 12789.03 | 0.50 | 9.92    | 4.86    | 35.00 | 26.57  |
| 125  | 754.57  | 12789.03 | 0.45 | 8.92    | 4.37    | 35.00 | 26.57  |
| 126  | 683.71  | 12789.03 | 0.42 | 8.08    | 3.96    | 35.00 | 26.57  |
| 127  | 617.39  | 12789.03 | 0.38 | 7.30    | 3.58    | 35.00 | 26.57  |
| 128  | 557.63  | 12789.03 | 0.34 | 6.59    | 3.23    | 35.00 | 26.57  |
| 129  | 495.41  | 12789.03 | 0.30 | 5.86    | 2.87    | 35.00 | 26.57  |
| 130  | 444.73  | 12789.03 | 0.26 | 5.26    | 2.58    | 35.00 | 26.57  |
| 131  | 404.18  | 12789.03 | 0.22 | 4.78    | 2.34    | 35.00 | 26.57  |
| 132  | 433.59  | 12789.03 | 0.24 | 5.13    | 2.51    | 35.00 | 26.57  |
| 133  | 483.67  | 12789.03 | 0.28 | 5.72    | 2.80    | 35.00 | 26.57  |
| 134  | 547.27  | 12789.03 | 0.32 | 6.47    | 3.17    | 35.00 | 26.57  |
| 135  | 610.23  | 12789.03 | 0.35 | 7.21    | 3.54    | 35.00 | 26.57  |
| 136  | 678.97  | 12789.03 | 0.39 | 8.03    | 3.94    | 35.00 | 26.57  |
| 137  | 757.15  | 12789.03 | 0.42 | 8.95    | 4.39    | 35.00 | 26.57  |
| 138  | 846.65  | 12789.03 | 0.46 | 10.01   | 4.91    | 35.00 | 26.57  |
| 139  | 934.88  | 12238.51 | 0.50 | 11.55   | 5.66    | 35.00 | 26.57  |
| 140  | 1029.37 | 12238.51 | 0.93 | 12.72   | 6.24    | 35.00 | 26.57  |
| 141  | 852.02  | 12238.51 | 0.91 | 10.53   | 5.16    | 35.00 | 26.57  |
| 142  | 826.45  | 12238.51 | 0.91 | 10.21   | 5.01    | 35.00 | 26.57  |
| 143  | 749.06  | 12789.03 | 0.67 | 8.86    | 4.34    | 35.00 | 26.57  |
| 144  | 675.19  | 12789.03 | 0.40 | 7.98    | 3.91    | 35.00 | 26.57  |
| 145  | 600.40  | 12789.03 | 0.27 | 7.10    | 3.48    | 35.00 | 26.57  |
| 146  | 546.65  | 12789.03 | 0.29 | 6.46    | 3.17    | 35.00 | 26.57  |
| 147  | 480.62  | 12789.03 | 0.25 | 5.68    | 2.79    | 35.00 | 26.57  |
| 148  | 419.45  | 12789.03 | 0.24 | 4.96    | 2.43    | 35.00 | 26.57  |
| 149  | 376.41  | 12789.03 | 0.23 | 4.45    | 2.18    | 35.00 | 26.57  |
| 150  | 337.73  | 12789.03 | 0.23 | 3.99    | 1.96    | 35.00 | 26.57  |
| 151  | 325.30  | 12789.03 | 0.23 | 3.85    | 1.89    | 35.00 | 26.57  |
| 152  | 361.57  | 12789.03 | 0.23 | 4.27    | 2.10    | 35.00 | 26.57  |
| 153  | 403.37  | 12789.03 | 0.19 | 4.77    | 2.34    | 35.00 | 26.57  |
| 154  | 450.81  | 12789.03 | 0.23 | 5.33    | 2.61    | 35.00 | 26.57  |
| 155  | 503.61  | 12789.03 | 0.28 | 5.95    | 2.92    | 35.00 | 26.57  |
| 156  | 551.74  | 12789.03 | 0.34 | 6.52    | 3.20    | 35.00 | 26.57  |
| 157  | 615.01  | 12789.03 | 0.39 | 7.27    | 3.56    | 35.00 | 26.57  |
| 158  | 684.68  | 12789.03 | 0.44 | 8.09    | 3.97    | 35.00 | 26.57  |
| 159  | 759.58  | 12789.03 | 0.50 | 8.98    | 4.40    | 35.00 | 26.57  |
| 160  | 839.77  | 12789.03 | 0.55 | 9.93    | 4.87    | 35.00 | 26.57  |
| 161  | 756.56  | 12789.03 | 0.61 | 8.94    | 4.39    | 35.00 | 26.57  |

### 7.3. EVALUACIÓN DEL E.L.U. DE RASANTE

COATES PARA PASANTE EN UNA SECCIÓN CAJÓN



Factores para obtener las tensiones tangenciales

| Sec. | Corte | Alpha_V | Beta_V | Alpha_T | Beta_T |
|------|-------|---------|--------|---------|--------|
| 1    | 1     | 0.0000  | 0.0000 | 0.0974  | 0.0331 |
| 1    | 2     | 0.1632  | 0.0496 | 0.1089  | 0.0331 |
| 1    | 3     | 0.1601  | 0.0820 | 0.0647  | 0.0331 |
| 1    | 4     | 0.1933  | 0.0967 | 0.0662  | 0.0331 |
| 1    | 5     | 0.3309  | 0.2015 | 0.0544  | 0.0331 |
| 1    | 6     | 0.3460  | 0.2107 | 0.0544  | 0.0331 |
| 1    | 7     | 0.2768  | 0.1686 | 0.0544  | 0.0331 |
| 1    | 8     | 0.2051  | 0.1231 | 0.0552  | 0.0331 |
| 1    | 9     | 0.2817  | 0.0845 | 0.1104  | 0.0331 |
| 1    | 10    | 0.0000  | 0.0000 | 0.1104  | 0.0331 |
| 2    | 1     | 0.0000  | 0.0000 | 0.1018  | 0.0346 |
| 2    | 2     | 0.1594  | 0.0485 | 0.1138  | 0.0346 |
| 2    | 3     | 0.1571  | 0.0805 | 0.0676  | 0.0346 |
| 2    | 4     | 0.1921  | 0.0961 | 0.0692  | 0.0346 |
| 2    | 5     | 0.3273  | 0.1993 | 0.0568  | 0.0346 |
| 2    | 6     | 0.3481  | 0.2120 | 0.0568  | 0.0346 |
| 2    | 7     | 0.3046  | 0.1855 | 0.0568  | 0.0346 |
| 2    | 8     | 0.2527  | 0.1516 | 0.0577  | 0.0346 |
| 2    | 9     | 0.1914  | 0.1148 | 0.0577  | 0.0346 |
| 2    | 10    | 0.0000  | 0.0000 | 0.0577  | 0.0346 |

alfa Tensiones  
beta rasante

7.3. EVALUACIÓN DEL E.L.U. DE RASANTE

Se comprueban las secciones críticas de la sección transversal a rasante según el artículo 47° de la EHE.

Seccion = 1

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos  
Vd (T) = 1266.967 Td (mT) = 904.562

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 88.10            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 130.76           | 29.46            | 0.24 | 11.00             |
| 3     | 939.69           | 1409.54          | 128.28           | 17.50            | 0.23 | 18.19             |
| 4     | 939.69           | 1409.54          | 154.88           | 17.91            | 0.27 | 21.45             |
| 5     | 939.69           | 1409.54          | 265.13           | 14.71            | 0.46 | 44.69             |
| 6     | 939.69           | 1409.54          | 277.23           | 14.71            | 0.48 | 46.73             |
| 7     | 939.69           | 1409.54          | 221.78           | 14.71            | 0.38 | 37.39             |
| 8     | 939.69           | 1409.54          | 164.33           | 14.93            | 0.29 | 27.30             |
| 9     | 939.69           | 1409.54          | 225.71           | 29.86            | 0.40 | 18.74             |
| 10    | 939.69           | 1409.54          | 0.00             | 99.86            | 0.07 | 0.00              |

Seccion = 2

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos  
Vd (T) = 1095.095 Td (mT) = 837.153

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 81.54            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 109.01           | 26.88            | 0.21 | 9.51              |
| 3     | 939.69           | 1409.54          | 106.94           | 15.97            | 0.20 | 15.72             |
| 4     | 939.69           | 1409.54          | 129.11           | 16.34            | 0.24 | 18.54             |
| 5     | 939.69           | 1409.54          | 221.02           | 13.43            | 0.40 | 38.63             |
| 6     | 939.69           | 1409.54          | 231.11           | 13.43            | 0.41 | 40.39             |
| 7     | 939.69           | 1409.54          | 184.89           | 13.43            | 0.33 | 32.32             |
| 8     | 939.69           | 1409.54          | 137.00           | 13.62            | 0.25 | 23.60             |
| 9     | 939.69           | 1409.54          | 188.16           | 27.25            | 0.35 | 16.20             |
| 10    | 939.69           | 1409.54          | 0.00             | 92.42            | 0.07 | 0.00              |

Seccion = 3

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos  
Vd (T) = 957.052 Td (mT) = 761.604

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.18            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 93.21            | 24.19            | 0.18 | 8.31              |
| 3     | 939.69           | 1409.54          | 91.44            | 14.37            | 0.17 | 13.74             |
| 4     | 939.69           | 1409.54          | 110.40           | 14.70            | 0.21 | 16.20             |
| 5     | 939.69           | 1409.54          | 188.99           | 12.08            | 0.35 | 33.76             |
| 6     | 939.69           | 1409.54          | 197.62           | 12.08            | 0.36 | 35.30             |
| 7     | 939.69           | 1409.54          | 158.09           | 12.08            | 0.29 | 28.25             |
| 8     | 939.69           | 1409.54          | 117.14           | 12.26            | 0.22 | 20.62             |
| 9     | 939.69           | 1409.54          | 160.89           | 24.52            | 0.30 | 14.16             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.08            | 0.06 | 0.00              |

Seccion = 4

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos  
Vd (T) = 823.293 Td (mT) = 690.401

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.25            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 77.73            | 21.45            | 0.16 | 7.15              |
| 3     | 939.69           | 1409.54          | 76.26            | 12.74            | 0.15 | 11.82             |
| 4     | 939.69           | 1409.54          | 92.07            | 13.04            | 0.18 | 13.94             |
| 5     | 939.69           | 1409.54          | 157.61           | 10.71            | 0.30 | 29.04             |
| 6     | 939.69           | 1409.54          | 164.80           | 10.71            | 0.31 | 30.37             |
| 7     | 939.69           | 1409.54          | 131.84           | 10.71            | 0.25 | 24.30             |
| 8     | 939.69           | 1409.54          | 97.69            | 10.87            | 0.19 | 17.74             |
| 9     | 939.69           | 1409.54          | 134.18           | 21.74            | 0.26 | 12.18             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.22            | 0.05 | 0.00              |

Seccion = 5

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 694.214 Td (mT) = 623.582

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.74            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 62.61            | 18.77            | 0.13 | 6.03              |
| 3     | 939.69           | 1409.54          | 61.42            | 11.15            | 0.13 | 9.96              |
| 4     | 939.69           | 1409.54          | 74.15            | 11.41            | 0.15 | 11.75             |
| 5     | 939.69           | 1409.54          | 126.94           | 9.38             | 0.25 | 24.49             |
| 6     | 939.69           | 1409.54          | 132.73           | 9.38             | 0.26 | 25.60             |
| 7     | 939.69           | 1409.54          | 106.19           | 9.38             | 0.21 | 20.49             |
| 8     | 939.69           | 1409.54          | 78.68            | 9.51             | 0.16 | 14.96             |
| 9     | 939.69           | 1409.54          | 108.07           | 19.03            | 0.22 | 10.27             |
| 10    | 939.69           | 1409.54          | 0.00             | 68.84            | 0.05 | 0.00              |

Seccion = 6

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 573.538 Td (mT) = 566.005

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 55.13            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 48.14            | 16.02            | 0.11 | 4.98              |
| 3     | 939.69           | 1409.54          | 47.23            | 9.52             | 0.10 | 8.23              |
| 4     | 939.69           | 1409.54          | 57.02            | 9.74             | 0.12 | 9.71              |
| 5     | 939.69           | 1409.54          | 97.61            | 8.00             | 0.21 | 20.23             |
| 6     | 939.69           | 1409.54          | 102.07           | 8.00             | 0.22 | 21.15             |
| 7     | 939.69           | 1409.54          | 81.65            | 8.00             | 0.17 | 16.93             |
| 8     | 939.69           | 1409.54          | 60.50            | 8.12             | 0.13 | 12.36             |
| 9     | 939.69           | 1409.54          | 83.10            | 16.24            | 0.18 | 8.48              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.49            | 0.04 | 0.00              |

Seccion = 7

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 459.036 Td (mT) = 516.423

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 50.30            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 34.16            | 13.45            | 0.09 | 3.99              |
| 3     | 939.69           | 1409.54          | 33.51            | 7.99             | 0.08 | 6.59              |
| 4     | 939.69           | 1409.54          | 40.46            | 8.17             | 0.10 | 7.77              |
| 5     | 939.69           | 1409.54          | 69.27            | 6.72             | 0.17 | 16.19             |
| 6     | 939.69           | 1409.54          | 72.43            | 6.72             | 0.17 | 16.93             |
| 7     | 939.69           | 1409.54          | 57.94            | 6.72             | 0.14 | 13.55             |
| 8     | 939.69           | 1409.54          | 42.93            | 6.82             | 0.11 | 9.89              |
| 9     | 939.69           | 1409.54          | 58.97            | 13.63            | 0.15 | 6.79              |
| 10    | 939.69           | 1409.54          | 0.00             | 57.01            | 0.04 | 0.00              |

Seccion = 8

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 343.629 Td (mT) = 465.131

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 45.30            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 20.13            | 10.56            | 0.07 | 2.98              |
| 3     | 939.69           | 1409.54          | 19.75            | 6.27             | 0.06 | 4.93              |
| 4     | 939.69           | 1409.54          | 23.85            | 6.42             | 0.08 | 5.82              |
| 5     | 939.69           | 1409.54          | 40.82            | 5.28             | 0.12 | 12.12             |
| 6     | 939.69           | 1409.54          | 42.68            | 5.28             | 0.13 | 12.67             |
| 7     | 939.69           | 1409.54          | 34.15            | 5.28             | 0.10 | 10.14             |
| 8     | 939.69           | 1409.54          | 25.30            | 5.35             | 0.08 | 7.40              |
| 9     | 939.69           | 1409.54          | 34.75            | 10.71            | 0.11 | 5.08              |
| 10    | 939.69           | 1409.54          | 0.00             | 51.35            | 0.04 | 0.00              |

Seccion = 9

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 276.001 Td (mT) = 417.878

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.70            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 6.45             | 3.97             | 0.05 | 2.40              |
| 3     | 939.69           | 1409.54          | 6.33             | 2.36             | 0.05 | 3.96              |
| 4     | 939.69           | 1409.54          | 7.64             | 2.41             | 0.06 | 4.67              |
| 5     | 939.69           | 1409.54          | 13.08            | 1.98             | 0.10 | 9.74              |
| 6     | 939.69           | 1409.54          | 13.68            | 1.98             | 0.10 | 10.18             |
| 7     | 939.69           | 1409.54          | 10.94            | 1.98             | 0.08 | 8.15              |
| 8     | 939.69           | 1409.54          | 8.11             | 2.01             | 0.06 | 5.95              |
| 9     | 939.69           | 1409.54          | 11.13            | 4.03             | 0.09 | 4.08              |
| 10    | 939.69           | 1409.54          | 0.00             | 46.13            | 0.03 | 0.00              |

Seccion = 10

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 382.051 Td (mT) = 376.348

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 36.66            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 6.66             | 1.56             | 0.07 | 3.32              |
| 3     | 939.69           | 1409.54          | 6.53             | 0.93             | 0.07 | 5.48              |
| 4     | 939.69           | 1409.54          | 7.88             | 0.95             | 0.08 | 6.47              |
| 5     | 939.69           | 1409.54          | 13.50            | 0.78             | 0.14 | 13.48             |
| 6     | 939.69           | 1409.54          | 14.11            | 0.78             | 0.14 | 14.09             |
| 7     | 939.69           | 1409.54          | 11.29            | 0.78             | 0.11 | 11.28             |
| 8     | 939.69           | 1409.54          | 8.37             | 0.79             | 0.08 | 8.23              |
| 9     | 939.69           | 1409.54          | 11.49            | 1.58             | 0.12 | 5.65              |
| 10    | 939.69           | 1409.54          | 0.00             | 41.55            | 0.03 | 0.00              |

Seccion = 11

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 420.902 Td (mT) = 341.941

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 33.31            | 0.02 | 0.00              |
| 2     | 939.69           | 1409.54          | 8.76             | 0.86             | 0.07 | 3.65              |
| 3     | 939.69           | 1409.54          | 8.59             | 0.51             | 0.07 | 6.04              |
| 4     | 939.69           | 1409.54          | 10.37            | 0.52             | 0.09 | 7.12              |
| 5     | 939.69           | 1409.54          | 17.76            | 0.43             | 0.15 | 14.85             |
| 6     | 939.69           | 1409.54          | 18.57            | 0.43             | 0.16 | 15.52             |
| 7     | 939.69           | 1409.54          | 14.85            | 0.43             | 0.12 | 12.42             |
| 8     | 939.69           | 1409.54          | 11.01            | 0.43             | 0.09 | 9.07              |
| 9     | 939.69           | 1409.54          | 15.12            | 0.87             | 0.13 | 6.23              |
| 10    | 939.69           | 1409.54          | 0.00             | 37.75            | 0.03 | 0.00              |

Seccion = 12

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 464.309 Td (mT) = 342.898

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 33.40            | 0.02 | 0.00              |
| 2     | 939.69           | 1409.54          | 31.88            | 3.34             | 0.08 | 4.03              |
| 3     | 939.69           | 1409.54          | 31.27            | 1.98             | 0.08 | 6.66              |
| 4     | 939.69           | 1409.54          | 37.76            | 2.03             | 0.10 | 7.86              |
| 5     | 939.69           | 1409.54          | 64.64            | 1.67             | 0.16 | 16.38             |
| 6     | 939.69           | 1409.54          | 67.59            | 1.67             | 0.17 | 17.13             |
| 7     | 939.69           | 1409.54          | 54.07            | 1.67             | 0.14 | 13.70             |
| 8     | 939.69           | 1409.54          | 40.06            | 1.69             | 0.10 | 10.01             |
| 9     | 939.69           | 1409.54          | 55.03            | 3.38             | 0.14 | 6.87              |
| 10    | 939.69           | 1409.54          | 0.00             | 37.86            | 0.03 | 0.00              |



Seccion = 13

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 510.046 Td (mT) = 384.370

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 37.44            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 34.21            | 5.87             | 0.09 | 4.43              |
| 3     | 939.69           | 1409.54          | 33.56            | 3.48             | 0.09 | 7.32              |
| 4     | 939.69           | 1409.54          | 40.52            | 3.57             | 0.11 | 8.63              |
| 5     | 939.69           | 1409.54          | 69.36            | 2.93             | 0.18 | 17.99             |
| 6     | 939.69           | 1409.54          | 72.52            | 2.93             | 0.19 | 18.81             |
| 7     | 939.69           | 1409.54          | 58.02            | 2.93             | 0.15 | 15.05             |
| 8     | 939.69           | 1409.54          | 42.99            | 2.97             | 0.11 | 10.99             |
| 9     | 939.69           | 1409.54          | 59.04            | 5.95             | 0.16 | 7.54              |
| 10    | 939.69           | 1409.54          | 0.00             | 42.43            | 0.03 | 0.00              |

Seccion = 14

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 557.203 Td (mT) = 432.424

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.12            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 36.48            | 8.36             | 0.10 | 4.84              |
| 3     | 939.69           | 1409.54          | 35.79            | 4.97             | 0.10 | 8.00              |
| 4     | 939.69           | 1409.54          | 43.21            | 5.08             | 0.12 | 9.43              |
| 5     | 939.69           | 1409.54          | 73.97            | 4.18             | 0.20 | 19.65             |
| 6     | 939.69           | 1409.54          | 77.34            | 4.18             | 0.21 | 20.55             |
| 7     | 939.69           | 1409.54          | 61.87            | 4.18             | 0.17 | 16.45             |
| 8     | 939.69           | 1409.54          | 45.85            | 4.24             | 0.12 | 12.01             |
| 9     | 939.69           | 1409.54          | 62.97            | 8.48             | 0.17 | 8.24              |
| 10    | 939.69           | 1409.54          | 0.00             | 47.74            | 0.03 | 0.00              |

Seccion = 15

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 604.898 Td (mT) = 486.545

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.39            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 38.54            | 10.90            | 0.11 | 5.25              |
| 3     | 939.69           | 1409.54          | 37.81            | 6.47             | 0.11 | 8.68              |
| 4     | 939.69           | 1409.54          | 45.65            | 6.62             | 0.13 | 10.24             |
| 5     | 939.69           | 1409.54          | 78.14            | 5.44             | 0.22 | 21.34             |
| 6     | 939.69           | 1409.54          | 81.70            | 5.44             | 0.23 | 22.31             |
| 7     | 939.69           | 1409.54          | 65.36            | 5.44             | 0.18 | 17.85             |
| 8     | 939.69           | 1409.54          | 48.43            | 5.52             | 0.14 | 13.03             |
| 9     | 939.69           | 1409.54          | 66.52            | 11.05            | 0.19 | 8.95              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.71            | 0.04 | 0.00              |

Seccion = 16

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 647.959 Td (mT) = 536.549

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 52.26            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 38.54            | 13.52            | 0.12 | 5.63              |
| 3     | 939.69           | 1409.54          | 37.80            | 8.03             | 0.12 | 9.30              |
| 4     | 939.69           | 1409.54          | 45.64            | 8.22             | 0.14 | 10.97             |
| 5     | 939.69           | 1409.54          | 78.13            | 6.75             | 0.23 | 22.86             |
| 6     | 939.69           | 1409.54          | 81.70            | 6.75             | 0.24 | 23.90             |
| 7     | 939.69           | 1409.54          | 65.36            | 6.75             | 0.20 | 19.12             |
| 8     | 939.69           | 1409.54          | 48.43            | 6.85             | 0.15 | 13.96             |
| 9     | 939.69           | 1409.54          | 66.52            | 13.70            | 0.20 | 9.58              |
| 10    | 939.69           | 1409.54          | 0.00             | 59.23            | 0.04 | 0.00              |

Seccion = 17

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 694.806 Td (mT) = 600.518

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 58.49            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 40.25            | 15.66            | 0.13 | 6.03              |
| 3     | 939.69           | 1409.54          | 39.48            | 9.31             | 0.12 | 9.97              |
| 4     | 939.69           | 1409.54          | 47.67            | 9.52             | 0.15 | 11.76             |
| 5     | 939.69           | 1409.54          | 81.60            | 7.82             | 0.25 | 24.51             |
| 6     | 939.69           | 1409.54          | 85.32            | 7.82             | 0.26 | 25.63             |
| 7     | 939.69           | 1409.54          | 68.26            | 7.82             | 0.21 | 20.51             |
| 8     | 939.69           | 1409.54          | 50.58            | 7.94             | 0.16 | 14.97             |
| 9     | 939.69           | 1409.54          | 69.47            | 15.88            | 0.22 | 10.28             |
| 10    | 939.69           | 1409.54          | 0.00             | 66.30            | 0.05 | 0.00              |

Seccion = 18

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 746.152 Td (mT) = 672.423

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 65.49            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 41.74            | 18.42            | 0.14 | 6.48              |
| 3     | 939.69           | 1409.54          | 40.95            | 10.94            | 0.13 | 10.71             |
| 4     | 939.69           | 1409.54          | 49.44            | 11.19            | 0.16 | 12.63             |
| 5     | 939.69           | 1409.54          | 84.64            | 9.20             | 0.27 | 26.32             |
| 6     | 939.69           | 1409.54          | 88.50            | 9.20             | 0.28 | 27.52             |
| 7     | 939.69           | 1409.54          | 70.80            | 9.20             | 0.23 | 22.02             |
| 8     | 939.69           | 1409.54          | 52.46            | 9.33             | 0.17 | 16.08             |
| 9     | 939.69           | 1409.54          | 72.05            | 18.67            | 0.24 | 11.04             |
| 10    | 939.69           | 1409.54          | 0.00             | 74.24            | 0.05 | 0.00              |

Seccion = 19

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 933.908 Td (mT) = 749.545

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 76.30            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 63.85            | 21.72            | 0.17 | 7.93              |
| 3     | 939.69           | 1409.54          | 62.93            | 12.90            | 0.17 | 13.16             |
| 4     | 939.69           | 1409.54          | 76.95            | 13.21            | 0.20 | 15.71             |
| 5     | 939.69           | 1409.54          | 131.11           | 10.84            | 0.33 | 32.58             |
| 6     | 939.69           | 1409.54          | 139.44           | 10.84            | 0.35 | 34.66             |
| 7     | 939.69           | 1409.54          | 122.01           | 10.84            | 0.31 | 30.33             |
| 8     | 939.69           | 1409.54          | 101.22           | 11.01            | 0.26 | 24.78             |
| 9     | 939.69           | 1409.54          | 76.67            | 11.01            | 0.20 | 18.77             |
| 10    | 939.69           | 1409.54          | 0.00             | 43.25            | 0.03 | 0.00              |

Seccion = 20

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1585.492 Td (mT) = 831.816

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 84.68            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 160.69           | 24.00            | 0.29 | 13.46             |
| 3     | 939.69           | 1409.54          | 158.37           | 14.26            | 0.28 | 22.34             |
| 4     | 939.69           | 1409.54          | 193.65           | 14.60            | 0.33 | 26.67             |
| 5     | 939.69           | 1409.54          | 329.95           | 11.98            | 0.56 | 55.31             |
| 6     | 939.69           | 1409.54          | 350.92           | 11.98            | 0.60 | 58.84             |
| 7     | 939.69           | 1409.54          | 307.06           | 11.98            | 0.52 | 51.48             |
| 8     | 939.69           | 1409.54          | 254.74           | 12.17            | 0.44 | 42.08             |
| 9     | 939.69           | 1409.54          | 192.95           | 12.17            | 0.33 | 31.86             |
| 10    | 939.69           | 1409.54          | 0.00             | 48.00            | 0.03 | 0.00              |



Seccion = 21

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2301.945 Td (mT) = 930.314

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.71            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 267.01           | 34.47            | 0.41 | 19.54             |
| 3     | 939.69           | 1409.54          | 263.15           | 20.48            | 0.40 | 32.44             |
| 4     | 939.69           | 1409.54          | 321.78           | 20.96            | 0.49 | 38.72             |
| 5     | 939.69           | 1409.54          | 548.25           | 17.21            | 0.81 | 80.31             |
| 6     | 939.69           | 1409.54          | 583.09           | 17.21            | 0.86 | 85.43             |
| 7     | 939.69           | 1409.54          | 510.23           | 17.21            | 0.76 | 74.75             |
| 8     | 939.69           | 1409.54          | 423.29           | 17.48            | 0.63 | 61.09             |
| 9     | 939.69           | 1409.54          | 320.61           | 17.48            | 0.48 | 46.26             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.68            | 0.04 | 0.00              |

Seccion = 22

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1684.344 Td (mT) = 1015.657

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 103.39           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 163.11           | 32.96            | 0.31 | 14.30             |
| 3     | 939.69           | 1409.54          | 160.75           | 19.58            | 0.30 | 23.74             |
| 4     | 939.69           | 1409.54          | 196.57           | 20.05            | 0.36 | 28.33             |
| 5     | 939.69           | 1409.54          | 334.91           | 16.45            | 0.60 | 58.76             |
| 6     | 939.69           | 1409.54          | 356.20           | 16.45            | 0.64 | 62.51             |
| 7     | 939.69           | 1409.54          | 311.69           | 16.45            | 0.56 | 54.69             |
| 8     | 939.69           | 1409.54          | 258.58           | 16.71            | 0.46 | 44.70             |
| 9     | 939.69           | 1409.54          | 195.85           | 16.71            | 0.35 | 33.85             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.60            | 0.04 | 0.00              |

Seccion = 23

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1071.606 Td (mT) = 927.589

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 90.35            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 75.05            | 28.77            | 0.21 | 9.30              |
| 3     | 939.69           | 1409.54          | 73.62            | 17.09            | 0.19 | 15.38             |
| 4     | 939.69           | 1409.54          | 88.89            | 17.49            | 0.23 | 18.14             |
| 5     | 939.69           | 1409.54          | 152.17           | 14.37            | 0.39 | 37.80             |
| 6     | 939.69           | 1409.54          | 159.11           | 14.37            | 0.40 | 39.52             |
| 7     | 939.69           | 1409.54          | 127.29           | 14.37            | 0.33 | 31.63             |
| 8     | 939.69           | 1409.54          | 94.32            | 14.58            | 0.24 | 23.09             |
| 9     | 939.69           | 1409.54          | 129.54           | 29.17            | 0.34 | 15.85             |
| 10    | 939.69           | 1409.54          | 0.00             | 102.41           | 0.07 | 0.00              |

Seccion = 24

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 975.107 Td (mT) = 845.045

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.31            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 67.09            | 25.68            | 0.19 | 8.47              |
| 3     | 939.69           | 1409.54          | 65.82            | 15.26            | 0.18 | 14.00             |
| 4     | 939.69           | 1409.54          | 79.47            | 15.61            | 0.21 | 16.51             |
| 5     | 939.69           | 1409.54          | 136.04           | 12.83            | 0.35 | 34.39             |
| 6     | 939.69           | 1409.54          | 142.24           | 12.83            | 0.37 | 35.97             |
| 7     | 939.69           | 1409.54          | 113.79           | 12.83            | 0.30 | 28.78             |
| 8     | 939.69           | 1409.54          | 84.32            | 13.02            | 0.22 | 21.01             |
| 9     | 939.69           | 1409.54          | 115.81           | 26.04            | 0.31 | 14.42             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.29            | 0.07 | 0.00              |

Seccion = 25

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 847.272 Td (mT) = 760.675

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.09            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 54.18            | 22.48            | 0.16 | 7.36              |
| 3     | 939.69           | 1409.54          | 53.15            | 13.36            | 0.15 | 12.16             |
| 4     | 939.69           | 1409.54          | 64.17            | 13.66            | 0.18 | 14.34             |
| 5     | 939.69           | 1409.54          | 109.86           | 11.23            | 0.31 | 29.89             |
| 6     | 939.69           | 1409.54          | 114.87           | 11.23            | 0.32 | 31.25             |
| 7     | 939.69           | 1409.54          | 91.89            | 11.23            | 0.26 | 25.01             |
| 8     | 939.69           | 1409.54          | 68.09            | 11.39            | 0.19 | 18.26             |
| 9     | 939.69           | 1409.54          | 93.52            | 22.79            | 0.27 | 12.53             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.98            | 0.06 | 0.00              |

Seccion = 26

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 721.162 Td (mT) = 689.882

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.19            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 41.03            | 18.90            | 0.14 | 6.26              |
| 3     | 939.69           | 1409.54          | 40.25            | 11.23            | 0.13 | 10.35             |
| 4     | 939.69           | 1409.54          | 48.60            | 11.49            | 0.16 | 12.21             |
| 5     | 939.69           | 1409.54          | 83.19            | 9.44             | 0.26 | 25.44             |
| 6     | 939.69           | 1409.54          | 86.98            | 9.44             | 0.27 | 26.60             |
| 7     | 939.69           | 1409.54          | 69.59            | 9.44             | 0.22 | 21.28             |
| 8     | 939.69           | 1409.54          | 51.56            | 9.58             | 0.16 | 15.54             |
| 9     | 939.69           | 1409.54          | 70.82            | 19.16            | 0.23 | 10.67             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.16            | 0.05 | 0.00              |

Seccion = 27

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 632.585 Td (mT) = 624.677

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.84            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 33.35            | 15.60            | 0.12 | 5.49              |
| 3     | 939.69           | 1409.54          | 32.72            | 9.27             | 0.11 | 9.08              |
| 4     | 939.69           | 1409.54          | 39.50            | 9.48             | 0.14 | 10.71             |
| 5     | 939.69           | 1409.54          | 67.62            | 7.79             | 0.23 | 22.31             |
| 6     | 939.69           | 1409.54          | 70.71            | 7.79             | 0.24 | 23.33             |
| 7     | 939.69           | 1409.54          | 56.57            | 7.79             | 0.19 | 18.67             |
| 8     | 939.69           | 1409.54          | 41.91            | 7.91             | 0.14 | 13.63             |
| 9     | 939.69           | 1409.54          | 57.57            | 15.81            | 0.20 | 9.36              |
| 10    | 939.69           | 1409.54          | 0.00             | 68.96            | 0.05 | 0.00              |

Seccion = 28

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 548.991 Td (mT) = 563.741

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 54.91            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 26.08            | 12.41            | 0.10 | 4.77              |
| 3     | 939.69           | 1409.54          | 25.59            | 7.37             | 0.10 | 7.88              |
| 4     | 939.69           | 1409.54          | 30.89            | 7.54             | 0.12 | 9.29              |
| 5     | 939.69           | 1409.54          | 52.88            | 6.20             | 0.20 | 19.36             |
| 6     | 939.69           | 1409.54          | 55.30            | 6.20             | 0.21 | 20.25             |
| 7     | 939.69           | 1409.54          | 44.24            | 6.20             | 0.17 | 16.20             |
| 8     | 939.69           | 1409.54          | 32.78            | 6.29             | 0.12 | 11.83             |
| 9     | 939.69           | 1409.54          | 45.02            | 12.58            | 0.17 | 8.12              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.24            | 0.04 | 0.00              |

Seccion = 29

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 464.530 Td (mT) = 502.009

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 48.90            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 18.70            | 9.09             | 0.09 | 4.03              |
| 3     | 939.69           | 1409.54          | 18.34            | 5.40             | 0.08 | 6.67              |
| 4     | 939.69           | 1409.54          | 22.15            | 5.53             | 0.10 | 7.86              |
| 5     | 939.69           | 1409.54          | 37.92            | 4.54             | 0.17 | 16.39             |
| 6     | 939.69           | 1409.54          | 39.65            | 4.54             | 0.17 | 17.13             |
| 7     | 939.69           | 1409.54          | 31.72            | 4.54             | 0.14 | 13.71             |
| 8     | 939.69           | 1409.54          | 23.50            | 4.61             | 0.10 | 10.01             |
| 9     | 939.69           | 1409.54          | 32.28            | 9.21             | 0.15 | 6.87              |
| 10    | 939.69           | 1409.54          | 0.00             | 55.42            | 0.04 | 0.00              |

Seccion = 30

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 387.831 Td (mT) = 451.900

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 44.02            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 11.92            | 5.74             | 0.07 | 3.37              |
| 3     | 939.69           | 1409.54          | 11.70            | 3.41             | 0.07 | 5.57              |
| 4     | 939.69           | 1409.54          | 14.12            | 3.49             | 0.08 | 6.57              |
| 5     | 939.69           | 1409.54          | 24.18            | 2.87             | 0.14 | 13.68             |
| 6     | 939.69           | 1409.54          | 25.28            | 2.87             | 0.14 | 14.30             |
| 7     | 939.69           | 1409.54          | 20.22            | 2.87             | 0.12 | 11.45             |
| 8     | 939.69           | 1409.54          | 14.98            | 2.91             | 0.09 | 8.36              |
| 9     | 939.69           | 1409.54          | 20.58            | 5.82             | 0.12 | 5.74              |
| 10    | 939.69           | 1409.54          | 0.00             | 49.89            | 0.04 | 0.00              |

Seccion = 31

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 339.852 Td (mT) = 409.333

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 39.87            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 5.93             | 2.21             | 0.06 | 2.95              |
| 3     | 939.69           | 1409.54          | 5.81             | 1.31             | 0.06 | 4.88              |
| 4     | 939.69           | 1409.54          | 7.02             | 1.34             | 0.07 | 5.75              |
| 5     | 939.69           | 1409.54          | 12.02            | 1.10             | 0.12 | 11.99             |
| 6     | 939.69           | 1409.54          | 12.56            | 1.10             | 0.13 | 12.53             |
| 7     | 939.69           | 1409.54          | 10.05            | 1.10             | 0.10 | 10.03             |
| 8     | 939.69           | 1409.54          | 7.45             | 1.12             | 0.07 | 7.32              |
| 9     | 939.69           | 1409.54          | 10.23            | 2.24             | 0.10 | 5.03              |
| 10    | 939.69           | 1409.54          | 0.00             | 45.19            | 0.03 | 0.00              |

Seccion = 32

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 405.745 Td (mT) = 430.790

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 41.96            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 20.59            | 5.46             | 0.07 | 3.52              |
| 3     | 939.69           | 1409.54          | 20.19            | 3.24             | 0.07 | 5.82              |
| 4     | 939.69           | 1409.54          | 24.38            | 3.32             | 0.09 | 6.87              |
| 5     | 939.69           | 1409.54          | 41.74            | 2.73             | 0.14 | 14.31             |
| 6     | 939.69           | 1409.54          | 43.64            | 2.73             | 0.15 | 14.97             |
| 7     | 939.69           | 1409.54          | 34.92            | 2.73             | 0.12 | 11.98             |
| 8     | 939.69           | 1409.54          | 25.87            | 2.77             | 0.09 | 8.74              |
| 9     | 939.69           | 1409.54          | 35.53            | 5.54             | 0.13 | 6.00              |
| 10    | 939.69           | 1409.54          | 0.00             | 47.56            | 0.03 | 0.00              |

Seccion = 33

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 476.421 Td (mT) = 476.967

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 46.46            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 24.00            | 8.68             | 0.09 | 4.14              |
| 3     | 939.69           | 1409.54          | 23.55            | 5.15             | 0.08 | 6.84              |
| 4     | 939.69           | 1409.54          | 28.43            | 5.27             | 0.10 | 8.06              |
| 5     | 939.69           | 1409.54          | 48.67            | 4.33             | 0.17 | 16.80             |
| 6     | 939.69           | 1409.54          | 50.89            | 4.33             | 0.18 | 17.57             |
| 7     | 939.69           | 1409.54          | 40.71            | 4.33             | 0.14 | 14.06             |
| 8     | 939.69           | 1409.54          | 30.17            | 4.40             | 0.11 | 10.27             |
| 9     | 939.69           | 1409.54          | 41.43            | 8.80             | 0.15 | 7.05              |
| 10    | 939.69           | 1409.54          | 0.00             | 52.66            | 0.04 | 0.00              |

Seccion = 34

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 553.775 Td (mT) = 541.196

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 52.71            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 30.09            | 11.91            | 0.10 | 4.81              |
| 3     | 939.69           | 1409.54          | 29.52            | 7.08             | 0.10 | 7.95              |
| 4     | 939.69           | 1409.54          | 35.64            | 7.24             | 0.12 | 9.37              |
| 5     | 939.69           | 1409.54          | 61.01            | 5.95             | 0.20 | 19.53             |
| 6     | 939.69           | 1409.54          | 63.79            | 5.95             | 0.21 | 20.43             |
| 7     | 939.69           | 1409.54          | 51.03            | 5.95             | 0.17 | 16.34             |
| 8     | 939.69           | 1409.54          | 37.81            | 6.04             | 0.13 | 11.93             |
| 9     | 939.69           | 1409.54          | 51.93            | 12.08            | 0.17 | 8.19              |
| 10    | 939.69           | 1409.54          | 0.00             | 59.75            | 0.04 | 0.00              |

Seccion = 35

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 626.676 Td (mT) = 604.003

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 58.83            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 35.76            | 15.11            | 0.12 | 5.44              |
| 3     | 939.69           | 1409.54          | 35.08            | 8.98             | 0.11 | 9.00              |
| 4     | 939.69           | 1409.54          | 42.35            | 9.19             | 0.14 | 10.61             |
| 5     | 939.69           | 1409.54          | 72.50            | 7.55             | 0.23 | 22.10             |
| 6     | 939.69           | 1409.54          | 75.81            | 7.55             | 0.24 | 23.11             |
| 7     | 939.69           | 1409.54          | 60.65            | 7.55             | 0.19 | 18.50             |
| 8     | 939.69           | 1409.54          | 44.94            | 7.66             | 0.14 | 13.50             |
| 9     | 939.69           | 1409.54          | 61.72            | 15.32            | 0.20 | 9.27              |
| 10    | 939.69           | 1409.54          | 0.00             | 66.68            | 0.05 | 0.00              |

Seccion = 36

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 700.743 Td (mT) = 672.915

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 65.54            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 41.18            | 18.30            | 0.13 | 6.08              |
| 3     | 939.69           | 1409.54          | 40.40            | 10.87            | 0.13 | 10.06             |
| 4     | 939.69           | 1409.54          | 48.78            | 11.13            | 0.15 | 11.86             |
| 5     | 939.69           | 1409.54          | 83.50            | 9.14             | 0.25 | 24.72             |
| 6     | 939.69           | 1409.54          | 87.31            | 9.14             | 0.26 | 25.85             |
| 7     | 939.69           | 1409.54          | 69.85            | 9.14             | 0.21 | 20.68             |
| 8     | 939.69           | 1409.54          | 51.76            | 9.28             | 0.16 | 15.10             |
| 9     | 939.69           | 1409.54          | 71.09            | 18.55            | 0.22 | 10.37             |
| 10    | 939.69           | 1409.54          | 0.00             | 74.29            | 0.05 | 0.00              |

Seccion = 37

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 779.579 Td (mT) = 751.087

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 73.16            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 46.36            | 21.63            | 0.15 | 6.77              |
| 3     | 939.69           | 1409.54          | 45.48            | 12.85            | 0.14 | 11.19             |
| 4     | 939.69           | 1409.54          | 54.91            | 13.15            | 0.17 | 13.20             |
| 5     | 939.69           | 1409.54          | 93.99            | 10.80            | 0.28 | 27.50             |
| 6     | 939.69           | 1409.54          | 98.28            | 10.80            | 0.29 | 28.75             |
| 7     | 939.69           | 1409.54          | 78.62            | 10.80            | 0.24 | 23.01             |
| 8     | 939.69           | 1409.54          | 58.26            | 10.96            | 0.18 | 16.80             |
| 9     | 939.69           | 1409.54          | 80.02            | 21.93            | 0.25 | 11.53             |
| 10    | 939.69           | 1409.54          | 0.00             | 82.92            | 0.06 | 0.00              |

Seccion = 38

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 861.007 Td (mT) = 841.091

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 81.92            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 51.46            | 24.51            | 0.17 | 7.48              |
| 3     | 939.69           | 1409.54          | 50.48            | 14.56            | 0.16 | 12.36             |
| 4     | 939.69           | 1409.54          | 60.95            | 14.90            | 0.19 | 14.57             |
| 5     | 939.69           | 1409.54          | 104.34           | 12.25            | 0.31 | 30.37             |
| 6     | 939.69           | 1409.54          | 109.10           | 12.25            | 0.33 | 31.76             |
| 7     | 939.69           | 1409.54          | 87.28            | 12.25            | 0.26 | 25.41             |
| 8     | 939.69           | 1409.54          | 64.67            | 12.43            | 0.20 | 18.55             |
| 9     | 939.69           | 1409.54          | 88.83            | 24.85            | 0.28 | 12.74             |
| 10    | 939.69           | 1409.54          | 0.00             | 92.86            | 0.07 | 0.00              |

Seccion = 39

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 948.892 Td (mT) = 929.451

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.62            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 56.33            | 29.03            | 0.18 | 8.06              |
| 3     | 939.69           | 1409.54          | 55.52            | 17.25            | 0.17 | 13.37             |
| 4     | 939.69           | 1409.54          | 67.89            | 17.65            | 0.21 | 15.96             |
| 5     | 939.69           | 1409.54          | 115.67           | 14.49            | 0.34 | 33.10             |
| 6     | 939.69           | 1409.54          | 123.02           | 14.49            | 0.36 | 35.21             |
| 7     | 939.69           | 1409.54          | 107.64           | 14.49            | 0.32 | 30.81             |
| 8     | 939.69           | 1409.54          | 89.30            | 14.72            | 0.27 | 25.18             |
| 9     | 939.69           | 1409.54          | 67.64            | 14.72            | 0.20 | 19.07             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.63            | 0.04 | 0.00              |

Seccion = 40

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1602.339 Td (mT) = 1024.541

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 104.30           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 152.29           | 31.77            | 0.29 | 13.60             |
| 3     | 939.69           | 1409.54          | 150.10           | 18.87            | 0.28 | 22.58             |
| 4     | 939.69           | 1409.54          | 183.54           | 19.32            | 0.34 | 26.96             |
| 5     | 939.69           | 1409.54          | 312.71           | 15.86            | 0.57 | 55.90             |
| 6     | 939.69           | 1409.54          | 332.58           | 15.86            | 0.60 | 59.46             |
| 7     | 939.69           | 1409.54          | 291.02           | 15.86            | 0.53 | 52.03             |
| 8     | 939.69           | 1409.54          | 241.43           | 16.11            | 0.44 | 42.52             |
| 9     | 939.69           | 1409.54          | 182.87           | 16.11            | 0.34 | 32.20             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.12            | 0.04 | 0.00              |

Seccion = 41

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2345.057 Td (mT) = 930.195

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.69            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 183.13           | 33.84            | 0.42 | 19.91             |
| 3     | 939.69           | 1409.54          | 180.49           | 20.10            | 0.41 | 33.05             |
| 4     | 939.69           | 1409.54          | 220.70           | 20.58            | 0.49 | 39.45             |
| 5     | 939.69           | 1409.54          | 376.03           | 16.89            | 0.83 | 81.81             |
| 6     | 939.69           | 1409.54          | 399.92           | 16.89            | 0.88 | 87.03             |
| 7     | 939.69           | 1409.54          | 349.95           | 16.89            | 0.77 | 76.15             |
| 8     | 939.69           | 1409.54          | 290.32           | 17.16            | 0.64 | 62.23             |
| 9     | 939.69           | 1409.54          | 219.90           | 17.16            | 0.49 | 47.13             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.67            | 0.04 | 0.00              |

Seccion = 42

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1671.293 Td (mT) = 1017.812

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 103.61           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 156.85           | 32.52            | 0.31 | 14.19             |
| 3     | 939.69           | 1409.54          | 154.58           | 19.31            | 0.29 | 23.55             |
| 4     | 939.69           | 1409.54          | 189.02           | 19.77            | 0.36 | 28.12             |
| 5     | 939.69           | 1409.54          | 322.06           | 16.23            | 0.59 | 58.31             |
| 6     | 939.69           | 1409.54          | 342.52           | 16.23            | 0.63 | 62.02             |
| 7     | 939.69           | 1409.54          | 299.72           | 16.23            | 0.55 | 54.27             |
| 8     | 939.69           | 1409.54          | 248.65           | 16.49            | 0.46 | 44.35             |
| 9     | 939.69           | 1409.54          | 188.33           | 16.49            | 0.35 | 33.59             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.73            | 0.04 | 0.00              |

Seccion = 43

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1020.425 Td (mT) = 929.621

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 90.55            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 62.40            | 28.29            | 0.20 | 8.86              |
| 3     | 939.69           | 1409.54          | 61.22            | 16.81            | 0.19 | 14.65             |
| 4     | 939.69           | 1409.54          | 73.91            | 17.19            | 0.22 | 17.27             |
| 5     | 939.69           | 1409.54          | 126.53           | 14.13            | 0.37 | 35.99             |
| 6     | 939.69           | 1409.54          | 132.30           | 14.13            | 0.39 | 37.64             |
| 7     | 939.69           | 1409.54          | 105.84           | 14.13            | 0.31 | 30.12             |
| 8     | 939.69           | 1409.54          | 78.43            | 14.34            | 0.23 | 21.99             |
| 9     | 939.69           | 1409.54          | 107.72           | 28.68            | 0.33 | 15.09             |
| 10    | 939.69           | 1409.54          | 0.00             | 102.63           | 0.07 | 0.00              |

Seccion = 44

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 937.408 Td (mT) = 847.110

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.51            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 56.64            | 25.29            | 0.18 | 8.14              |
| 3     | 939.69           | 1409.54          | 55.56            | 15.02            | 0.17 | 13.46             |
| 4     | 939.69           | 1409.54          | 67.08            | 15.37            | 0.20 | 15.87             |
| 5     | 939.69           | 1409.54          | 114.83           | 12.63            | 0.34 | 33.07             |
| 6     | 939.69           | 1409.54          | 120.07           | 12.63            | 0.35 | 34.57             |
| 7     | 939.69           | 1409.54          | 96.06            | 12.63            | 0.29 | 27.67             |
| 8     | 939.69           | 1409.54          | 71.18            | 12.82            | 0.21 | 20.20             |
| 9     | 939.69           | 1409.54          | 97.76            | 25.63            | 0.30 | 13.87             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.52            | 0.07 | 0.00              |



Seccion = 45

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 823.760 Td (mT) = 762.850

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.30            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 46.02            | 22.07            | 0.16 | 7.15              |
| 3     | 939.69           | 1409.54          | 45.15            | 13.11            | 0.15 | 11.82             |
| 4     | 939.69           | 1409.54          | 54.51            | 13.42            | 0.18 | 13.94             |
| 5     | 939.69           | 1409.54          | 93.31            | 11.03            | 0.30 | 29.06             |
| 6     | 939.69           | 1409.54          | 97.57            | 11.03            | 0.31 | 30.38             |
| 7     | 939.69           | 1409.54          | 78.05            | 11.03            | 0.25 | 24.31             |
| 8     | 939.69           | 1409.54          | 57.84            | 11.19            | 0.19 | 17.75             |
| 9     | 939.69           | 1409.54          | 79.44            | 22.38            | 0.26 | 12.18             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.22            | 0.06 | 0.00              |

Seccion = 46

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 767.502 Td (mT) = 691.936

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.39            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.24            | 18.56            | 0.15 | 6.66              |
| 3     | 939.69           | 1409.54          | 43.40            | 11.03            | 0.14 | 11.02             |
| 4     | 939.69           | 1409.54          | 52.40            | 11.28            | 0.17 | 12.99             |
| 5     | 939.69           | 1409.54          | 89.70            | 9.27             | 0.28 | 27.07             |
| 6     | 939.69           | 1409.54          | 93.80            | 9.27             | 0.29 | 28.31             |
| 7     | 939.69           | 1409.54          | 75.04            | 9.27             | 0.23 | 22.65             |
| 8     | 939.69           | 1409.54          | 55.60            | 9.41             | 0.17 | 16.54             |
| 9     | 939.69           | 1409.54          | 76.37            | 18.82            | 0.24 | 11.35             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.39            | 0.05 | 0.00              |

Seccion = 47

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 678.116 Td (mT) = 626.161

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.99            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 36.40            | 15.34            | 0.13 | 5.89              |
| 3     | 939.69           | 1409.54          | 35.71            | 9.12             | 0.12 | 9.73              |
| 4     | 939.69           | 1409.54          | 43.12            | 9.33             | 0.15 | 11.48             |
| 5     | 939.69           | 1409.54          | 73.81            | 7.66             | 0.24 | 23.92             |
| 6     | 939.69           | 1409.54          | 77.18            | 7.66             | 0.26 | 25.01             |
| 7     | 939.69           | 1409.54          | 61.75            | 7.66             | 0.21 | 20.01             |
| 8     | 939.69           | 1409.54          | 45.75            | 7.78             | 0.15 | 14.61             |
| 9     | 939.69           | 1409.54          | 62.84            | 15.55            | 0.21 | 10.03             |
| 10    | 939.69           | 1409.54          | 0.00             | 69.13            | 0.05 | 0.00              |

Seccion = 48

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 594.493 Td (mT) = 565.666

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 55.10            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 29.10            | 12.11            | 0.11 | 5.16              |
| 3     | 939.69           | 1409.54          | 28.55            | 7.20             | 0.11 | 8.53              |
| 4     | 939.69           | 1409.54          | 34.47            | 7.36             | 0.13 | 10.06             |
| 5     | 939.69           | 1409.54          | 59.01            | 6.05             | 0.21 | 20.97             |
| 6     | 939.69           | 1409.54          | 61.70            | 6.05             | 0.22 | 21.93             |
| 7     | 939.69           | 1409.54          | 49.36            | 6.05             | 0.18 | 17.55             |
| 8     | 939.69           | 1409.54          | 36.57            | 6.14             | 0.13 | 12.81             |
| 9     | 939.69           | 1409.54          | 50.23            | 12.28            | 0.19 | 8.79              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.45            | 0.04 | 0.00              |

Seccion = 49

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 509.742 Td (mT) = 503.919

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 49.08            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 21.64            | 8.81             | 0.09 | 4.43              |
| 3     | 939.69           | 1409.54          | 21.23            | 5.23             | 0.09 | 7.32              |
| 4     | 939.69           | 1409.54          | 25.64            | 5.36             | 0.11 | 8.63              |
| 5     | 939.69           | 1409.54          | 43.89            | 4.40             | 0.18 | 17.98             |
| 6     | 939.69           | 1409.54          | 45.89            | 4.40             | 0.19 | 18.80             |
| 7     | 939.69           | 1409.54          | 36.71            | 4.40             | 0.15 | 15.04             |
| 8     | 939.69           | 1409.54          | 27.20            | 4.47             | 0.11 | 10.98             |
| 9     | 939.69           | 1409.54          | 37.36            | 8.93             | 0.16 | 7.54              |
| 10    | 939.69           | 1409.54          | 0.00             | 55.63            | 0.04 | 0.00              |

Seccion = 50

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 433.072 Td (mT) = 452.848

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 44.11            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 14.85            | 5.65             | 0.08 | 3.76              |
| 3     | 939.69           | 1409.54          | 14.57            | 3.36             | 0.08 | 6.22              |
| 4     | 939.69           | 1409.54          | 17.59            | 3.43             | 0.09 | 7.33              |
| 5     | 939.69           | 1409.54          | 30.11            | 2.82             | 0.15 | 15.28             |
| 6     | 939.69           | 1409.54          | 31.48            | 2.82             | 0.16 | 15.97             |
| 7     | 939.69           | 1409.54          | 25.19            | 2.82             | 0.13 | 12.78             |
| 8     | 939.69           | 1409.54          | 18.66            | 2.86             | 0.10 | 9.33              |
| 9     | 939.69           | 1409.54          | 25.63            | 5.73             | 0.13 | 6.41              |
| 10    | 939.69           | 1409.54          | 0.00             | 49.99            | 0.04 | 0.00              |

Seccion = 51

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 365.366 Td (mT) = 411.430

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.07            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 8.78             | 2.40             | 0.07 | 3.17              |
| 3     | 939.69           | 1409.54          | 8.62             | 1.43             | 0.06 | 5.24              |
| 4     | 939.69           | 1409.54          | 10.40            | 1.46             | 0.08 | 6.18              |
| 5     | 939.69           | 1409.54          | 17.81            | 1.20             | 0.13 | 12.89             |
| 6     | 939.69           | 1409.54          | 18.62            | 1.20             | 0.14 | 13.48             |
| 7     | 939.69           | 1409.54          | 14.90            | 1.20             | 0.11 | 10.78             |
| 8     | 939.69           | 1409.54          | 11.04            | 1.22             | 0.08 | 7.87              |
| 9     | 939.69           | 1409.54          | 15.16            | 2.43             | 0.11 | 5.40              |
| 10    | 939.69           | 1409.54          | 0.00             | 45.42            | 0.03 | 0.00              |

Seccion = 52

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 412.924 Td (mT) = 436.934

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.56            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 14.89            | 5.58             | 0.08 | 3.59              |
| 3     | 939.69           | 1409.54          | 14.61            | 3.32             | 0.07 | 5.93              |
| 4     | 939.69           | 1409.54          | 17.64            | 3.39             | 0.09 | 6.99              |
| 5     | 939.69           | 1409.54          | 30.19            | 2.79             | 0.15 | 14.57             |
| 6     | 939.69           | 1409.54          | 31.57            | 2.79             | 0.15 | 15.23             |
| 7     | 939.69           | 1409.54          | 25.25            | 2.79             | 0.12 | 12.19             |
| 8     | 939.69           | 1409.54          | 18.71            | 2.83             | 0.09 | 8.90              |
| 9     | 939.69           | 1409.54          | 25.70            | 5.66             | 0.13 | 6.11              |
| 10    | 939.69           | 1409.54          | 0.00             | 48.24            | 0.03 | 0.00              |



Seccion = 53

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 484.181 Td (mT) = 486.789

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.41            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 20.98            | 8.82             | 0.09 | 4.20              |
| 3     | 939.69           | 1409.54          | 20.58            | 5.24             | 0.09 | 6.95              |
| 4     | 939.69           | 1409.54          | 24.85            | 5.36             | 0.10 | 8.20              |
| 5     | 939.69           | 1409.54          | 42.54            | 4.41             | 0.17 | 17.08             |
| 6     | 939.69           | 1409.54          | 44.48            | 4.41             | 0.18 | 17.86             |
| 7     | 939.69           | 1409.54          | 35.58            | 4.41             | 0.15 | 14.29             |
| 8     | 939.69           | 1409.54          | 26.37            | 4.47             | 0.11 | 10.43             |
| 9     | 939.69           | 1409.54          | 36.21            | 8.94             | 0.15 | 7.16              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.74            | 0.04 | 0.00              |

Seccion = 54

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 561.888 Td (mT) = 550.379

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.61            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 27.12            | 12.14            | 0.11 | 4.88              |
| 3     | 939.69           | 1409.54          | 26.61            | 7.21             | 0.10 | 8.07              |
| 4     | 939.69           | 1409.54          | 32.13            | 7.38             | 0.12 | 9.51              |
| 5     | 939.69           | 1409.54          | 55.00            | 6.06             | 0.20 | 19.82             |
| 6     | 939.69           | 1409.54          | 57.51            | 6.06             | 0.21 | 20.72             |
| 7     | 939.69           | 1409.54          | 46.01            | 6.06             | 0.17 | 16.58             |
| 8     | 939.69           | 1409.54          | 34.09            | 6.15             | 0.13 | 12.11             |
| 9     | 939.69           | 1409.54          | 46.82            | 12.31            | 0.18 | 8.31              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.76            | 0.04 | 0.00              |

Seccion = 55

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 635.041 Td (mT) = 613.400

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.75            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 32.84            | 15.37            | 0.12 | 5.51              |
| 3     | 939.69           | 1409.54          | 32.21            | 9.13             | 0.11 | 9.12              |
| 4     | 939.69           | 1409.54          | 38.89            | 9.34             | 0.14 | 10.75             |
| 5     | 939.69           | 1409.54          | 66.58            | 7.68             | 0.23 | 22.40             |
| 6     | 939.69           | 1409.54          | 69.62            | 7.68             | 0.24 | 23.42             |
| 7     | 939.69           | 1409.54          | 55.69            | 7.68             | 0.19 | 18.74             |
| 8     | 939.69           | 1409.54          | 41.27            | 7.79             | 0.14 | 13.68             |
| 9     | 939.69           | 1409.54          | 56.68            | 15.58            | 0.20 | 9.39              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.72            | 0.05 | 0.00              |

Seccion = 56

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 709.034 Td (mT) = 682.814

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.51            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 37.90            | 18.60            | 0.14 | 6.16              |
| 3     | 939.69           | 1409.54          | 37.18            | 11.05            | 0.13 | 10.18             |
| 4     | 939.69           | 1409.54          | 44.89            | 11.31            | 0.15 | 12.00             |
| 5     | 939.69           | 1409.54          | 76.84            | 9.29             | 0.26 | 25.01             |
| 6     | 939.69           | 1409.54          | 80.35            | 9.29             | 0.27 | 26.15             |
| 7     | 939.69           | 1409.54          | 64.28            | 9.29             | 0.22 | 20.93             |
| 8     | 939.69           | 1409.54          | 47.63            | 9.43             | 0.16 | 15.28             |
| 9     | 939.69           | 1409.54          | 65.42            | 18.85            | 0.23 | 10.49             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.38            | 0.05 | 0.00              |

Seccion = 57

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 787.743 Td (mT) = 761.017

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.12            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 43.34            | 21.67            | 0.15 | 6.84              |
| 3     | 939.69           | 1409.54          | 42.52            | 12.87            | 0.14 | 11.31             |
| 4     | 939.69           | 1409.54          | 51.34            | 13.17            | 0.17 | 13.33             |
| 5     | 939.69           | 1409.54          | 87.88            | 10.82            | 0.29 | 27.79             |
| 6     | 939.69           | 1409.54          | 91.89            | 10.82            | 0.30 | 29.05             |
| 7     | 939.69           | 1409.54          | 73.51            | 10.82            | 0.24 | 23.25             |
| 8     | 939.69           | 1409.54          | 54.47            | 10.98            | 0.18 | 16.97             |
| 9     | 939.69           | 1409.54          | 74.82            | 21.96            | 0.25 | 11.65             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.02            | 0.06 | 0.00              |

Seccion = 58

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 869.282 Td (mT) = 850.524

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.84            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 48.38            | 24.96            | 0.17 | 7.55              |
| 3     | 939.69           | 1409.54          | 47.46            | 14.83            | 0.16 | 12.48             |
| 4     | 939.69           | 1409.54          | 57.31            | 15.17            | 0.19 | 14.71             |
| 5     | 939.69           | 1409.54          | 98.10            | 12.47            | 0.31 | 30.66             |
| 6     | 939.69           | 1409.54          | 102.58           | 12.47            | 0.33 | 32.06             |
| 7     | 939.69           | 1409.54          | 82.06            | 12.47            | 0.26 | 25.66             |
| 8     | 939.69           | 1409.54          | 60.80            | 12.65            | 0.20 | 18.73             |
| 9     | 939.69           | 1409.54          | 83.51            | 25.30            | 0.28 | 12.86             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.90            | 0.07 | 0.00              |

Seccion = 59

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 957.551 Td (mT) = 938.894

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 95.58            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 53.42            | 29.18            | 0.18 | 8.13              |
| 3     | 939.69           | 1409.54          | 52.65            | 17.33            | 0.17 | 13.49             |
| 4     | 939.69           | 1409.54          | 64.38            | 17.74            | 0.21 | 16.11             |
| 5     | 939.69           | 1409.54          | 109.68           | 14.56            | 0.34 | 33.41             |
| 6     | 939.69           | 1409.54          | 116.66           | 14.56            | 0.37 | 35.54             |
| 7     | 939.69           | 1409.54          | 102.08           | 14.56            | 0.32 | 31.09             |
| 8     | 939.69           | 1409.54          | 84.68            | 14.80            | 0.27 | 25.41             |
| 9     | 939.69           | 1409.54          | 64.14            | 14.80            | 0.21 | 19.24             |
| 10    | 939.69           | 1409.54          | 0.00             | 54.17            | 0.04 | 0.00              |

Seccion = 60

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1611.071 Td (mT) = 1033.901

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 105.25           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 149.39           | 31.91            | 0.30 | 13.68             |
| 3     | 939.69           | 1409.54          | 147.24           | 18.95            | 0.28 | 22.70             |
| 4     | 939.69           | 1409.54          | 180.04           | 19.40            | 0.34 | 27.10             |
| 5     | 939.69           | 1409.54          | 306.75           | 15.93            | 0.57 | 56.21             |
| 6     | 939.69           | 1409.54          | 326.24           | 15.93            | 0.61 | 59.79             |
| 7     | 939.69           | 1409.54          | 285.48           | 15.93            | 0.53 | 52.31             |
| 8     | 939.69           | 1409.54          | 236.83           | 16.18            | 0.44 | 42.75             |
| 9     | 939.69           | 1409.54          | 179.38           | 16.18            | 0.34 | 32.38             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.66            | 0.04 | 0.00              |

Seccion = 61

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2346.235 Td (mT) = 930.299

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.70            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 182.21           | 33.52            | 0.42 | 19.92             |
| 3     | 939.69           | 1409.54          | 179.58           | 19.91            | 0.41 | 33.06             |
| 4     | 939.69           | 1409.54          | 219.59           | 20.38            | 0.49 | 39.47             |
| 5     | 939.69           | 1409.54          | 374.13           | 16.73            | 0.83 | 81.86             |
| 6     | 939.69           | 1409.54          | 397.91           | 16.73            | 0.88 | 87.07             |
| 7     | 939.69           | 1409.54          | 348.18           | 16.73            | 0.77 | 76.19             |
| 8     | 939.69           | 1409.54          | 288.86           | 16.99            | 0.64 | 62.26             |
| 9     | 939.69           | 1409.54          | 218.79           | 16.99            | 0.49 | 47.15             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.68            | 0.04 | 0.00              |

Seccion = 62

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1672.603 Td (mT) = 1018.845

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 103.72           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 156.51           | 32.37            | 0.31 | 14.20             |
| 3     | 939.69           | 1409.54          | 154.25           | 19.23            | 0.29 | 23.57             |
| 4     | 939.69           | 1409.54          | 188.61           | 19.68            | 0.36 | 28.14             |
| 5     | 939.69           | 1409.54          | 321.36           | 16.16            | 0.59 | 58.35             |
| 6     | 939.69           | 1409.54          | 341.78           | 16.16            | 0.63 | 62.07             |
| 7     | 939.69           | 1409.54          | 299.07           | 16.16            | 0.55 | 54.31             |
| 8     | 939.69           | 1409.54          | 248.11           | 16.41            | 0.46 | 44.39             |
| 9     | 939.69           | 1409.54          | 187.93           | 16.41            | 0.35 | 33.61             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.79            | 0.04 | 0.00              |

Seccion = 63

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1021.532 Td (mT) = 930.624

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 90.64            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 62.00            | 28.17            | 0.20 | 8.87              |
| 3     | 939.69           | 1409.54          | 60.82            | 16.73            | 0.19 | 14.66             |
| 4     | 939.69           | 1409.54          | 73.43            | 17.12            | 0.22 | 17.29             |
| 5     | 939.69           | 1409.54          | 125.70           | 14.07            | 0.37 | 36.03             |
| 6     | 939.69           | 1409.54          | 131.44           | 14.07            | 0.39 | 37.68             |
| 7     | 939.69           | 1409.54          | 105.15           | 14.07            | 0.31 | 30.15             |
| 8     | 939.69           | 1409.54          | 77.91            | 14.28            | 0.23 | 22.01             |
| 9     | 939.69           | 1409.54          | 107.01           | 28.55            | 0.33 | 15.11             |
| 10    | 939.69           | 1409.54          | 0.00             | 102.74           | 0.07 | 0.00              |

Seccion = 64

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 938.025 Td (mT) = 848.134

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.61            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 56.11            | 25.17            | 0.18 | 8.14              |
| 3     | 939.69           | 1409.54          | 55.05            | 14.95            | 0.17 | 13.46             |
| 4     | 939.69           | 1409.54          | 66.46            | 15.30            | 0.20 | 15.88             |
| 5     | 939.69           | 1409.54          | 113.77           | 12.57            | 0.34 | 33.09             |
| 6     | 939.69           | 1409.54          | 118.96           | 12.57            | 0.35 | 34.60             |
| 7     | 939.69           | 1409.54          | 95.17            | 12.57            | 0.29 | 27.68             |
| 8     | 939.69           | 1409.54          | 70.52            | 12.76            | 0.21 | 20.21             |
| 9     | 939.69           | 1409.54          | 96.86            | 25.52            | 0.30 | 13.88             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.63            | 0.07 | 0.00              |

Seccion = 65

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 824.137 Td (mT) = 763.869

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.40            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 45.46            | 21.96            | 0.16 | 7.16              |
| 3     | 939.69           | 1409.54          | 44.60            | 13.05            | 0.15 | 11.83             |
| 4     | 939.69           | 1409.54          | 53.84            | 13.35            | 0.18 | 13.95             |
| 5     | 939.69           | 1409.54          | 92.17            | 10.97            | 0.30 | 29.07             |
| 6     | 939.69           | 1409.54          | 96.38            | 10.97            | 0.31 | 30.40             |
| 7     | 939.69           | 1409.54          | 77.10            | 10.97            | 0.25 | 24.32             |
| 8     | 939.69           | 1409.54          | 57.13            | 11.13            | 0.19 | 17.76             |
| 9     | 939.69           | 1409.54          | 78.47            | 22.27            | 0.26 | 12.19             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.33            | 0.06 | 0.00              |

Seccion = 66

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 767.830 Td (mT) = 691.355

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.34            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 43.52            | 18.59            | 0.15 | 6.67              |
| 3     | 939.69           | 1409.54          | 42.69            | 11.04            | 0.14 | 11.02             |
| 4     | 939.69           | 1409.54          | 51.55            | 11.30            | 0.17 | 13.00             |
| 5     | 939.69           | 1409.54          | 88.24            | 9.29             | 0.28 | 27.08             |
| 6     | 939.69           | 1409.54          | 92.27            | 9.29             | 0.29 | 28.32             |
| 7     | 939.69           | 1409.54          | 73.82            | 9.29             | 0.23 | 22.66             |
| 8     | 939.69           | 1409.54          | 54.70            | 9.42             | 0.17 | 16.55             |
| 9     | 939.69           | 1409.54          | 75.12            | 18.84            | 0.24 | 11.36             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.33            | 0.05 | 0.00              |

Seccion = 67

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 678.314 Td (mT) = 626.064

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.98            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 35.42            | 15.34            | 0.13 | 5.89              |
| 3     | 939.69           | 1409.54          | 34.75            | 9.12             | 0.12 | 9.74              |
| 4     | 939.69           | 1409.54          | 41.95            | 9.33             | 0.15 | 11.48             |
| 5     | 939.69           | 1409.54          | 71.82            | 7.67             | 0.24 | 23.93             |
| 6     | 939.69           | 1409.54          | 75.10            | 7.67             | 0.26 | 25.02             |
| 7     | 939.69           | 1409.54          | 60.08            | 7.67             | 0.21 | 20.02             |
| 8     | 939.69           | 1409.54          | 44.52            | 7.78             | 0.15 | 14.62             |
| 9     | 939.69           | 1409.54          | 61.14            | 15.56            | 0.21 | 10.03             |
| 10    | 939.69           | 1409.54          | 0.00             | 69.12            | 0.05 | 0.00              |

Seccion = 68

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 594.812 Td (mT) = 565.147

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 55.05            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 28.14            | 12.15            | 0.11 | 5.16              |
| 3     | 939.69           | 1409.54          | 27.61            | 7.22             | 0.11 | 8.54              |
| 4     | 939.69           | 1409.54          | 33.33            | 7.39             | 0.13 | 10.07             |
| 5     | 939.69           | 1409.54          | 57.06            | 6.07             | 0.21 | 20.98             |
| 6     | 939.69           | 1409.54          | 59.66            | 6.07             | 0.22 | 21.94             |
| 7     | 939.69           | 1409.54          | 47.73            | 6.07             | 0.18 | 17.56             |
| 8     | 939.69           | 1409.54          | 35.37            | 6.16             | 0.13 | 12.82             |
| 9     | 939.69           | 1409.54          | 48.58            | 12.32            | 0.19 | 8.80              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.39            | 0.04 | 0.00              |

Seccion = 69

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 510.344 Td (mT) = 503.299

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As, ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|--------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 49.02            | 0.03 | 0.00               |
| 2     | 939.69           | 1409.54          | 20.72            | 8.87             | 0.09 | 4.43               |
| 3     | 939.69           | 1409.54          | 20.33            | 5.27             | 0.09 | 7.33               |
| 4     | 939.69           | 1409.54          | 24.55            | 5.39             | 0.11 | 8.64               |
| 5     | 939.69           | 1409.54          | 42.02            | 4.43             | 0.18 | 18.00              |
| 6     | 939.69           | 1409.54          | 43.94            | 4.43             | 0.19 | 18.82              |
| 7     | 939.69           | 1409.54          | 35.15            | 4.43             | 0.15 | 15.06              |
| 8     | 939.69           | 1409.54          | 26.04            | 4.50             | 0.11 | 11.00              |
| 9     | 939.69           | 1409.54          | 35.77            | 9.00             | 0.16 | 7.55               |
| 10    | 939.69           | 1409.54          | 0.00             | 55.56            | 0.04 | 0.00               |

Seccion = 70

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 433.824 Td (mT) = 452.716

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As, ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|--------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 44.09            | 0.03 | 0.00               |
| 2     | 939.69           | 1409.54          | 13.94            | 5.63             | 0.08 | 3.77               |
| 3     | 939.69           | 1409.54          | 13.67            | 3.35             | 0.08 | 6.23               |
| 4     | 939.69           | 1409.54          | 16.51            | 3.42             | 0.09 | 7.34               |
| 5     | 939.69           | 1409.54          | 28.26            | 2.81             | 0.15 | 15.30              |
| 6     | 939.69           | 1409.54          | 29.55            | 2.81             | 0.16 | 16.00              |
| 7     | 939.69           | 1409.54          | 23.64            | 2.81             | 0.13 | 12.80              |
| 8     | 939.69           | 1409.54          | 17.51            | 2.85             | 0.10 | 9.35               |
| 9     | 939.69           | 1409.54          | 24.06            | 5.71             | 0.13 | 6.42               |
| 10    | 939.69           | 1409.54          | 0.00             | 49.98            | 0.04 | 0.00               |

Seccion = 71

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 366.470 Td (mT) = 411.393

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As, ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|--------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.07            | 0.03 | 0.00               |
| 2     | 939.69           | 1409.54          | 7.92             | 2.37             | 0.07 | 3.18               |
| 3     | 939.69           | 1409.54          | 7.77             | 1.41             | 0.06 | 5.26               |
| 4     | 939.69           | 1409.54          | 9.38             | 1.44             | 0.08 | 6.20               |
| 5     | 939.69           | 1409.54          | 16.06            | 1.19             | 0.13 | 12.93              |
| 6     | 939.69           | 1409.54          | 16.79            | 1.19             | 0.14 | 13.52              |
| 7     | 939.69           | 1409.54          | 13.43            | 1.19             | 0.11 | 10.82              |
| 8     | 939.69           | 1409.54          | 9.95             | 1.20             | 0.08 | 7.90               |
| 9     | 939.69           | 1409.54          | 13.67            | 2.41             | 0.11 | 5.42               |
| 10    | 939.69           | 1409.54          | 0.00             | 45.42            | 0.03 | 0.00               |

Seccion = 72

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 426.219 Td (mT) = 437.275

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As, ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|--------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.59            | 0.03 | 0.00               |
| 2     | 939.69           | 1409.54          | 15.95            | 5.62             | 0.08 | 3.70               |
| 3     | 939.69           | 1409.54          | 15.65            | 3.34             | 0.07 | 6.12               |
| 4     | 939.69           | 1409.54          | 18.89            | 3.42             | 0.09 | 7.21               |
| 5     | 939.69           | 1409.54          | 32.34            | 2.81             | 0.15 | 15.03              |
| 6     | 939.69           | 1409.54          | 33.82            | 2.81             | 0.16 | 15.72              |
| 7     | 939.69           | 1409.54          | 27.06            | 2.81             | 0.13 | 12.58              |
| 8     | 939.69           | 1409.54          | 20.05            | 2.85             | 0.10 | 9.18               |
| 9     | 939.69           | 1409.54          | 27.53            | 5.70             | 0.13 | 6.30               |
| 10    | 939.69           | 1409.54          | 0.00             | 48.28            | 0.03 | 0.00               |

Seccion = 73

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 497.368 Td (mT) = 487.461

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.48            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 21.94            | 8.82             | 0.09 | 4.32              |
| 3     | 939.69           | 1409.54          | 21.52            | 5.24             | 0.09 | 7.14              |
| 4     | 939.69           | 1409.54          | 25.98            | 5.36             | 0.11 | 8.42              |
| 5     | 939.69           | 1409.54          | 44.48            | 4.40             | 0.18 | 17.54             |
| 6     | 939.69           | 1409.54          | 46.51            | 4.40             | 0.19 | 18.34             |
| 7     | 939.69           | 1409.54          | 37.20            | 4.40             | 0.15 | 14.68             |
| 8     | 939.69           | 1409.54          | 27.57            | 4.47             | 0.11 | 10.72             |
| 9     | 939.69           | 1409.54          | 37.86            | 8.94             | 0.16 | 7.36              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.82            | 0.04 | 0.00              |

Seccion = 74

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 575.063 Td (mT) = 550.898

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.66            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 28.24            | 12.14            | 0.11 | 4.99              |
| 3     | 939.69           | 1409.54          | 27.71            | 7.21             | 0.10 | 8.25              |
| 4     | 939.69           | 1409.54          | 33.45            | 7.38             | 0.12 | 9.73              |
| 5     | 939.69           | 1409.54          | 57.26            | 6.07             | 0.21 | 20.28             |
| 6     | 939.69           | 1409.54          | 59.88            | 6.07             | 0.22 | 21.21             |
| 7     | 939.69           | 1409.54          | 47.90            | 6.07             | 0.17 | 16.97             |
| 8     | 939.69           | 1409.54          | 35.49            | 6.15             | 0.13 | 12.39             |
| 9     | 939.69           | 1409.54          | 48.75            | 12.31            | 0.18 | 8.51              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.82            | 0.04 | 0.00              |

Seccion = 75

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 648.338 Td (mT) = 614.026

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.81            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 33.43            | 15.40            | 0.12 | 5.63              |
| 3     | 939.69           | 1409.54          | 32.79            | 9.15             | 0.12 | 9.31              |
| 4     | 939.69           | 1409.54          | 39.59            | 9.36             | 0.14 | 10.97             |
| 5     | 939.69           | 1409.54          | 67.78            | 7.70             | 0.23 | 22.87             |
| 6     | 939.69           | 1409.54          | 70.87            | 7.70             | 0.24 | 23.91             |
| 7     | 939.69           | 1409.54          | 56.70            | 7.70             | 0.20 | 19.13             |
| 8     | 939.69           | 1409.54          | 42.01            | 7.81             | 0.15 | 13.97             |
| 9     | 939.69           | 1409.54          | 57.70            | 15.62            | 0.21 | 9.59              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.79            | 0.05 | 0.00              |

Seccion = 76

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 722.288 Td (mT) = 683.274

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.55            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 39.05            | 18.57            | 0.14 | 6.27              |
| 3     | 939.69           | 1409.54          | 38.31            | 11.03            | 0.13 | 10.37             |
| 4     | 939.69           | 1409.54          | 46.25            | 11.29            | 0.16 | 12.23             |
| 5     | 939.69           | 1409.54          | 79.17            | 9.28             | 0.26 | 25.48             |
| 6     | 939.69           | 1409.54          | 82.79            | 9.28             | 0.27 | 26.64             |
| 7     | 939.69           | 1409.54          | 66.23            | 9.28             | 0.22 | 21.32             |
| 8     | 939.69           | 1409.54          | 49.07            | 9.41             | 0.16 | 15.56             |
| 9     | 939.69           | 1409.54          | 67.40            | 18.83            | 0.23 | 10.68             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.43            | 0.05 | 0.00              |



Seccion = 77

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 801.206 Td (mT) = 761.460

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.17            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.32            | 21.69            | 0.15 | 6.96              |
| 3     | 939.69           | 1409.54          | 43.48            | 12.89            | 0.15 | 11.50             |
| 4     | 939.69           | 1409.54          | 52.50            | 13.19            | 0.17 | 13.56             |
| 5     | 939.69           | 1409.54          | 89.87            | 10.84            | 0.29 | 28.26             |
| 6     | 939.69           | 1409.54          | 93.97            | 10.84            | 0.30 | 29.55             |
| 7     | 939.69           | 1409.54          | 75.18            | 10.84            | 0.24 | 23.65             |
| 8     | 939.69           | 1409.54          | 55.70            | 11.00            | 0.18 | 17.27             |
| 9     | 939.69           | 1409.54          | 76.51            | 21.99            | 0.26 | 11.85             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.07            | 0.06 | 0.00              |

Seccion = 78

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 882.640 Td (mT) = 850.856

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.87            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 49.32            | 25.06            | 0.17 | 7.66              |
| 3     | 939.69           | 1409.54          | 48.38            | 14.89            | 0.16 | 12.67             |
| 4     | 939.69           | 1409.54          | 58.42            | 15.24            | 0.19 | 14.94             |
| 5     | 939.69           | 1409.54          | 100.00           | 12.52            | 0.32 | 31.13             |
| 6     | 939.69           | 1409.54          | 104.56           | 12.52            | 0.33 | 32.55             |
| 7     | 939.69           | 1409.54          | 83.65            | 12.52            | 0.27 | 26.05             |
| 8     | 939.69           | 1409.54          | 61.98            | 12.70            | 0.20 | 19.02             |
| 9     | 939.69           | 1409.54          | 85.13            | 25.41            | 0.28 | 13.06             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.93            | 0.07 | 0.00              |

Seccion = 79

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 970.767 Td (mT) = 939.239

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 95.61            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 54.31            | 29.15            | 0.19 | 8.24              |
| 3     | 939.69           | 1409.54          | 53.53            | 17.32            | 0.17 | 13.68             |
| 4     | 939.69           | 1409.54          | 65.45            | 17.73            | 0.21 | 16.33             |
| 5     | 939.69           | 1409.54          | 111.52           | 14.55            | 0.35 | 33.87             |
| 6     | 939.69           | 1409.54          | 118.60           | 14.55            | 0.37 | 36.03             |
| 7     | 939.69           | 1409.54          | 103.78           | 14.55            | 0.32 | 31.52             |
| 8     | 939.69           | 1409.54          | 86.10            | 14.78            | 0.27 | 25.76             |
| 9     | 939.69           | 1409.54          | 65.21            | 14.78            | 0.21 | 19.51             |
| 10    | 939.69           | 1409.54          | 0.00             | 54.19            | 0.04 | 0.00              |

Seccion = 80

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1624.208 Td (mT) = 1034.288

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 105.29           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 150.27           | 31.87            | 0.30 | 13.79             |
| 3     | 939.69           | 1409.54          | 148.10           | 18.93            | 0.28 | 22.89             |
| 4     | 939.69           | 1409.54          | 181.10           | 19.38            | 0.35 | 27.32             |
| 5     | 939.69           | 1409.54          | 308.56           | 15.91            | 0.58 | 56.67             |
| 6     | 939.69           | 1409.54          | 328.17           | 15.91            | 0.61 | 60.28             |
| 7     | 939.69           | 1409.54          | 287.16           | 15.91            | 0.54 | 52.74             |
| 8     | 939.69           | 1409.54          | 238.23           | 16.16            | 0.45 | 43.10             |
| 9     | 939.69           | 1409.54          | 180.44           | 16.16            | 0.34 | 32.64             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.68            | 0.04 | 0.00              |

Seccion = 81

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2349.844 Td (mT) = 932.112

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.89            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 182.77           | 33.86            | 0.42 | 19.95             |
| 3     | 939.69           | 1409.54          | 180.13           | 20.11            | 0.41 | 33.11             |
| 4     | 939.69           | 1409.54          | 220.26           | 20.59            | 0.49 | 39.53             |
| 5     | 939.69           | 1409.54          | 375.28           | 16.90            | 0.83 | 81.98             |
| 6     | 939.69           | 1409.54          | 399.13           | 16.90            | 0.88 | 87.21             |
| 7     | 939.69           | 1409.54          | 349.25           | 16.90            | 0.77 | 76.30             |
| 8     | 939.69           | 1409.54          | 289.74           | 17.17            | 0.64 | 62.36             |
| 9     | 939.69           | 1409.54          | 219.46           | 17.17            | 0.49 | 47.22             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.78            | 0.04 | 0.00              |

Seccion = 82

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1676.108 Td (mT) = 1017.005

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 103.53           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 157.37           | 32.52            | 0.31 | 14.23             |
| 3     | 939.69           | 1409.54          | 155.10           | 19.32            | 0.29 | 23.62             |
| 4     | 939.69           | 1409.54          | 189.65           | 19.77            | 0.36 | 28.20             |
| 5     | 939.69           | 1409.54          | 323.12           | 16.23            | 0.60 | 58.48             |
| 6     | 939.69           | 1409.54          | 343.66           | 16.23            | 0.63 | 62.20             |
| 7     | 939.69           | 1409.54          | 300.71           | 16.23            | 0.55 | 54.43             |
| 8     | 939.69           | 1409.54          | 249.48           | 16.49            | 0.46 | 44.48             |
| 9     | 939.69           | 1409.54          | 188.96           | 16.49            | 0.35 | 33.68             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.68            | 0.04 | 0.00              |

Seccion = 83

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1025.045 Td (mT) = 928.851

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 90.47            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 62.90            | 28.25            | 0.20 | 8.90              |
| 3     | 939.69           | 1409.54          | 61.71            | 16.79            | 0.19 | 14.71             |
| 4     | 939.69           | 1409.54          | 74.51            | 17.18            | 0.22 | 17.35             |
| 5     | 939.69           | 1409.54          | 127.54           | 14.11            | 0.37 | 36.16             |
| 6     | 939.69           | 1409.54          | 133.36           | 14.11            | 0.39 | 37.81             |
| 7     | 939.69           | 1409.54          | 106.69           | 14.11            | 0.31 | 30.25             |
| 8     | 939.69           | 1409.54          | 79.06            | 14.32            | 0.23 | 22.09             |
| 9     | 939.69           | 1409.54          | 108.58           | 28.64            | 0.33 | 15.16             |
| 10    | 939.69           | 1409.54          | 0.00             | 102.55           | 0.07 | 0.00              |

Seccion = 84

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 941.789 Td (mT) = 846.318

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.43            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 56.97            | 25.39            | 0.18 | 8.18              |
| 3     | 939.69           | 1409.54          | 55.89            | 15.09            | 0.17 | 13.52             |
| 4     | 939.69           | 1409.54          | 67.48            | 15.44            | 0.20 | 15.94             |
| 5     | 939.69           | 1409.54          | 115.51           | 12.68            | 0.34 | 33.22             |
| 6     | 939.69           | 1409.54          | 120.78           | 12.68            | 0.36 | 34.74             |
| 7     | 939.69           | 1409.54          | 96.62            | 12.68            | 0.29 | 27.80             |
| 8     | 939.69           | 1409.54          | 71.59            | 12.87            | 0.21 | 20.29             |
| 9     | 939.69           | 1409.54          | 98.33            | 25.74            | 0.30 | 13.93             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.43            | 0.07 | 0.00              |



Seccion = 85

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 828.067 Td (mT) = 761.952

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.21            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 46.43            | 22.13            | 0.16 | 7.19              |
| 3     | 939.69           | 1409.54          | 45.55            | 13.15            | 0.15 | 11.89             |
| 4     | 939.69           | 1409.54          | 54.99            | 13.45            | 0.18 | 14.02             |
| 5     | 939.69           | 1409.54          | 94.14            | 11.05            | 0.30 | 29.21             |
| 6     | 939.69           | 1409.54          | 98.44            | 11.05            | 0.31 | 30.54             |
| 7     | 939.69           | 1409.54          | 78.75            | 11.05            | 0.25 | 24.44             |
| 8     | 939.69           | 1409.54          | 58.35            | 11.22            | 0.19 | 17.84             |
| 9     | 939.69           | 1409.54          | 80.14            | 22.43            | 0.26 | 12.25             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.12            | 0.06 | 0.00              |

Seccion = 86

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 771.698 Td (mT) = 692.631

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.46            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.03            | 18.50            | 0.15 | 6.70              |
| 3     | 939.69           | 1409.54          | 43.20            | 10.99            | 0.14 | 11.08             |
| 4     | 939.69           | 1409.54          | 52.15            | 11.25            | 0.17 | 13.06             |
| 5     | 939.69           | 1409.54          | 89.28            | 9.24             | 0.28 | 27.22             |
| 6     | 939.69           | 1409.54          | 93.35            | 9.24             | 0.29 | 28.46             |
| 7     | 939.69           | 1409.54          | 74.68            | 9.24             | 0.23 | 22.78             |
| 8     | 939.69           | 1409.54          | 55.34            | 9.38             | 0.18 | 16.63             |
| 9     | 939.69           | 1409.54          | 76.00            | 18.76            | 0.24 | 11.41             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.47            | 0.05 | 0.00              |

Seccion = 87

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 682.264 Td (mT) = 626.058

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.98            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 36.19            | 15.32            | 0.13 | 5.92              |
| 3     | 939.69           | 1409.54          | 35.50            | 9.10             | 0.12 | 9.79              |
| 4     | 939.69           | 1409.54          | 42.86            | 9.31             | 0.15 | 11.55             |
| 5     | 939.69           | 1409.54          | 73.37            | 7.65             | 0.25 | 24.07             |
| 6     | 939.69           | 1409.54          | 76.72            | 7.65             | 0.26 | 25.16             |
| 7     | 939.69           | 1409.54          | 61.37            | 7.65             | 0.21 | 20.14             |
| 8     | 939.69           | 1409.54          | 45.48            | 7.77             | 0.15 | 14.70             |
| 9     | 939.69           | 1409.54          | 62.46            | 15.53            | 0.22 | 10.09             |
| 10    | 939.69           | 1409.54          | 0.00             | 69.12            | 0.05 | 0.00              |

Seccion = 88

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 598.672 Td (mT) = 566.135

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 55.14            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 28.89            | 12.04            | 0.11 | 5.20              |
| 3     | 939.69           | 1409.54          | 28.34            | 7.15             | 0.11 | 8.59              |
| 4     | 939.69           | 1409.54          | 34.22            | 7.32             | 0.13 | 10.13             |
| 5     | 939.69           | 1409.54          | 58.57            | 6.01             | 0.22 | 21.12             |
| 6     | 939.69           | 1409.54          | 61.25            | 6.01             | 0.22 | 22.08             |
| 7     | 939.69           | 1409.54          | 49.00            | 6.01             | 0.18 | 17.67             |
| 8     | 939.69           | 1409.54          | 36.31            | 6.10             | 0.13 | 12.90             |
| 9     | 939.69           | 1409.54          | 49.86            | 12.21            | 0.19 | 8.86              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.50            | 0.04 | 0.00              |

Seccion = 89

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 514.293 Td (mT) = 504.837

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 49.17            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 21.35            | 8.68             | 0.10 | 4.47              |
| 3     | 939.69           | 1409.54          | 20.95            | 5.16             | 0.09 | 7.38              |
| 4     | 939.69           | 1409.54          | 25.29            | 5.28             | 0.11 | 8.71              |
| 5     | 939.69           | 1409.54          | 43.29            | 4.34             | 0.18 | 18.14             |
| 6     | 939.69           | 1409.54          | 45.27            | 4.34             | 0.19 | 18.97             |
| 7     | 939.69           | 1409.54          | 36.22            | 4.34             | 0.15 | 15.18             |
| 8     | 939.69           | 1409.54          | 26.84            | 4.40             | 0.12 | 11.08             |
| 9     | 939.69           | 1409.54          | 36.86            | 8.80             | 0.16 | 7.61              |
| 10    | 939.69           | 1409.54          | 0.00             | 55.73            | 0.04 | 0.00              |

Seccion = 90

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 437.467 Td (mT) = 453.823

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 44.20            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 14.52            | 5.52             | 0.08 | 3.80              |
| 3     | 939.69           | 1409.54          | 14.25            | 3.28             | 0.08 | 6.28              |
| 4     | 939.69           | 1409.54          | 17.20            | 3.36             | 0.09 | 7.41              |
| 5     | 939.69           | 1409.54          | 29.45            | 2.76             | 0.16 | 15.43             |
| 6     | 939.69           | 1409.54          | 30.79            | 2.76             | 0.16 | 16.14             |
| 7     | 939.69           | 1409.54          | 24.63            | 2.76             | 0.13 | 12.91             |
| 8     | 939.69           | 1409.54          | 18.25            | 2.80             | 0.10 | 9.43              |
| 9     | 939.69           | 1409.54          | 25.07            | 5.60             | 0.14 | 6.47              |
| 10    | 939.69           | 1409.54          | 0.00             | 50.10            | 0.04 | 0.00              |

Seccion = 91

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 370.007 Td (mT) = 411.670

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.10            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 8.48             | 2.44             | 0.07 | 3.21              |
| 3     | 939.69           | 1409.54          | 8.32             | 1.45             | 0.06 | 5.31              |
| 4     | 939.69           | 1409.54          | 10.05            | 1.48             | 0.08 | 6.26              |
| 5     | 939.69           | 1409.54          | 17.20            | 1.22             | 0.13 | 13.05             |
| 6     | 939.69           | 1409.54          | 17.99            | 1.22             | 0.14 | 13.65             |
| 7     | 939.69           | 1409.54          | 14.39            | 1.22             | 0.11 | 10.92             |
| 8     | 939.69           | 1409.54          | 10.66            | 1.24             | 0.08 | 7.97              |
| 9     | 939.69           | 1409.54          | 14.65            | 2.47             | 0.11 | 5.47              |
| 10    | 939.69           | 1409.54          | 0.00             | 45.45            | 0.03 | 0.00              |

Seccion = 92

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 422.535 Td (mT) = 436.047

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.47            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 15.31            | 5.80             | 0.08 | 3.67              |
| 3     | 939.69           | 1409.54          | 15.02            | 3.45             | 0.07 | 6.07              |
| 4     | 939.69           | 1409.54          | 18.14            | 3.53             | 0.09 | 7.15              |
| 5     | 939.69           | 1409.54          | 31.04            | 2.90             | 0.15 | 14.90             |
| 6     | 939.69           | 1409.54          | 32.46            | 2.90             | 0.16 | 15.58             |
| 7     | 939.69           | 1409.54          | 25.97            | 2.90             | 0.13 | 12.47             |
| 8     | 939.69           | 1409.54          | 19.24            | 2.94             | 0.09 | 9.11              |
| 9     | 939.69           | 1409.54          | 26.43            | 5.88             | 0.13 | 6.25              |
| 10    | 939.69           | 1409.54          | 0.00             | 48.14            | 0.03 | 0.00              |

Seccion = 93

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 493.689 Td (mT) = 486.769

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.41            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 21.21            | 8.95             | 0.09 | 4.29              |
| 3     | 939.69           | 1409.54          | 20.81            | 5.32             | 0.09 | 7.09              |
| 4     | 939.69           | 1409.54          | 25.12            | 5.44             | 0.11 | 8.36              |
| 5     | 939.69           | 1409.54          | 43.01            | 4.47             | 0.18 | 17.41             |
| 6     | 939.69           | 1409.54          | 44.97            | 4.47             | 0.18 | 18.21             |
| 7     | 939.69           | 1409.54          | 35.98            | 4.47             | 0.15 | 14.57             |
| 8     | 939.69           | 1409.54          | 26.66            | 4.54             | 0.11 | 10.64             |
| 9     | 939.69           | 1409.54          | 36.61            | 9.08             | 0.15 | 7.30              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.74            | 0.04 | 0.00              |

Seccion = 94

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 571.218 Td (mT) = 550.395

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.61            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 27.30            | 12.24            | 0.11 | 4.96              |
| 3     | 939.69           | 1409.54          | 26.78            | 7.27             | 0.10 | 8.20              |
| 4     | 939.69           | 1409.54          | 32.33            | 7.44             | 0.12 | 9.67              |
| 5     | 939.69           | 1409.54          | 55.34            | 6.11             | 0.21 | 20.15             |
| 6     | 939.69           | 1409.54          | 57.87            | 6.11             | 0.21 | 21.07             |
| 7     | 939.69           | 1409.54          | 46.30            | 6.11             | 0.17 | 16.86             |
| 8     | 939.69           | 1409.54          | 34.30            | 6.20             | 0.13 | 12.31             |
| 9     | 939.69           | 1409.54          | 47.11            | 12.41            | 0.18 | 8.45              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.76            | 0.04 | 0.00              |

Seccion = 95

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 644.272 Td (mT) = 613.308

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.74            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 32.93            | 15.48            | 0.12 | 5.59              |
| 3     | 939.69           | 1409.54          | 32.30            | 9.20             | 0.12 | 9.25              |
| 4     | 939.69           | 1409.54          | 39.00            | 9.41             | 0.14 | 10.91             |
| 5     | 939.69           | 1409.54          | 66.76            | 7.73             | 0.23 | 22.73             |
| 6     | 939.69           | 1409.54          | 69.80            | 7.73             | 0.24 | 23.76             |
| 7     | 939.69           | 1409.54          | 55.84            | 7.73             | 0.20 | 19.01             |
| 8     | 939.69           | 1409.54          | 41.38            | 7.85             | 0.15 | 13.88             |
| 9     | 939.69           | 1409.54          | 56.83            | 15.69            | 0.20 | 9.53              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.71            | 0.05 | 0.00              |

Seccion = 96

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 718.424 Td (mT) = 682.485

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.47            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 38.13            | 18.70            | 0.14 | 6.24              |
| 3     | 939.69           | 1409.54          | 37.40            | 11.11            | 0.13 | 10.31             |
| 4     | 939.69           | 1409.54          | 45.16            | 11.37            | 0.16 | 12.16             |
| 5     | 939.69           | 1409.54          | 77.30            | 9.34             | 0.26 | 25.34             |
| 6     | 939.69           | 1409.54          | 80.83            | 9.34             | 0.27 | 26.50             |
| 7     | 939.69           | 1409.54          | 64.66            | 9.34             | 0.22 | 21.20             |
| 8     | 939.69           | 1409.54          | 47.91            | 9.48             | 0.16 | 15.48             |
| 9     | 939.69           | 1409.54          | 65.81            | 18.95            | 0.23 | 10.63             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.35            | 0.05 | 0.00              |

Seccion = 97

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 797.213 Td (mT) = 760.632

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.09            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 43.35            | 21.87            | 0.15 | 6.92              |
| 3     | 939.69           | 1409.54          | 42.53            | 12.99            | 0.15 | 11.44             |
| 4     | 939.69           | 1409.54          | 51.34            | 13.29            | 0.17 | 13.49             |
| 5     | 939.69           | 1409.54          | 87.89            | 10.92            | 0.29 | 28.12             |
| 6     | 939.69           | 1409.54          | 91.90            | 10.92            | 0.30 | 29.40             |
| 7     | 939.69           | 1409.54          | 73.52            | 10.92            | 0.24 | 23.53             |
| 8     | 939.69           | 1409.54          | 54.48            | 11.08            | 0.18 | 17.18             |
| 9     | 939.69           | 1409.54          | 74.83            | 22.17            | 0.25 | 11.79             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.97            | 0.06 | 0.00              |

Seccion = 98

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 878.711 Td (mT) = 850.283

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.82            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 48.41            | 24.99            | 0.17 | 7.63              |
| 3     | 939.69           | 1409.54          | 47.49            | 14.85            | 0.16 | 12.61             |
| 4     | 939.69           | 1409.54          | 57.34            | 15.19            | 0.19 | 14.87             |
| 5     | 939.69           | 1409.54          | 98.16            | 12.48            | 0.32 | 30.99             |
| 6     | 939.69           | 1409.54          | 102.64           | 12.48            | 0.33 | 32.41             |
| 7     | 939.69           | 1409.54          | 82.11            | 12.48            | 0.27 | 25.93             |
| 8     | 939.69           | 1409.54          | 60.84            | 12.67            | 0.20 | 18.94             |
| 9     | 939.69           | 1409.54          | 83.57            | 25.33            | 0.28 | 13.00             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.87            | 0.07 | 0.00              |

Seccion = 99

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 967.133 Td (mT) = 938.751

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 95.56            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 53.44            | 29.42            | 0.18 | 8.21              |
| 3     | 939.69           | 1409.54          | 52.67            | 17.47            | 0.17 | 13.63             |
| 4     | 939.69           | 1409.54          | 64.40            | 17.89            | 0.21 | 16.27             |
| 5     | 939.69           | 1409.54          | 109.72           | 14.68            | 0.35 | 33.74             |
| 6     | 939.69           | 1409.54          | 116.70           | 14.68            | 0.37 | 35.89             |
| 7     | 939.69           | 1409.54          | 102.11           | 14.68            | 0.32 | 31.40             |
| 8     | 939.69           | 1409.54          | 84.71            | 14.91            | 0.27 | 25.67             |
| 9     | 939.69           | 1409.54          | 64.16            | 14.91            | 0.21 | 19.44             |
| 10    | 939.69           | 1409.54          | 0.00             | 54.17            | 0.04 | 0.00              |

Seccion = 100

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1602.245 Td (mT) = 1033.935

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 105.25           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 146.48           | 31.90            | 0.29 | 13.60             |
| 3     | 939.69           | 1409.54          | 144.37           | 18.95            | 0.28 | 22.58             |
| 4     | 939.69           | 1409.54          | 176.53           | 19.40            | 0.34 | 26.95             |
| 5     | 939.69           | 1409.54          | 300.77           | 15.92            | 0.57 | 55.90             |
| 6     | 939.69           | 1409.54          | 319.88           | 15.92            | 0.60 | 59.46             |
| 7     | 939.69           | 1409.54          | 279.91           | 15.92            | 0.53 | 52.03             |
| 8     | 939.69           | 1409.54          | 232.22           | 16.17            | 0.44 | 42.52             |
| 9     | 939.69           | 1409.54          | 175.88           | 16.17            | 0.34 | 32.20             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.66            | 0.04 | 0.00              |

Seccion = 101

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2297.244 Td (mT) = 930.659

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.74            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 175.60           | 33.82            | 0.41 | 19.50             |
| 3     | 939.69           | 1409.54          | 173.07           | 20.09            | 0.40 | 32.37             |
| 4     | 939.69           | 1409.54          | 211.62           | 20.56            | 0.48 | 38.65             |
| 5     | 939.69           | 1409.54          | 360.57           | 16.88            | 0.81 | 80.15             |
| 6     | 939.69           | 1409.54          | 383.48           | 16.88            | 0.86 | 85.25             |
| 7     | 939.69           | 1409.54          | 335.56           | 16.88            | 0.76 | 74.60             |
| 8     | 939.69           | 1409.54          | 278.38           | 17.15            | 0.63 | 60.96             |
| 9     | 939.69           | 1409.54          | 210.85           | 17.15            | 0.48 | 46.17             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.70            | 0.04 | 0.00              |

Seccion = 102

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1641.952 Td (mT) = 1018.145

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 103.65           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 153.12           | 32.21            | 0.30 | 13.94             |
| 3     | 939.69           | 1409.54          | 150.91           | 19.14            | 0.29 | 23.14             |
| 4     | 939.69           | 1409.54          | 184.54           | 19.59            | 0.35 | 27.62             |
| 5     | 939.69           | 1409.54          | 314.41           | 16.08            | 0.58 | 57.28             |
| 6     | 939.69           | 1409.54          | 334.39           | 16.08            | 0.62 | 60.93             |
| 7     | 939.69           | 1409.54          | 292.61           | 16.08            | 0.54 | 53.32             |
| 8     | 939.69           | 1409.54          | 242.75           | 16.33            | 0.45 | 43.57             |
| 9     | 939.69           | 1409.54          | 183.86           | 16.33            | 0.35 | 33.00             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.75            | 0.04 | 0.00              |

Seccion = 103

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1009.188 Td (mT) = 929.891

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 90.57            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 61.54            | 28.13            | 0.20 | 8.76              |
| 3     | 939.69           | 1409.54          | 60.38            | 16.71            | 0.18 | 14.49             |
| 4     | 939.69           | 1409.54          | 72.90            | 17.10            | 0.22 | 17.08             |
| 5     | 939.69           | 1409.54          | 124.79           | 14.05            | 0.37 | 35.60             |
| 6     | 939.69           | 1409.54          | 130.48           | 14.05            | 0.38 | 37.22             |
| 7     | 939.69           | 1409.54          | 104.38           | 14.05            | 0.31 | 29.78             |
| 8     | 939.69           | 1409.54          | 77.35            | 14.26            | 0.23 | 21.75             |
| 9     | 939.69           | 1409.54          | 106.23           | 28.52            | 0.32 | 14.93             |
| 10    | 939.69           | 1409.54          | 0.00             | 102.66           | 0.07 | 0.00              |

Seccion = 104

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 925.817 Td (mT) = 847.366

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.53            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 55.64            | 25.17            | 0.18 | 8.04              |
| 3     | 939.69           | 1409.54          | 54.59            | 14.96            | 0.17 | 13.29             |
| 4     | 939.69           | 1409.54          | 65.90            | 15.30            | 0.20 | 15.67             |
| 5     | 939.69           | 1409.54          | 112.82           | 12.58            | 0.33 | 32.66             |
| 6     | 939.69           | 1409.54          | 117.97           | 12.58            | 0.35 | 34.15             |
| 7     | 939.69           | 1409.54          | 94.37            | 12.58            | 0.28 | 27.32             |
| 8     | 939.69           | 1409.54          | 69.93            | 12.76            | 0.21 | 19.95             |
| 9     | 939.69           | 1409.54          | 96.04            | 25.52            | 0.30 | 13.69             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.55            | 0.07 | 0.00              |

Seccion = 105

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 811.969 Td (mT) = 763.105

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.33            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.99            | 21.96            | 0.16 | 7.05              |
| 3     | 939.69           | 1409.54          | 44.14            | 13.05            | 0.15 | 11.66             |
| 4     | 939.69           | 1409.54          | 53.29            | 13.35            | 0.18 | 13.74             |
| 5     | 939.69           | 1409.54          | 91.23            | 10.97            | 0.29 | 28.64             |
| 6     | 939.69           | 1409.54          | 95.39            | 10.97            | 0.31 | 29.95             |
| 7     | 939.69           | 1409.54          | 76.31            | 10.97            | 0.25 | 23.96             |
| 8     | 939.69           | 1409.54          | 56.55            | 11.13            | 0.19 | 17.50             |
| 9     | 939.69           | 1409.54          | 77.67            | 22.26            | 0.26 | 12.01             |
| 10    | 939.69           | 1409.54          | 0.00             | 84.25            | 0.06 | 0.00              |

Seccion = 106

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 755.681 Td (mT) = 692.181

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 67.42            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 42.63            | 18.46            | 0.14 | 6.56              |
| 3     | 939.69           | 1409.54          | 41.82            | 10.97            | 0.14 | 10.85             |
| 4     | 939.69           | 1409.54          | 50.50            | 11.22            | 0.16 | 12.79             |
| 5     | 939.69           | 1409.54          | 86.44            | 9.22             | 0.27 | 26.66             |
| 6     | 939.69           | 1409.54          | 90.39            | 9.22             | 0.28 | 27.87             |
| 7     | 939.69           | 1409.54          | 72.31            | 9.22             | 0.23 | 22.30             |
| 8     | 939.69           | 1409.54          | 53.58            | 9.36             | 0.17 | 16.28             |
| 9     | 939.69           | 1409.54          | 73.59            | 18.71            | 0.24 | 11.18             |
| 10    | 939.69           | 1409.54          | 0.00             | 76.42            | 0.05 | 0.00              |

Seccion = 107

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 666.205 Td (mT) = 626.370

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 61.01            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 34.75            | 15.25            | 0.13 | 5.78              |
| 3     | 939.69           | 1409.54          | 34.09            | 9.06             | 0.12 | 9.56              |
| 4     | 939.69           | 1409.54          | 41.16            | 9.27             | 0.14 | 11.28             |
| 5     | 939.69           | 1409.54          | 70.47            | 7.62             | 0.24 | 23.50             |
| 6     | 939.69           | 1409.54          | 73.68            | 7.62             | 0.25 | 24.57             |
| 7     | 939.69           | 1409.54          | 58.95            | 7.62             | 0.20 | 19.66             |
| 8     | 939.69           | 1409.54          | 43.68            | 7.73             | 0.15 | 14.36             |
| 9     | 939.69           | 1409.54          | 59.99            | 15.46            | 0.21 | 9.85              |
| 10    | 939.69           | 1409.54          | 0.00             | 69.15            | 0.05 | 0.00              |

Seccion = 108

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 582.736 Td (mT) = 565.957

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 55.12            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 27.48            | 12.02            | 0.11 | 5.06              |
| 3     | 939.69           | 1409.54          | 26.96            | 7.14             | 0.10 | 8.36              |
| 4     | 939.69           | 1409.54          | 32.55            | 7.31             | 0.13 | 9.86              |
| 5     | 939.69           | 1409.54          | 55.71            | 6.01             | 0.21 | 20.55             |
| 6     | 939.69           | 1409.54          | 58.26            | 6.01             | 0.22 | 21.49             |
| 7     | 939.69           | 1409.54          | 46.61            | 6.01             | 0.18 | 17.20             |
| 8     | 939.69           | 1409.54          | 34.53            | 6.09             | 0.13 | 12.56             |
| 9     | 939.69           | 1409.54          | 47.43            | 12.19            | 0.18 | 8.62              |
| 10    | 939.69           | 1409.54          | 0.00             | 62.48            | 0.04 | 0.00              |



Seccion = 109

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 498.333 Td (mT) = 503.660

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 49.06            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 20.07            | 8.80             | 0.09 | 4.33              |
| 3     | 939.69           | 1409.54          | 19.69            | 5.23             | 0.09 | 7.15              |
| 4     | 939.69           | 1409.54          | 23.77            | 5.35             | 0.11 | 8.44              |
| 5     | 939.69           | 1409.54          | 40.69            | 4.39             | 0.18 | 17.58             |
| 6     | 939.69           | 1409.54          | 42.55            | 4.39             | 0.19 | 18.38             |
| 7     | 939.69           | 1409.54          | 34.04            | 4.39             | 0.15 | 14.71             |
| 8     | 939.69           | 1409.54          | 25.22            | 4.46             | 0.11 | 10.74             |
| 9     | 939.69           | 1409.54          | 34.64            | 8.92             | 0.16 | 7.37              |
| 10    | 939.69           | 1409.54          | 0.00             | 55.60            | 0.04 | 0.00              |

Seccion = 110

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 421.529 Td (mT) = 453.534

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 44.17            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 13.05            | 5.49             | 0.08 | 3.66              |
| 3     | 939.69           | 1409.54          | 12.80            | 3.26             | 0.07 | 6.05              |
| 4     | 939.69           | 1409.54          | 15.45            | 3.34             | 0.09 | 7.14              |
| 5     | 939.69           | 1409.54          | 26.45            | 2.74             | 0.15 | 14.87             |
| 6     | 939.69           | 1409.54          | 27.66            | 2.74             | 0.16 | 15.55             |
| 7     | 939.69           | 1409.54          | 22.13            | 2.74             | 0.13 | 12.44             |
| 8     | 939.69           | 1409.54          | 16.40            | 2.79             | 0.09 | 9.08              |
| 9     | 939.69           | 1409.54          | 22.52            | 5.57             | 0.13 | 6.24              |
| 10    | 939.69           | 1409.54          | 0.00             | 50.07            | 0.04 | 0.00              |

Seccion = 111

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 357.717 Td (mT) = 411.460

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.08            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 7.02             | 2.53             | 0.06 | 3.11              |
| 3     | 939.69           | 1409.54          | 6.88             | 1.51             | 0.06 | 5.13              |
| 4     | 939.69           | 1409.54          | 8.31             | 1.54             | 0.07 | 6.06              |
| 5     | 939.69           | 1409.54          | 14.23            | 1.27             | 0.13 | 12.62             |
| 6     | 939.69           | 1409.54          | 14.88            | 1.27             | 0.13 | 13.19             |
| 7     | 939.69           | 1409.54          | 11.90            | 1.27             | 0.11 | 10.56             |
| 8     | 939.69           | 1409.54          | 8.82             | 1.28             | 0.08 | 7.71              |
| 9     | 939.69           | 1409.54          | 12.11            | 2.57             | 0.11 | 5.29              |
| 10    | 939.69           | 1409.54          | 0.00             | 45.43            | 0.03 | 0.00              |

Seccion = 112

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 424.345 Td (mT) = 436.306

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.50            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 16.66            | 5.76             | 0.08 | 3.68              |
| 3     | 939.69           | 1409.54          | 16.34            | 3.42             | 0.07 | 6.09              |
| 4     | 939.69           | 1409.54          | 19.73            | 3.50             | 0.09 | 7.18              |
| 5     | 939.69           | 1409.54          | 33.78            | 2.88             | 0.15 | 14.97             |
| 6     | 939.69           | 1409.54          | 35.32            | 2.88             | 0.16 | 15.65             |
| 7     | 939.69           | 1409.54          | 28.26            | 2.88             | 0.13 | 12.52             |
| 8     | 939.69           | 1409.54          | 20.94            | 2.92             | 0.09 | 9.14              |
| 9     | 939.69           | 1409.54          | 28.76            | 5.84             | 0.13 | 6.28              |
| 10    | 939.69           | 1409.54          | 0.00             | 48.17            | 0.03 | 0.00              |

Seccion = 113

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 495.643 Td (mT) = 486.768

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.41            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 22.57            | 8.93             | 0.09 | 4.30              |
| 3     | 939.69           | 1409.54          | 22.14            | 5.31             | 0.09 | 7.11              |
| 4     | 939.69           | 1409.54          | 26.73            | 5.43             | 0.11 | 8.39              |
| 5     | 939.69           | 1409.54          | 45.76            | 4.46             | 0.18 | 17.48             |
| 6     | 939.69           | 1409.54          | 47.85            | 4.46             | 0.19 | 18.28             |
| 7     | 939.69           | 1409.54          | 38.28            | 4.46             | 0.15 | 14.63             |
| 8     | 939.69           | 1409.54          | 28.37            | 4.53             | 0.11 | 10.68             |
| 9     | 939.69           | 1409.54          | 38.96            | 9.06             | 0.16 | 7.33              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.74            | 0.04 | 0.00              |

Seccion = 114

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 573.548 Td (mT) = 550.368

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.61            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 28.70            | 12.24            | 0.11 | 4.98              |
| 3     | 939.69           | 1409.54          | 28.16            | 7.27             | 0.10 | 8.23              |
| 4     | 939.69           | 1409.54          | 34.00            | 7.44             | 0.12 | 9.71              |
| 5     | 939.69           | 1409.54          | 58.20            | 6.12             | 0.21 | 20.23             |
| 6     | 939.69           | 1409.54          | 60.86            | 6.12             | 0.22 | 21.15             |
| 7     | 939.69           | 1409.54          | 48.69            | 6.12             | 0.17 | 16.93             |
| 8     | 939.69           | 1409.54          | 36.07            | 6.21             | 0.13 | 12.36             |
| 9     | 939.69           | 1409.54          | 49.55            | 12.41            | 0.18 | 8.48              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.76            | 0.04 | 0.00              |

Seccion = 115

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 646.741 Td (mT) = 613.242

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.73            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 34.07            | 15.50            | 0.12 | 5.62              |
| 3     | 939.69           | 1409.54          | 33.43            | 9.21             | 0.12 | 9.28              |
| 4     | 939.69           | 1409.54          | 40.36            | 9.42             | 0.14 | 10.95             |
| 5     | 939.69           | 1409.54          | 69.08            | 7.74             | 0.23 | 22.81             |
| 6     | 939.69           | 1409.54          | 72.24            | 7.74             | 0.24 | 23.85             |
| 7     | 939.69           | 1409.54          | 57.79            | 7.74             | 0.20 | 19.09             |
| 8     | 939.69           | 1409.54          | 42.82            | 7.86             | 0.15 | 13.94             |
| 9     | 939.69           | 1409.54          | 58.81            | 15.71            | 0.21 | 9.57              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.70            | 0.05 | 0.00              |

Seccion = 116

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 720.921 Td (mT) = 682.526

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.48            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 39.16            | 18.71            | 0.14 | 6.26              |
| 3     | 939.69           | 1409.54          | 38.41            | 11.12            | 0.13 | 10.35             |
| 4     | 939.69           | 1409.54          | 46.38            | 11.37            | 0.16 | 12.20             |
| 5     | 939.69           | 1409.54          | 79.40            | 9.35             | 0.26 | 25.43             |
| 6     | 939.69           | 1409.54          | 83.02            | 9.35             | 0.27 | 26.59             |
| 7     | 939.69           | 1409.54          | 66.42            | 9.35             | 0.22 | 21.28             |
| 8     | 939.69           | 1409.54          | 49.21            | 9.48             | 0.16 | 15.54             |
| 9     | 939.69           | 1409.54          | 67.59            | 18.97            | 0.23 | 10.66             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.35            | 0.05 | 0.00              |



Seccion = 117

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 799.651 Td (mT) = 760.734

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 74.10            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.34            | 21.96            | 0.15 | 6.94              |
| 3     | 939.69           | 1409.54          | 43.50            | 13.04            | 0.15 | 11.48             |
| 4     | 939.69           | 1409.54          | 52.52            | 13.35            | 0.17 | 13.54             |
| 5     | 939.69           | 1409.54          | 89.90            | 10.97            | 0.29 | 28.21             |
| 6     | 939.69           | 1409.54          | 94.01            | 10.97            | 0.30 | 29.49             |
| 7     | 939.69           | 1409.54          | 75.20            | 10.97            | 0.24 | 23.60             |
| 8     | 939.69           | 1409.54          | 55.72            | 11.13            | 0.18 | 17.23             |
| 9     | 939.69           | 1409.54          | 76.54            | 22.26            | 0.26 | 11.83             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.99            | 0.06 | 0.00              |

Seccion = 118

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 880.963 Td (mT) = 850.433

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.83            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 49.34            | 25.07            | 0.17 | 7.65              |
| 3     | 939.69           | 1409.54          | 48.41            | 14.89            | 0.16 | 12.65             |
| 4     | 939.69           | 1409.54          | 58.44            | 15.24            | 0.19 | 14.91             |
| 5     | 939.69           | 1409.54          | 100.05           | 12.52            | 0.32 | 31.07             |
| 6     | 939.69           | 1409.54          | 104.61           | 12.52            | 0.33 | 32.49             |
| 7     | 939.69           | 1409.54          | 83.69            | 12.52            | 0.27 | 26.00             |
| 8     | 939.69           | 1409.54          | 62.01            | 12.71            | 0.20 | 18.98             |
| 9     | 939.69           | 1409.54          | 85.17            | 25.41            | 0.28 | 13.03             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.89            | 0.07 | 0.00              |

Seccion = 119

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 968.704 Td (mT) = 938.818

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 95.57            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 54.24            | 29.17            | 0.19 | 8.22              |
| 3     | 939.69           | 1409.54          | 53.45            | 17.33            | 0.17 | 13.65             |
| 4     | 939.69           | 1409.54          | 65.36            | 17.74            | 0.21 | 16.30             |
| 5     | 939.69           | 1409.54          | 111.37           | 14.56            | 0.35 | 33.80             |
| 6     | 939.69           | 1409.54          | 118.44           | 14.56            | 0.37 | 35.95             |
| 7     | 939.69           | 1409.54          | 103.64           | 14.56            | 0.32 | 31.46             |
| 8     | 939.69           | 1409.54          | 85.98            | 14.79            | 0.27 | 25.71             |
| 9     | 939.69           | 1409.54          | 65.12            | 14.79            | 0.21 | 19.47             |
| 10    | 939.69           | 1409.54          | 0.00             | 54.17            | 0.04 | 0.00              |

Seccion = 120

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2232.169 Td (mT) = 1033.292

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 105.19           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 247.42           | 32.36            | 0.40 | 18.95             |
| 3     | 939.69           | 1409.54          | 243.85           | 19.22            | 0.39 | 31.46             |
| 4     | 939.69           | 1409.54          | 298.17           | 19.68            | 0.47 | 37.55             |
| 5     | 939.69           | 1409.54          | 508.03           | 16.15            | 0.79 | 77.88             |
| 6     | 939.69           | 1409.54          | 540.31           | 16.15            | 0.84 | 82.84             |
| 7     | 939.69           | 1409.54          | 472.79           | 16.15            | 0.74 | 72.48             |
| 8     | 939.69           | 1409.54          | 392.24           | 16.41            | 0.61 | 59.24             |
| 9     | 939.69           | 1409.54          | 297.09           | 16.41            | 0.47 | 44.86             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.62            | 0.04 | 0.00              |

Seccion = 121

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2337.303 Td (mT) = 927.590

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 94.43            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 186.11           | 33.57            | 0.42 | 19.84             |
| 3     | 939.69           | 1409.54          | 183.43           | 19.94            | 0.40 | 32.94             |
| 4     | 939.69           | 1409.54          | 224.29           | 20.41            | 0.49 | 39.32             |
| 5     | 939.69           | 1409.54          | 382.15           | 16.75            | 0.83 | 81.54             |
| 6     | 939.69           | 1409.54          | 406.44           | 16.75            | 0.88 | 86.74             |
| 7     | 939.69           | 1409.54          | 355.65           | 16.75            | 0.77 | 75.90             |
| 8     | 939.69           | 1409.54          | 295.05           | 17.02            | 0.64 | 62.03             |
| 9     | 939.69           | 1409.54          | 223.48           | 17.02            | 0.49 | 46.97             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.52            | 0.04 | 0.00              |

Seccion = 122

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1662.719 Td (mT) = 1009.541

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 102.77           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 160.76           | 32.01            | 0.30 | 14.12             |
| 3     | 939.69           | 1409.54          | 158.44           | 19.02            | 0.29 | 23.43             |
| 4     | 939.69           | 1409.54          | 193.73           | 19.47            | 0.35 | 27.97             |
| 5     | 939.69           | 1409.54          | 330.08           | 15.98            | 0.59 | 58.01             |
| 6     | 939.69           | 1409.54          | 351.06           | 15.98            | 0.63 | 61.71             |
| 7     | 939.69           | 1409.54          | 307.19           | 15.98            | 0.55 | 53.99             |
| 8     | 939.69           | 1409.54          | 254.85           | 16.23            | 0.46 | 44.13             |
| 9     | 939.69           | 1409.54          | 193.03           | 16.23            | 0.35 | 33.41             |
| 10    | 939.69           | 1409.54          | 0.00             | 58.25            | 0.04 | 0.00              |

Seccion = 123

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1011.861 Td (mT) = 921.169

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 89.72            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 66.37            | 27.95            | 0.20 | 8.79              |
| 3     | 939.69           | 1409.54          | 65.11            | 16.60            | 0.18 | 14.52             |
| 4     | 939.69           | 1409.54          | 78.62            | 16.99            | 0.22 | 17.13             |
| 5     | 939.69           | 1409.54          | 134.58           | 13.96            | 0.37 | 35.69             |
| 6     | 939.69           | 1409.54          | 140.72           | 13.96            | 0.38 | 37.32             |
| 7     | 939.69           | 1409.54          | 112.58           | 13.96            | 0.31 | 29.86             |
| 8     | 939.69           | 1409.54          | 83.42            | 14.17            | 0.23 | 21.80             |
| 9     | 939.69           | 1409.54          | 114.57           | 28.33            | 0.32 | 14.97             |
| 10    | 939.69           | 1409.54          | 0.00             | 101.70           | 0.07 | 0.00              |

Seccion = 124

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 928.777 Td (mT) = 838.694

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 81.69            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 60.59            | 24.85            | 0.18 | 8.06              |
| 3     | 939.69           | 1409.54          | 59.44            | 14.77            | 0.17 | 13.33             |
| 4     | 939.69           | 1409.54          | 71.76            | 15.11            | 0.20 | 15.72             |
| 5     | 939.69           | 1409.54          | 122.85           | 12.41            | 0.34 | 32.76             |
| 6     | 939.69           | 1409.54          | 128.45           | 12.41            | 0.35 | 34.26             |
| 7     | 939.69           | 1409.54          | 102.76           | 12.41            | 0.28 | 27.41             |
| 8     | 939.69           | 1409.54          | 76.14            | 12.60            | 0.21 | 20.01             |
| 9     | 939.69           | 1409.54          | 104.58           | 25.19            | 0.30 | 13.74             |
| 10    | 939.69           | 1409.54          | 0.00             | 92.59            | 0.07 | 0.00              |

Seccion = 125

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 814.970 Td (mT) = 754.571

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 73.50            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 49.90            | 21.71            | 0.16 | 7.08              |
| 3     | 939.69           | 1409.54          | 48.95            | 12.90            | 0.15 | 11.70             |
| 4     | 939.69           | 1409.54          | 59.10            | 13.20            | 0.18 | 13.80             |
| 5     | 939.69           | 1409.54          | 101.17           | 10.84            | 0.29 | 28.75             |
| 6     | 939.69           | 1409.54          | 105.79           | 10.84            | 0.31 | 30.06             |
| 7     | 939.69           | 1409.54          | 84.63            | 10.84            | 0.25 | 24.05             |
| 8     | 939.69           | 1409.54          | 62.71            | 11.00            | 0.19 | 17.56             |
| 9     | 939.69           | 1409.54          | 86.13            | 22.01            | 0.26 | 12.05             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.30            | 0.06 | 0.00              |

Seccion = 126

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 758.155 Td (mT) = 683.707

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.59            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 47.43            | 18.21            | 0.14 | 6.58              |
| 3     | 939.69           | 1409.54          | 46.53            | 10.82            | 0.14 | 10.88             |
| 4     | 939.69           | 1409.54          | 56.18            | 11.07            | 0.16 | 12.83             |
| 5     | 939.69           | 1409.54          | 96.17            | 9.10             | 0.27 | 26.74             |
| 6     | 939.69           | 1409.54          | 100.56           | 9.10             | 0.29 | 27.96             |
| 7     | 939.69           | 1409.54          | 80.45            | 9.10             | 0.23 | 22.38             |
| 8     | 939.69           | 1409.54          | 59.61            | 9.23             | 0.17 | 16.34             |
| 9     | 939.69           | 1409.54          | 81.88            | 18.46            | 0.24 | 11.21             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.48            | 0.05 | 0.00              |

Seccion = 127

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 668.862 Td (mT) = 617.385

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 60.13            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 39.60            | 15.02            | 0.13 | 5.81              |
| 3     | 939.69           | 1409.54          | 38.85            | 8.92             | 0.12 | 9.60              |
| 4     | 939.69           | 1409.54          | 46.91            | 9.13             | 0.14 | 11.32             |
| 5     | 939.69           | 1409.54          | 80.30            | 7.50             | 0.24 | 23.59             |
| 6     | 939.69           | 1409.54          | 83.96            | 7.50             | 0.25 | 24.67             |
| 7     | 939.69           | 1409.54          | 67.17            | 7.50             | 0.20 | 19.74             |
| 8     | 939.69           | 1409.54          | 49.77            | 7.61             | 0.15 | 14.41             |
| 9     | 939.69           | 1409.54          | 68.36            | 15.22            | 0.21 | 9.89              |
| 10    | 939.69           | 1409.54          | 0.00             | 68.16            | 0.05 | 0.00              |

Seccion = 128

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 585.588 Td (mT) = 557.634

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 54.31            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 32.17            | 11.74            | 0.11 | 5.08              |
| 3     | 939.69           | 1409.54          | 31.56            | 6.98             | 0.10 | 8.41              |
| 4     | 939.69           | 1409.54          | 38.10            | 7.14             | 0.13 | 9.91              |
| 5     | 939.69           | 1409.54          | 65.22            | 5.87             | 0.21 | 20.66             |
| 6     | 939.69           | 1409.54          | 68.20            | 5.87             | 0.22 | 21.60             |
| 7     | 939.69           | 1409.54          | 54.56            | 5.87             | 0.18 | 17.28             |
| 8     | 939.69           | 1409.54          | 40.43            | 5.95             | 0.13 | 12.62             |
| 9     | 939.69           | 1409.54          | 55.53            | 11.91            | 0.18 | 8.66              |
| 10    | 939.69           | 1409.54          | 0.00             | 61.56            | 0.04 | 0.00              |

Seccion = 129

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 501.535 Td (mT) = 495.405

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 48.25            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 24.79            | 8.51             | 0.09 | 4.35              |
| 3     | 939.69           | 1409.54          | 24.32            | 5.05             | 0.09 | 7.20              |
| 4     | 939.69           | 1409.54          | 29.37            | 5.17             | 0.11 | 8.49              |
| 5     | 939.69           | 1409.54          | 50.27            | 4.25             | 0.18 | 17.69             |
| 6     | 939.69           | 1409.54          | 52.57            | 4.25             | 0.19 | 18.50             |
| 7     | 939.69           | 1409.54          | 42.05            | 4.25             | 0.15 | 14.80             |
| 8     | 939.69           | 1409.54          | 31.16            | 4.31             | 0.11 | 10.81             |
| 9     | 939.69           | 1409.54          | 42.80            | 8.62             | 0.16 | 7.42              |
| 10    | 939.69           | 1409.54          | 0.00             | 54.69            | 0.04 | 0.00              |

Seccion = 130

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 425.454 Td (mT) = 444.730

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 43.32            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 17.98            | 5.30             | 0.08 | 3.69              |
| 3     | 939.69           | 1409.54          | 17.64            | 3.15             | 0.07 | 6.11              |
| 4     | 939.69           | 1409.54          | 21.30            | 3.22             | 0.09 | 7.20              |
| 5     | 939.69           | 1409.54          | 36.46            | 2.65             | 0.15 | 15.01             |
| 6     | 939.69           | 1409.54          | 38.13            | 2.65             | 0.16 | 15.69             |
| 7     | 939.69           | 1409.54          | 30.50            | 2.65             | 0.13 | 12.56             |
| 8     | 939.69           | 1409.54          | 22.60            | 2.68             | 0.09 | 9.17              |
| 9     | 939.69           | 1409.54          | 31.04            | 5.37             | 0.13 | 6.29              |
| 10    | 939.69           | 1409.54          | 0.00             | 49.10            | 0.03 | 0.00              |

Seccion = 131

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 358.780 Td (mT) = 404.184

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 39.37            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 8.31             | 2.05             | 0.06 | 3.12              |
| 3     | 939.69           | 1409.54          | 8.15             | 1.22             | 0.06 | 5.15              |
| 4     | 939.69           | 1409.54          | 9.84             | 1.24             | 0.07 | 6.07              |
| 5     | 939.69           | 1409.54          | 16.84            | 1.02             | 0.13 | 12.66             |
| 6     | 939.69           | 1409.54          | 17.61            | 1.02             | 0.13 | 13.23             |
| 7     | 939.69           | 1409.54          | 14.09            | 1.02             | 0.11 | 10.59             |
| 8     | 939.69           | 1409.54          | 10.44            | 1.04             | 0.08 | 7.73              |
| 9     | 939.69           | 1409.54          | 14.34            | 2.08             | 0.11 | 5.31              |
| 10    | 939.69           | 1409.54          | 0.00             | 44.62            | 0.03 | 0.00              |

Seccion = 132

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 368.320 Td (mT) = 433.591

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 42.23            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 11.91            | 5.96             | 0.07 | 3.20              |
| 3     | 939.69           | 1409.54          | 11.68            | 3.54             | 0.07 | 5.29              |
| 4     | 939.69           | 1409.54          | 14.11            | 3.62             | 0.08 | 6.23              |
| 5     | 939.69           | 1409.54          | 24.15            | 2.98             | 0.13 | 12.99             |
| 6     | 939.69           | 1409.54          | 25.25            | 2.98             | 0.14 | 13.58             |
| 7     | 939.69           | 1409.54          | 20.20            | 2.98             | 0.11 | 10.87             |
| 8     | 939.69           | 1409.54          | 14.97            | 3.02             | 0.08 | 7.94              |
| 9     | 939.69           | 1409.54          | 20.56            | 6.04             | 0.11 | 5.45              |
| 10    | 939.69           | 1409.54          | 0.00             | 47.87            | 0.03 | 0.00              |

Seccion = 133

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 439.553 Td (mT) = 483.674

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 47.11            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 17.77            | 9.19             | 0.08 | 3.82              |
| 3     | 939.69           | 1409.54          | 17.44            | 5.46             | 0.08 | 6.31              |
| 4     | 939.69           | 1409.54          | 21.05            | 5.59             | 0.09 | 7.44              |
| 5     | 939.69           | 1409.54          | 36.04            | 4.59             | 0.16 | 15.50             |
| 6     | 939.69           | 1409.54          | 37.68            | 4.59             | 0.17 | 16.21             |
| 7     | 939.69           | 1409.54          | 30.15            | 4.59             | 0.13 | 12.97             |
| 8     | 939.69           | 1409.54          | 22.34            | 4.66             | 0.10 | 9.47              |
| 9     | 939.69           | 1409.54          | 30.68            | 9.32             | 0.14 | 6.50              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.40            | 0.04 | 0.00              |

Seccion = 134

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 517.028 Td (mT) = 547.269

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.30            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 23.82            | 12.53            | 0.10 | 4.49              |
| 3     | 939.69           | 1409.54          | 23.37            | 7.44             | 0.09 | 7.42              |
| 4     | 939.69           | 1409.54          | 28.21            | 7.62             | 0.11 | 8.75              |
| 5     | 939.69           | 1409.54          | 48.29            | 6.26             | 0.19 | 18.24             |
| 6     | 939.69           | 1409.54          | 50.50            | 6.26             | 0.19 | 19.07             |
| 7     | 939.69           | 1409.54          | 40.40            | 6.26             | 0.16 | 15.26             |
| 8     | 939.69           | 1409.54          | 29.93            | 6.35             | 0.12 | 11.14             |
| 9     | 939.69           | 1409.54          | 41.11            | 12.70            | 0.16 | 7.65              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.42            | 0.04 | 0.00              |

Seccion = 135

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 590.249 Td (mT) = 610.232

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.44            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 29.15            | 15.80            | 0.11 | 5.12              |
| 3     | 939.69           | 1409.54          | 28.60            | 9.38             | 0.11 | 8.47              |
| 4     | 939.69           | 1409.54          | 34.53            | 9.60             | 0.13 | 9.99              |
| 5     | 939.69           | 1409.54          | 59.11            | 7.89             | 0.21 | 20.82             |
| 6     | 939.69           | 1409.54          | 61.81            | 7.89             | 0.22 | 21.77             |
| 7     | 939.69           | 1409.54          | 49.45            | 7.89             | 0.18 | 17.42             |
| 8     | 939.69           | 1409.54          | 36.64            | 8.01             | 0.13 | 12.72             |
| 9     | 939.69           | 1409.54          | 50.32            | 16.01            | 0.19 | 8.73              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.37            | 0.05 | 0.00              |

Seccion = 136

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 664.406 Td (mT) = 678.969

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.13            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 34.21            | 19.06            | 0.13 | 5.77              |
| 3     | 939.69           | 1409.54          | 33.56            | 11.32            | 0.12 | 9.54              |
| 4     | 939.69           | 1409.54          | 40.52            | 11.59            | 0.14 | 11.25             |
| 5     | 939.69           | 1409.54          | 69.36            | 9.52             | 0.24 | 23.44             |
| 6     | 939.69           | 1409.54          | 72.52            | 9.52             | 0.25 | 24.51             |
| 7     | 939.69           | 1409.54          | 58.02            | 9.52             | 0.20 | 19.61             |
| 8     | 939.69           | 1409.54          | 42.99            | 9.66             | 0.15 | 14.32             |
| 9     | 939.69           | 1409.54          | 59.05            | 19.32            | 0.21 | 9.83              |
| 10    | 939.69           | 1409.54          | 0.00             | 74.96            | 0.05 | 0.00              |

Seccion = 137

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 743.638 Td (mT) = 757.152

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 73.75            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 39.44            | 22.32            | 0.14 | 6.46              |
| 3     | 939.69           | 1409.54          | 38.69            | 13.26            | 0.14 | 10.67             |
| 4     | 939.69           | 1409.54          | 46.72            | 13.57            | 0.16 | 12.59             |
| 5     | 939.69           | 1409.54          | 79.97            | 11.15            | 0.27 | 26.23             |
| 6     | 939.69           | 1409.54          | 83.62            | 11.15            | 0.28 | 27.43             |
| 7     | 939.69           | 1409.54          | 66.90            | 11.15            | 0.23 | 21.95             |
| 8     | 939.69           | 1409.54          | 49.57            | 11.31            | 0.17 | 16.02             |
| 9     | 939.69           | 1409.54          | 68.08            | 22.63            | 0.24 | 11.00             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.59            | 0.06 | 0.00              |

Seccion = 138

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 825.850 Td (mT) = 846.650

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 82.46            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 44.58            | 25.49            | 0.16 | 7.17              |
| 3     | 939.69           | 1409.54          | 43.73            | 15.15            | 0.15 | 11.85             |
| 4     | 939.69           | 1409.54          | 52.80            | 15.50            | 0.18 | 13.98             |
| 5     | 939.69           | 1409.54          | 90.38            | 12.73            | 0.30 | 29.13             |
| 6     | 939.69           | 1409.54          | 94.51            | 12.73            | 0.31 | 30.46             |
| 7     | 939.69           | 1409.54          | 75.61            | 12.73            | 0.25 | 24.37             |
| 8     | 939.69           | 1409.54          | 56.02            | 12.92            | 0.19 | 17.80             |
| 9     | 939.69           | 1409.54          | 76.94            | 25.84            | 0.27 | 12.22             |
| 10    | 939.69           | 1409.54          | 0.00             | 93.47            | 0.07 | 0.00              |

Seccion = 139

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 915.666 Td (mT) = 934.880

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 95.17            | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 49.90            | 29.83            | 0.18 | 7.77              |
| 3     | 939.69           | 1409.54          | 49.18            | 17.72            | 0.17 | 12.90             |
| 4     | 939.69           | 1409.54          | 60.14            | 18.14            | 0.20 | 15.40             |
| 5     | 939.69           | 1409.54          | 102.47           | 14.89            | 0.33 | 31.95             |
| 6     | 939.69           | 1409.54          | 108.98           | 14.89            | 0.35 | 33.98             |
| 7     | 939.69           | 1409.54          | 95.36            | 14.89            | 0.31 | 29.73             |
| 8     | 939.69           | 1409.54          | 79.11            | 15.12            | 0.26 | 24.30             |
| 9     | 939.69           | 1409.54          | 59.92            | 15.12            | 0.20 | 18.40             |
| 10    | 939.69           | 1409.54          | 0.00             | 53.94            | 0.04 | 0.00              |

Seccion = 140

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2178.722 Td (mT) = 1029.375

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 104.79           | 0.07 | 0.00              |
| 2     | 939.69           | 1409.54          | 243.02           | 32.84            | 0.39 | 18.50             |
| 3     | 939.69           | 1409.54          | 239.51           | 19.51            | 0.38 | 30.70             |
| 4     | 939.69           | 1409.54          | 292.87           | 19.97            | 0.46 | 36.65             |
| 5     | 939.69           | 1409.54          | 498.99           | 16.39            | 0.77 | 76.01             |
| 6     | 939.69           | 1409.54          | 530.70           | 16.39            | 0.82 | 80.85             |
| 7     | 939.69           | 1409.54          | 464.38           | 16.39            | 0.72 | 70.75             |
| 8     | 939.69           | 1409.54          | 385.26           | 16.65            | 0.60 | 57.82             |
| 9     | 939.69           | 1409.54          | 291.80           | 16.65            | 0.46 | 43.78             |
| 10    | 939.69           | 1409.54          | 0.00             | 59.39            | 0.04 | 0.00              |



Seccion = 141

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2139.458 Td (mT) = 852.017

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 86.74            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 167.20           | 25.47            | 0.38 | 18.16             |
| 3     | 939.69           | 1409.54          | 164.79           | 15.13            | 0.37 | 30.15             |
| 4     | 939.69           | 1409.54          | 201.51           | 15.49            | 0.45 | 35.99             |
| 5     | 939.69           | 1409.54          | 343.33           | 12.71            | 0.75 | 74.64             |
| 6     | 939.69           | 1409.54          | 365.14           | 12.71            | 0.80 | 79.40             |
| 7     | 939.69           | 1409.54          | 319.51           | 12.71            | 0.70 | 69.47             |
| 8     | 939.69           | 1409.54          | 265.07           | 12.91            | 0.58 | 56.78             |
| 9     | 939.69           | 1409.54          | 200.77           | 12.91            | 0.44 | 42.99             |
| 10    | 939.69           | 1409.54          | 0.00             | 49.16            | 0.03 | 0.00              |

Seccion = 142

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 2120.793 Td (mT) = 826.450

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 84.13            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 245.26           | 24.70            | 0.38 | 18.01             |
| 3     | 939.69           | 1409.54          | 241.72           | 14.68            | 0.36 | 29.89             |
| 4     | 939.69           | 1409.54          | 295.58           | 15.02            | 0.44 | 35.68             |
| 5     | 939.69           | 1409.54          | 503.60           | 12.33            | 0.75 | 73.99             |
| 6     | 939.69           | 1409.54          | 535.61           | 12.33            | 0.79 | 78.70             |
| 7     | 939.69           | 1409.54          | 468.68           | 12.33            | 0.70 | 68.87             |
| 8     | 939.69           | 1409.54          | 388.82           | 12.53            | 0.58 | 56.28             |
| 9     | 939.69           | 1409.54          | 294.50           | 12.53            | 0.44 | 42.62             |
| 10    | 939.69           | 1409.54          | 0.00             | 47.69            | 0.03 | 0.00              |

Seccion = 143

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1419.634 Td (mT) = 749.057

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 72.96            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 143.69           | 20.95            | 0.26 | 12.33             |
| 3     | 939.69           | 1409.54          | 140.96           | 12.45            | 0.25 | 20.38             |
| 4     | 939.69           | 1409.54          | 170.19           | 12.74            | 0.30 | 24.03             |
| 5     | 939.69           | 1409.54          | 291.34           | 10.47            | 0.51 | 50.07             |
| 6     | 939.69           | 1409.54          | 304.63           | 10.47            | 0.53 | 52.36             |
| 7     | 939.69           | 1409.54          | 243.71           | 10.47            | 0.43 | 41.90             |
| 8     | 939.69           | 1409.54          | 180.58           | 10.62            | 0.32 | 30.59             |
| 9     | 939.69           | 1409.54          | 248.02           | 21.24            | 0.44 | 21.00             |
| 10    | 939.69           | 1409.54          | 0.00             | 82.70            | 0.06 | 0.00              |

Seccion = 144

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 684.751 Td (mT) = 675.186

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 65.76            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 30.50            | 18.77            | 0.13 | 5.95              |
| 3     | 939.69           | 1409.54          | 29.92            | 11.15            | 0.12 | 9.83              |
| 4     | 939.69           | 1409.54          | 36.12            | 11.41            | 0.15 | 11.59             |
| 5     | 939.69           | 1409.54          | 61.84            | 9.38             | 0.25 | 24.15             |
| 6     | 939.69           | 1409.54          | 64.66            | 9.38             | 0.26 | 25.26             |
| 7     | 939.69           | 1409.54          | 51.73            | 9.38             | 0.21 | 20.21             |
| 8     | 939.69           | 1409.54          | 38.33            | 9.52             | 0.16 | 14.76             |
| 9     | 939.69           | 1409.54          | 52.65            | 19.03            | 0.22 | 10.13             |
| 10    | 939.69           | 1409.54          | 0.00             | 74.54            | 0.05 | 0.00              |

Seccion = 145

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 407.064 Td (mT) = 600.400

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 58.48            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 7.93             | 16.16            | 0.08 | 3.53              |
| 3     | 939.69           | 1409.54          | 7.78             | 9.60             | 0.08 | 5.84              |
| 4     | 939.69           | 1409.54          | 9.39             | 9.83             | 0.09 | 6.89              |
| 5     | 939.69           | 1409.54          | 16.07            | 8.07             | 0.15 | 14.36             |
| 6     | 939.69           | 1409.54          | 16.80            | 8.07             | 0.16 | 15.01             |
| 7     | 939.69           | 1409.54          | 13.44            | 8.07             | 0.13 | 12.01             |
| 8     | 939.69           | 1409.54          | 9.96             | 8.19             | 0.09 | 8.77              |
| 9     | 939.69           | 1409.54          | 13.68            | 16.39            | 0.13 | 6.02              |
| 10    | 939.69           | 1409.54          | 0.00             | 66.28            | 0.05 | 0.00              |

Seccion = 146

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 459.145 Td (mT) = 546.653

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.24            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 5.90             | 13.59            | 0.09 | 3.99              |
| 3     | 939.69           | 1409.54          | 5.79             | 8.08             | 0.08 | 6.59              |
| 4     | 939.69           | 1409.54          | 6.99             | 8.26             | 0.10 | 7.77              |
| 5     | 939.69           | 1409.54          | 11.96            | 6.79             | 0.17 | 16.20             |
| 6     | 939.69           | 1409.54          | 12.51            | 6.79             | 0.17 | 16.93             |
| 7     | 939.69           | 1409.54          | 10.00            | 6.79             | 0.14 | 13.55             |
| 8     | 939.69           | 1409.54          | 7.41             | 6.89             | 0.11 | 9.89              |
| 9     | 939.69           | 1409.54          | 10.18            | 13.78            | 0.15 | 6.79              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.35            | 0.04 | 0.00              |

Seccion = 147

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 376.865 Td (mT) = 480.622

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 46.81            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 1.23             | 11.00            | 0.07 | 3.27              |
| 3     | 939.69           | 1409.54          | 1.21             | 6.53             | 0.07 | 5.41              |
| 4     | 939.69           | 1409.54          | 1.45             | 6.69             | 0.08 | 6.38              |
| 5     | 939.69           | 1409.54          | 2.49             | 5.49             | 0.14 | 13.29             |
| 6     | 939.69           | 1409.54          | 2.60             | 5.49             | 0.14 | 13.90             |
| 7     | 939.69           | 1409.54          | 2.08             | 5.49             | 0.11 | 11.12             |
| 8     | 939.69           | 1409.54          | 1.54             | 5.57             | 0.09 | 8.12              |
| 9     | 939.69           | 1409.54          | 2.12             | 11.15            | 0.12 | 5.57              |
| 10    | 939.69           | 1409.54          | 0.00             | 53.06            | 0.04 | 0.00              |

Seccion = 148

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 362.565 Td (mT) = 419.453

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 40.85            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 2.42             | 8.41             | 0.07 | 3.15              |
| 3     | 939.69           | 1409.54          | 2.37             | 4.99             | 0.07 | 5.20              |
| 4     | 939.69           | 1409.54          | 2.87             | 5.11             | 0.08 | 6.14              |
| 5     | 939.69           | 1409.54          | 4.91             | 4.20             | 0.13 | 12.79             |
| 6     | 939.69           | 1409.54          | 5.13             | 4.20             | 0.14 | 13.37             |
| 7     | 939.69           | 1409.54          | 4.11             | 4.20             | 0.11 | 10.70             |
| 8     | 939.69           | 1409.54          | 3.04             | 4.26             | 0.08 | 7.81              |
| 9     | 939.69           | 1409.54          | 4.18             | 8.52             | 0.11 | 5.36              |
| 10    | 939.69           | 1409.54          | 0.00             | 46.31            | 0.03 | 0.00              |



Seccion = 149

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 357.263 Td (mT) = 376.410

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 36.66            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 6.95             | 5.88             | 0.07 | 3.10              |
| 3     | 939.69           | 1409.54          | 6.81             | 3.50             | 0.06 | 5.13              |
| 4     | 939.69           | 1409.54          | 8.23             | 3.58             | 0.08 | 6.05              |
| 5     | 939.69           | 1409.54          | 14.08            | 2.94             | 0.13 | 12.60             |
| 6     | 939.69           | 1409.54          | 14.73            | 2.94             | 0.13 | 13.18             |
| 7     | 939.69           | 1409.54          | 11.78            | 2.94             | 0.11 | 10.54             |
| 8     | 939.69           | 1409.54          | 8.73             | 2.98             | 0.08 | 7.70              |
| 9     | 939.69           | 1409.54          | 11.99            | 5.97             | 0.11 | 5.28              |
| 10    | 939.69           | 1409.54          | 0.00             | 41.56            | 0.03 | 0.00              |

Seccion = 150

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 359.381 Td (mT) = 337.729

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 32.89            | 0.02 | 0.00              |
| 2     | 939.69           | 1409.54          | 12.08            | 3.40             | 0.06 | 3.12              |
| 3     | 939.69           | 1409.54          | 11.85            | 2.02             | 0.06 | 5.16              |
| 4     | 939.69           | 1409.54          | 14.31            | 2.07             | 0.08 | 6.08              |
| 5     | 939.69           | 1409.54          | 24.50            | 1.70             | 0.13 | 12.68             |
| 6     | 939.69           | 1409.54          | 25.62            | 1.70             | 0.13 | 13.26             |
| 7     | 939.69           | 1409.54          | 20.49            | 1.70             | 0.11 | 10.61             |
| 8     | 939.69           | 1409.54          | 15.19            | 1.72             | 0.08 | 7.74              |
| 9     | 939.69           | 1409.54          | 20.86            | 3.45             | 0.11 | 5.32              |
| 10    | 939.69           | 1409.54          | 0.00             | 37.29            | 0.03 | 0.00              |

Seccion = 151

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 371.400 Td (mT) = 325.296

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 31.68            | 0.02 | 0.00              |
| 2     | 939.69           | 1409.54          | 1.88             | 0.99             | 0.07 | 3.22              |
| 3     | 939.69           | 1409.54          | 1.85             | 0.59             | 0.06 | 5.33              |
| 4     | 939.69           | 1409.54          | 2.23             | 0.60             | 0.08 | 6.29              |
| 5     | 939.69           | 1409.54          | 3.82             | 0.49             | 0.13 | 13.10             |
| 6     | 939.69           | 1409.54          | 3.99             | 0.49             | 0.14 | 13.70             |
| 7     | 939.69           | 1409.54          | 3.19             | 0.49             | 0.11 | 10.96             |
| 8     | 939.69           | 1409.54          | 2.37             | 0.50             | 0.08 | 8.00              |
| 9     | 939.69           | 1409.54          | 3.25             | 1.00             | 0.11 | 5.49              |
| 10    | 939.69           | 1409.54          | 0.00             | 35.91            | 0.03 | 0.00              |

Seccion = 152

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 377.760 Td (mT) = 361.571

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 35.22            | 0.02 | 0.00              |
| 2     | 939.69           | 1409.54          | 4.04             | 1.46             | 0.07 | 3.28              |
| 3     | 939.69           | 1409.54          | 3.97             | 0.87             | 0.06 | 5.42              |
| 4     | 939.69           | 1409.54          | 4.79             | 0.89             | 0.08 | 6.39              |
| 5     | 939.69           | 1409.54          | 8.20             | 0.73             | 0.13 | 13.32             |
| 6     | 939.69           | 1409.54          | 8.57             | 0.73             | 0.14 | 13.93             |
| 7     | 939.69           | 1409.54          | 6.86             | 0.73             | 0.11 | 11.15             |
| 8     | 939.69           | 1409.54          | 5.08             | 0.74             | 0.08 | 8.14              |
| 9     | 939.69           | 1409.54          | 6.98             | 1.48             | 0.11 | 5.59              |
| 10    | 939.69           | 1409.54          | 0.00             | 39.92            | 0.03 | 0.00              |

Seccion = 153

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 276.383 Td (mT) = 403.369

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 39.29            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 8.17             | 4.02             | 0.05 | 2.40              |
| 3     | 939.69           | 1409.54          | 8.01             | 2.39             | 0.05 | 3.97              |
| 4     | 939.69           | 1409.54          | 9.67             | 2.44             | 0.06 | 4.68              |
| 5     | 939.69           | 1409.54          | 16.56            | 2.01             | 0.10 | 9.75              |
| 6     | 939.69           | 1409.54          | 17.31            | 2.01             | 0.10 | 10.19             |
| 7     | 939.69           | 1409.54          | 13.85            | 2.01             | 0.08 | 8.16              |
| 8     | 939.69           | 1409.54          | 10.26            | 2.04             | 0.06 | 5.96              |
| 9     | 939.69           | 1409.54          | 14.10            | 4.07             | 0.09 | 4.09              |
| 10    | 939.69           | 1409.54          | 0.00             | 44.53            | 0.03 | 0.00              |

Seccion = 154

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 334.280 Td (mT) = 450.815

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 43.91            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 20.82            | 10.63            | 0.07 | 2.90              |
| 3     | 939.69           | 1409.54          | 20.43            | 6.32             | 0.06 | 4.80              |
| 4     | 939.69           | 1409.54          | 24.66            | 6.46             | 0.07 | 5.66              |
| 5     | 939.69           | 1409.54          | 42.22            | 5.31             | 0.12 | 11.79             |
| 6     | 939.69           | 1409.54          | 44.15            | 5.31             | 0.13 | 12.33             |
| 7     | 939.69           | 1409.54          | 35.32            | 5.31             | 0.10 | 9.87              |
| 8     | 939.69           | 1409.54          | 26.17            | 5.39             | 0.08 | 7.20              |
| 9     | 939.69           | 1409.54          | 35.94            | 10.78            | 0.11 | 4.94              |
| 10    | 939.69           | 1409.54          | 0.00             | 49.77            | 0.04 | 0.00              |

Seccion = 155

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 444.129 Td (mT) = 503.612

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 49.05            | 0.03 | 0.00              |
| 2     | 939.69           | 1409.54          | 33.89            | 13.47            | 0.09 | 3.86              |
| 3     | 939.69           | 1409.54          | 33.25            | 8.00             | 0.08 | 6.38              |
| 4     | 939.69           | 1409.54          | 40.15            | 8.19             | 0.10 | 7.52              |
| 5     | 939.69           | 1409.54          | 68.72            | 6.73             | 0.16 | 15.67             |
| 6     | 939.69           | 1409.54          | 71.86            | 6.73             | 0.17 | 16.38             |
| 7     | 939.69           | 1409.54          | 57.49            | 6.73             | 0.14 | 13.11             |
| 8     | 939.69           | 1409.54          | 42.60            | 6.83             | 0.10 | 9.57              |
| 9     | 939.69           | 1409.54          | 58.50            | 13.65            | 0.14 | 6.57              |
| 10    | 939.69           | 1409.54          | 0.00             | 55.60            | 0.04 | 0.00              |

Seccion = 156

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 551.129 Td (mT) = 551.735

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 53.74            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 46.71            | 16.18            | 0.11 | 4.79              |
| 3     | 939.69           | 1409.54          | 45.82            | 9.61             | 0.10 | 7.91              |
| 4     | 939.69           | 1409.54          | 55.33            | 9.84             | 0.12 | 9.33              |
| 5     | 939.69           | 1409.54          | 94.71            | 8.08             | 0.20 | 19.44             |
| 6     | 939.69           | 1409.54          | 99.03            | 8.08             | 0.21 | 20.33             |
| 7     | 939.69           | 1409.54          | 79.23            | 8.08             | 0.17 | 16.27             |
| 8     | 939.69           | 1409.54          | 58.70            | 8.20             | 0.13 | 11.88             |
| 9     | 939.69           | 1409.54          | 80.63            | 16.40            | 0.18 | 8.15              |
| 10    | 939.69           | 1409.54          | 0.00             | 60.91            | 0.04 | 0.00              |

Seccion = 157

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 671.211 Td (mT) = 615.009

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 59.90            | 0.04 | 0.00              |
| 2     | 939.69           | 1409.54          | 60.60            | 18.80            | 0.13 | 5.83              |
| 3     | 939.69           | 1409.54          | 59.45            | 11.17            | 0.12 | 9.63              |
| 4     | 939.69           | 1409.54          | 71.77            | 11.43            | 0.15 | 11.36             |
| 5     | 939.69           | 1409.54          | 122.87           | 9.39             | 0.24 | 23.68             |
| 6     | 939.69           | 1409.54          | 128.47           | 9.39             | 0.25 | 24.76             |
| 7     | 939.69           | 1409.54          | 102.78           | 9.39             | 0.20 | 19.81             |
| 8     | 939.69           | 1409.54          | 76.16            | 9.53             | 0.15 | 14.46             |
| 9     | 939.69           | 1409.54          | 104.60           | 19.06            | 0.21 | 9.93              |
| 10    | 939.69           | 1409.54          | 0.00             | 67.90            | 0.05 | 0.00              |

Seccion = 158

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 796.388 Td (mT) = 684.681

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 66.69            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 74.86            | 21.51            | 0.15 | 6.91              |
| 3     | 939.69           | 1409.54          | 73.44            | 12.78            | 0.14 | 11.43             |
| 4     | 939.69           | 1409.54          | 88.67            | 13.08            | 0.17 | 13.48             |
| 5     | 939.69           | 1409.54          | 151.79           | 10.74            | 0.29 | 28.09             |
| 6     | 939.69           | 1409.54          | 158.72           | 10.74            | 0.30 | 29.37             |
| 7     | 939.69           | 1409.54          | 126.97           | 10.74            | 0.24 | 23.50             |
| 8     | 939.69           | 1409.54          | 94.08            | 10.90            | 0.18 | 17.16             |
| 9     | 939.69           | 1409.54          | 129.22           | 21.81            | 0.25 | 11.78             |
| 10    | 939.69           | 1409.54          | 0.00             | 75.59            | 0.05 | 0.00              |

Seccion = 159

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 926.904 Td (mT) = 759.578

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 73.98            | 0.05 | 0.00              |
| 2     | 939.69           | 1409.54          | 89.54            | 24.22            | 0.18 | 8.05              |
| 3     | 939.69           | 1409.54          | 87.84            | 14.39            | 0.17 | 13.31             |
| 4     | 939.69           | 1409.54          | 106.05           | 14.72            | 0.20 | 15.69             |
| 5     | 939.69           | 1409.54          | 181.55           | 12.10            | 0.33 | 32.69             |
| 6     | 939.69           | 1409.54          | 189.83           | 12.10            | 0.35 | 34.19             |
| 7     | 939.69           | 1409.54          | 151.87           | 12.10            | 0.28 | 27.36             |
| 8     | 939.69           | 1409.54          | 112.53           | 12.27            | 0.21 | 19.97             |
| 9     | 939.69           | 1409.54          | 154.55           | 24.55            | 0.30 | 13.71             |
| 10    | 939.69           | 1409.54          | 0.00             | 83.86            | 0.06 | 0.00              |

Seccion = 160

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1062.552 Td (mT) = 839.773

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As,ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|-------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 81.79            | 0.06 | 0.00              |
| 2     | 939.69           | 1409.54          | 104.60           | 26.86            | 0.20 | 9.23              |
| 3     | 939.69           | 1409.54          | 102.61           | 15.96            | 0.19 | 15.25             |
| 4     | 939.69           | 1409.54          | 123.89           | 16.33            | 0.23 | 17.99             |
| 5     | 939.69           | 1409.54          | 212.08           | 13.42            | 0.38 | 37.48             |
| 6     | 939.69           | 1409.54          | 221.76           | 13.42            | 0.40 | 39.19             |
| 7     | 939.69           | 1409.54          | 177.41           | 13.42            | 0.32 | 31.36             |
| 8     | 939.69           | 1409.54          | 131.45           | 13.61            | 0.24 | 22.90             |
| 9     | 939.69           | 1409.54          | 180.55           | 27.23            | 0.34 | 15.72             |
| 10    | 939.69           | 1409.54          | 0.00             | 92.71            | 0.07 | 0.00              |

Seccion = 161

Angulo de la biela comprimida (sex) = 35.00

Valores maximos de los esfuerzos

Vd (T) = 1225.930 Td (mT) = 756.557

| Corte | tau_Vu<br>(T/m2) | tau_Tu<br>(T/m2) | tau_Vd<br>(T/m2) | tau_Td<br>(T/m2) | T-V  | As, ras<br>(cm2/m) |
|-------|------------------|------------------|------------------|------------------|------|--------------------|
| 1     | 939.69           | 1409.54          | 0.00             | 73.69            | 0.05 | 0.00               |
| 2     | 939.69           | 1409.54          | 121.94           | 29.50            | 0.23 | 10.64              |
| 3     | 939.69           | 1409.54          | 119.63           | 17.53            | 0.22 | 17.60              |
| 4     | 939.69           | 1409.54          | 144.43           | 17.93            | 0.26 | 20.75              |
| 5     | 939.69           | 1409.54          | 247.25           | 14.74            | 0.44 | 43.24              |
| 6     | 939.69           | 1409.54          | 258.53           | 14.74            | 0.46 | 45.22              |
| 7     | 939.69           | 1409.54          | 206.82           | 14.74            | 0.37 | 36.18              |
| 8     | 939.69           | 1409.54          | 153.25           | 14.95            | 0.28 | 26.42              |
| 9     | 939.69           | 1409.54          | 210.49           | 29.91            | 0.39 | 18.13              |
| 10    | 939.69           | 1409.54          | 0.00             | 83.52            | 0.06 | 0.00               |

# ARMADURA TRANSVERSAL EN TABLERO

Alpha=35°

Luz vano

|   |      |   |
|---|------|---|
| 1 | 36.0 | m |
| 2 | 45.0 | m |
| 3 | 45.0 | m |
| 4 | 45.0 | m |
| 5 | 45.0 | m |
| 6 | 45.0 | m |
| 7 | 45.0 | m |
| 8 | 36.0 | m |

|     |        | Armadura de Rasante (cm2/m) |                |                |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |      |
|-----|--------|-----------------------------|----------------|----------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|
| SEC | X<br>m | Cortante                    | Torsión        |                | 1   | 1    | 2    | 2    | 3    | 3    | 4    | 4    | 5    | 5    | 6    | 6    | 7    | 7    | 8    | 8    | 9    | 9    | 10  | 10   |
|     |        | Asc<br>(cm2/m)              | Asl<br>(cm2/m) | Ast<br>(cm2/m) | Vd  | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd  | Td   |
| 1   | 0.00   | 78.30                       | 10.69          | 5.24           | 0.0 | 7.3  | 11.0 | 7.3  | 18.2 | 7.3  | 21.4 | 7.3  | 44.7 | 7.3  | 46.7 | 7.3  | 37.4 | 7.3  | 27.3 | 7.3  | 18.7 | 7.3  | 0.0 | 7.3  |
| 2   | 1.80   | 66.20                       | 9.90           | 4.85           | 0.0 | 6.3  | 9.5  | 6.3  | 15.7 | 6.3  | 18.5 | 6.3  | 38.6 | 6.3  | 40.4 | 6.3  | 32.3 | 6.3  | 23.6 | 6.3  | 16.2 | 6.3  | 0.0 | 6.3  |
| 3   | 3.60   | 56.60                       | 9.00           | 4.41           | 0.0 | 5.5  | 8.3  | 5.5  | 13.7 | 5.5  | 16.2 | 5.5  | 33.8 | 5.5  | 35.3 | 5.5  | 28.2 | 5.5  | 20.6 | 5.5  | 14.2 | 5.5  | 0.0 | 5.5  |
| 4   | 5.40   | 47.30                       | 8.16           | 4.00           | 0.0 | 4.8  | 7.1  | 4.8  | 11.8 | 4.8  | 13.9 | 4.8  | 29.0 | 4.8  | 30.4 | 4.8  | 24.3 | 4.8  | 17.7 | 4.8  | 12.2 | 4.8  | 0.0 | 4.8  |
| 5   | 7.20   | 38.30                       | 7.37           | 3.61           | 0.0 | 4.0  | 6.0  | 4.0  | 10.0 | 4.0  | 11.8 | 4.0  | 24.5 | 4.0  | 25.6 | 4.0  | 20.5 | 4.0  | 15.0 | 4.0  | 10.3 | 4.0  | 0.0 | 4.0  |
| 6   | 9.00   | 29.90                       | 6.69           | 3.28           | 0.0 | 3.3  | 5.0  | 3.3  | 8.2  | 3.3  | 9.7  | 3.3  | 20.2 | 3.3  | 21.2 | 3.3  | 16.9 | 3.3  | 12.4 | 3.3  | 8.5  | 3.3  | 0.0 | 3.3  |
| 7   | 10.80  | 21.90                       | 6.11           | 2.99           | 0.0 | 2.7  | 4.0  | 2.7  | 6.6  | 2.7  | 7.8  | 2.7  | 16.2 | 2.7  | 16.9 | 2.7  | 13.5 | 2.7  | 9.9  | 2.7  | 6.8  | 2.7  | 0.0 | 2.7  |
| 8   | 12.60  | 16.30                       | 5.50           | 2.70           | 0.0 | 2.0  | 3.0  | 2.0  | 4.9  | 2.0  | 5.8  | 2.0  | 12.1 | 2.0  | 12.7 | 2.0  | 10.1 | 2.0  | 7.4  | 2.0  | 5.1  | 2.0  | 0.0 | 2.0  |
| 9   | 14.40  | 16.30                       | 4.94           | 2.42           | 0.0 | 1.6  | 2.4  | 1.6  | 4.0  | 1.6  | 4.7  | 1.6  | 9.7  | 1.6  | 10.2 | 1.6  | 8.1  | 1.6  | 5.9  | 1.6  | 4.1  | 1.6  | 0.0 | 1.6  |
| 10  | 16.20  | 16.50                       | 4.45           | 2.18           | 0.0 | 2.2  | 3.3  | 2.2  | 5.5  | 2.2  | 6.5  | 2.2  | 13.5 | 2.2  | 14.1 | 2.2  | 11.3 | 2.2  | 8.2  | 2.2  | 5.7  | 2.2  | 0.0 | 2.2  |
| 11  | 18.00  | 19.10                       | 4.04           | 1.98           | 0.0 | 2.4  | 3.7  | 2.4  | 6.0  | 2.4  | 7.1  | 2.4  | 14.8 | 2.4  | 15.5 | 2.4  | 12.4 | 2.4  | 9.1  | 2.4  | 6.2  | 2.4  | 0.0 | 2.4  |
| 12  | 19.80  | 22.00                       | 4.05           | 1.99           | 0.0 | 2.7  | 4.0  | 2.7  | 6.7  | 2.7  | 7.9  | 2.7  | 16.4 | 2.7  | 17.1 | 2.7  | 13.7 | 2.7  | 10.0 | 2.7  | 6.9  | 2.7  | 0.0 | 2.7  |
| 13  | 21.60  | 25.10                       | 4.54           | 2.23           | 0.0 | 3.0  | 4.4  | 3.0  | 7.3  | 3.0  | 8.6  | 3.0  | 18.0 | 3.0  | 18.8 | 3.0  | 15.1 | 3.0  | 11.0 | 3.0  | 7.5  | 3.0  | 0.0 | 3.0  |
| 14  | 23.40  | 28.20                       | 5.11           | 2.51           | 0.0 | 3.2  | 4.8  | 3.2  | 8.0  | 3.2  | 9.4  | 3.2  | 19.7 | 3.2  | 20.6 | 3.2  | 16.4 | 3.2  | 12.0 | 3.2  | 8.2  | 3.2  | 0.0 | 3.2  |
| 15  | 25.20  | 31.40                       | 5.75           | 2.82           | 0.0 | 3.5  | 5.3  | 3.5  | 8.7  | 3.5  | 10.2 | 3.5  | 21.3 | 3.5  | 22.3 | 3.5  | 17.9 | 3.5  | 13.0 | 3.5  | 8.9  | 3.5  | 0.0 | 3.5  |
| 16  | 27.00  | 34.20                       | 6.34           | 3.11           | 0.0 | 3.8  | 5.6  | 3.8  | 9.3  | 3.8  | 11.0 | 3.8  | 22.9 | 3.8  | 23.9 | 3.8  | 19.1 | 3.8  | 14.0 | 3.8  | 9.6  | 3.8  | 0.0 | 3.8  |
| 17  | 28.80  | 37.40                       | 7.10           | 3.48           | 0.0 | 4.0  | 6.0  | 4.0  | 10.0 | 4.0  | 11.8 | 4.0  | 24.5 | 4.0  | 25.6 | 4.0  | 20.5 | 4.0  | 15.0 | 4.0  | 10.3 | 4.0  | 0.0 | 4.0  |
| 18  | 30.60  | 40.80                       | 7.95           | 3.90           | 0.0 | 4.3  | 6.5  | 4.3  | 10.7 | 4.3  | 12.6 | 4.3  | 26.3 | 4.3  | 27.5 | 4.3  | 22.0 | 4.3  | 16.1 | 4.3  | 11.0 | 4.3  | 0.0 | 4.3  |
| 19  | 32.40  | 54.90                       | 9.26           | 4.54           | 0.0 | 5.7  | 7.9  | 5.7  | 13.2 | 5.7  | 15.7 | 5.7  | 32.6 | 5.7  | 34.7 | 5.7  | 30.3 | 5.7  | 24.8 | 5.7  | 18.8 | 5.7  | 0.0 | 5.7  |
| 20  | 34.20  | 100.00                      | 10.28          | 5.04           | 0.0 | 9.6  | 13.5 | 9.6  | 22.3 | 9.6  | 26.7 | 9.6  | 55.3 | 9.6  | 58.8 | 9.6  | 51.5 | 9.6  | 42.1 | 9.6  | 31.9 | 9.6  | 0.0 | 9.6  |
| 21  | 36.00  | 149.60                      | 11.49          | 5.64           | 0.0 | 13.9 | 19.5 | 13.9 | 32.4 | 13.9 | 38.7 | 13.9 | 80.3 | 13.9 | 85.4 | 13.9 | 74.7 | 13.9 | 61.1 | 13.9 | 46.3 | 13.9 | 0.0 | 13.9 |
| 22  | 38.25  | 106.90                      | 12.55          | 6.15           | 0.0 | 10.2 | 14.3 | 10.2 | 23.7 | 10.2 | 28.3 | 10.2 | 58.8 | 10.2 | 62.5 | 10.2 | 54.7 | 10.2 | 44.7 | 10.2 | 33.8 | 10.2 | 0.0 | 10.2 |
| 23  | 40.50  | 63.30                       | 10.97          | 5.38           | 0.0 | 6.2  | 9.3  | 6.2  | 15.4 | 6.2  | 18.1 | 6.2  | 37.8 | 6.2  | 39.5 | 6.2  | 31.6 | 6.2  | 23.1 | 6.2  | 15.9 | 6.2  | 0.0 | 6.2  |
| 24  | 42.75  | 56.60                       | 9.99           | 4.90           | 0.0 | 5.6  | 8.5  | 5.6  | 14.0 | 5.6  | 16.5 | 5.6  | 34.4 | 5.6  | 36.0 | 5.6  | 28.8 | 5.6  | 21.0 | 5.6  | 14.4 | 5.6  | 0.0 | 5.6  |
| 25  | 45.00  | 47.90                       | 8.99           | 4.41           | 0.0 | 4.9  | 7.4  | 4.9  | 12.2 | 4.9  | 14.3 | 4.9  | 29.9 | 4.9  | 31.3 | 4.9  | 25.0 | 4.9  | 18.3 | 4.9  | 12.5 | 4.9  | 0.0 | 4.9  |
| 26  | 47.25  | 39.20                       | 8.16           | 4.00           | 0.0 | 4.2  | 6.3  | 4.2  | 10.4 | 4.2  | 12.2 | 4.2  | 25.4 | 4.2  | 26.6 | 4.2  | 21.3 | 4.2  | 15.5 | 4.2  | 10.7 | 4.2  | 0.0 | 4.2  |
| 27  | 49.50  | 33.00                       | 7.39           | 3.62           | 0.0 | 3.7  | 5.5  | 3.7  | 9.1  | 3.7  | 10.7 | 3.7  | 22.3 | 3.7  | 23.3 | 3.7  | 18.7 | 3.7  | 13.6 | 3.7  | 9.4  | 3.7  | 0.0 | 3.7  |
| 28  | 51.75  | 27.20                       | 6.66           | 3.27           | 0.0 | 3.2  | 4.8  | 3.2  | 7.9  | 3.2  | 9.3  | 3.2  | 19.4 | 3.2  | 20.2 | 3.2  | 16.2 | 3.2  | 11.8 | 3.2  | 8.1  | 3.2  | 0.0 | 3.2  |
| 29  | 54.00  | 21.40                       | 5.93           | 2.91           | 0.0 | 2.7  | 4.0  | 2.7  | 6.7  | 2.7  | 7.9  | 2.7  | 16.4 | 2.7  | 17.1 | 2.7  | 13.7 | 2.7  | 10.0 | 2.7  | 6.9  | 2.7  | 0.0 | 2.7  |
| 30  | 56.25  | 16.30                       | 5.34           | 2.62           | 0.0 | 2.2  | 3.4  | 2.2  | 5.6  | 2.2  | 6.6  | 2.2  | 13.7 | 2.2  | 14.3 | 2.2  | 11.4 | 2.2  | 8.4  | 2.2  | 5.7  | 2.2  | 0.0 | 2.2  |
| 31  | 58.50  | 16.30                       | 4.84           | 2.37           | 0.0 | 2.0  | 3.0  | 2.0  | 4.9  | 2.0  | 5.8  | 2.0  | 12.0 | 2.0  | 12.5 | 2.0  | 10.0 | 2.0  | 7.3  | 2.0  | 5.0  | 2.0  | 0.0 | 2.0  |
| 32  | 60.75  | 17.10                       | 5.09           | 2.50           | 0.0 | 2.4  | 3.5  | 2.4  | 5.8  | 2.4  | 6.9  | 2.4  | 14.3 | 2.4  | 15.0 | 2.4  | 12.0 | 2.4  | 8.7  | 2.4  | 6.0  | 2.4  | 0.0 | 2.4  |
| 33  | 63.00  | 21.90                       | 5.64           | 2.76           | 0.0 | 2.8  | 4.1  | 2.8  | 6.8  | 2.8  | 8.1  | 2.8  | 16.8 | 2.8  | 17.6 | 2.8  | 14.1 | 2.8  | 10.3 | 2.8  | 7.0  | 2.8  | 0.0 | 2.8  |
| 34  | 65.25  | 27.20                       | 6.40           | 3.14           | 0.0 | 3.2  | 4.8  | 3.2  | 7.9  | 3.2  | 9.4  | 3.2  | 19.5 | 3.2  | 20.4 | 3.2  | 16.3 | 3.2  | 11.9 | 3.2  | 8.2  | 3.2  | 0.0 | 3.2  |
| 35  | 67.50  | 32.10                       | 7.14           | 3.50           | 0.0 | 3.6  | 5.4  | 3.6  | 9.0  | 3.6  | 10.6 | 3.6  | 22.1 | 3.6  | 23.1 | 3.6  | 18.5 | 3.6  | 13.5 | 3.6  | 9.3  | 3.6  | 0.0 | 3.6  |
| 36  | 69.75  | 37.00                       | 7.96           | 3.90           | 0.0 | 4.1  | 6.1  | 4.1  | 10.1 | 4.1  | 11.9 | 4.1  | 24.7 | 4.1  | 25.8 | 4.1  | 20.7 | 4.1  | 15.1 | 4.1  | 10.4 | 4.1  | 0.0 | 4.1  |
| 37  | 72.00  | 42.40                       | 8.88           | 4.35           | 0.0 | 4.5  | 6.8  | 4.5  | 11.2 | 4.5  | 13.2 | 4.5  | 27.5 | 4.5  | 28.8 | 4.5  | 23.0 | 4.5  | 16.8 | 4.5  | 11.5 | 4.5  | 0.0 | 4.5  |
| 38  | 74.25  | 47.80                       | 9.94           | 4.88           | 0.0 | 5.0  | 7.5  | 5.0  | 12.4 | 5.0  | 14.6 | 5.0  | 30.4 | 5.0  | 31.8 | 5.0  | 25.4 | 5.0  | 18.6 | 5.0  | 12.7 | 5.0  | 0.0 | 5.0  |
| 39  | 76.50  | 55.10                       | 11.48          | 5.63           | 0.0 | 5.7  | 8.1  | 5.7  | 13.4 | 5.7  | 16.0 | 5.7  | 33.1 | 5.7  | 35.2 | 5.7  | 30.8 | 5.7  | 25.2 | 5.7  | 19.1 | 5.7  | 0.0 | 5.7  |
| 40  | 78.75  | 100.40                      | 12.66          | 6.21           | 0.0 | 9.7  | 13.6 | 9.7  | 22.6 | 9.7  | 27.0 | 9.7  | 55.9 | 9.7  | 59.5 | 9.7  | 52.0 | 9.7  | 42.5 | 9.7  | 32.2 | 9.7  | 0.0 | 9.7  |
| 41  | 81.00  | 151.70                      | 11.49          | 5.63           | 0.0 | 14.2 | 19.9 | 14.2 | 33.0 | 14.2 | 39.4 | 14.2 | 81.8 | 14.2 | 87.0 | 14.2 | 76.1 | 14.2 | 62.2 | 14.2 | 47.1 | 14.2 | 0.0 | 14.2 |
| 42  | 83.25  | 105.10                      | 12.57          | 6.17           | 0.0 | 10.1 | 14.2 | 10.1 | 23.6 | 10.1 | 28.1 | 10.1 | 58.3 | 10.1 | 62.0 | 10.1 | 54.3 | 10.1 | 44.4 | 10.1 | 33.6 | 10.1 | 0.0 | 10.1 |
| 43  | 85.50  | 58.80                       | 10.99          | 5.39           | 0.0 | 5.9  | 8.9  | 5.9  | 14.6 | 5.9  | 17.3 | 5.9  | 36.0 | 5.9  | 37.6 | 5.9  | 30.1 | 5.9  | 22.0 | 5.9  | 15.1 | 5.9  | 0.0 | 5.9  |
| 44  | 87.75  | 53.10                       | 10.01          | 4.91           | 0.0 | 5.4  | 8.1  | 5.4  | 13.5 | 5.4  | 15.9 | 5.4  | 33.1 | 5.4  | 34.6 | 5.4  | 27.7 | 5.4  | 20.2 | 5.4  | 13.9 | 5.4  | 0.0 | 5.4  |

| Armadura de Rasante (cm2/m) |        |                |                |                |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |      |
|-----------------------------|--------|----------------|----------------|----------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|
| SEC                         | X<br>m | Cortante       | Torsión        | 1              | 1   | 2    | 2    | 3    | 3    | 4    | 4    | 5    | 5    | 6    | 6    | 7    | 7    | 8    | 8    | 9    | 9    | 10   | 10  |      |
|                             |        | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | Vd  | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd   | Td   | Vd  | Td   |
| 45                          | 90.00  | 45.30          | 9.02           | 4.42           | 0.0 | 4.8  | 7.2  | 4.8  | 11.8 | 4.8  | 13.9 | 4.8  | 29.1 | 4.8  | 30.4 | 4.8  | 24.3 | 4.8  | 17.8 | 4.8  | 12.2 | 4.8  | 0.0 | 4.8  |
| 46                          | 92.25  | 42.40          | 8.18           | 4.01           | 0.0 | 4.4  | 6.7  | 4.4  | 11.0 | 4.4  | 13.0 | 4.4  | 27.1 | 4.4  | 28.3 | 4.4  | 22.7 | 4.4  | 16.5 | 4.4  | 11.4 | 4.4  | 0.0 | 4.4  |
| 47                          | 94.50  | 36.20          | 7.40           | 3.63           | 0.0 | 3.9  | 5.9  | 3.9  | 9.7  | 3.9  | 11.5 | 3.9  | 23.9 | 3.9  | 25.0 | 3.9  | 20.0 | 3.9  | 14.6 | 3.9  | 10.0 | 3.9  | 0.0 | 3.9  |
| 48                          | 96.75  | 30.40          | 6.69           | 3.28           | 0.0 | 3.4  | 5.2  | 3.4  | 8.5  | 3.4  | 10.1 | 3.4  | 21.0 | 3.4  | 21.9 | 3.4  | 17.5 | 3.4  | 12.8 | 3.4  | 8.8  | 3.4  | 0.0 | 3.4  |
| 49                          | 99.00  | 24.50          | 5.96           | 2.92           | 0.0 | 3.0  | 4.4  | 3.0  | 7.3  | 3.0  | 8.6  | 3.0  | 18.0 | 3.0  | 18.8 | 3.0  | 15.0 | 3.0  | 11.0 | 3.0  | 7.5  | 3.0  | 0.0 | 3.0  |
| 50                          | 101.25 | 19.20          | 5.35           | 2.62           | 0.0 | 2.5  | 3.8  | 2.5  | 6.2  | 2.5  | 7.3  | 2.5  | 15.3 | 2.5  | 16.0 | 2.5  | 12.8 | 2.5  | 9.3  | 2.5  | 6.4  | 2.5  | 0.0 | 2.5  |
| 51                          | 103.50 | 16.30          | 4.86           | 2.38           | 0.0 | 2.1  | 3.2  | 2.1  | 5.2  | 2.1  | 6.2  | 2.1  | 12.9 | 2.1  | 13.5 | 2.1  | 10.8 | 2.1  | 7.9  | 2.1  | 5.4  | 2.1  | 0.0 | 2.1  |
| 52                          | 105.75 | 17.60          | 5.17           | 2.53           | 0.0 | 2.4  | 3.6  | 2.4  | 5.9  | 2.4  | 7.0  | 2.4  | 14.6 | 2.4  | 15.2 | 2.4  | 12.2 | 2.4  | 8.9  | 2.4  | 6.1  | 2.4  | 0.0 | 2.4  |
| 53                          | 108.00 | 22.50          | 5.76           | 2.82           | 0.0 | 2.8  | 4.2  | 2.8  | 7.0  | 2.8  | 8.2  | 2.8  | 17.1 | 2.8  | 17.9 | 2.8  | 14.3 | 2.8  | 10.4 | 2.8  | 7.2  | 2.8  | 0.0 | 2.8  |
| 54                          | 110.25 | 27.70          | 6.51           | 3.19           | 0.0 | 3.3  | 4.9  | 3.3  | 8.1  | 3.3  | 9.5  | 3.3  | 19.8 | 3.3  | 20.7 | 3.3  | 16.6 | 3.3  | 12.1 | 3.3  | 8.3  | 3.3  | 0.0 | 3.3  |
| 55                          | 112.50 | 32.70          | 7.25           | 3.56           | 0.0 | 3.7  | 5.5  | 3.7  | 9.1  | 3.7  | 10.7 | 3.7  | 22.4 | 3.7  | 23.4 | 3.7  | 18.7 | 3.7  | 13.7 | 3.7  | 9.4  | 3.7  | 0.0 | 3.7  |
| 56                          | 114.75 | 37.60          | 8.07           | 3.96           | 0.0 | 4.1  | 6.2  | 4.1  | 10.2 | 4.1  | 12.0 | 4.1  | 25.0 | 4.1  | 26.2 | 4.1  | 20.9 | 4.1  | 15.3 | 4.1  | 10.5 | 4.1  | 0.0 | 4.1  |
| 57                          | 117.00 | 42.90          | 9.00           | 4.41           | 0.0 | 4.6  | 6.8  | 4.6  | 11.3 | 4.6  | 13.3 | 4.6  | 27.8 | 4.6  | 29.1 | 4.6  | 23.2 | 4.6  | 17.0 | 4.6  | 11.7 | 4.6  | 0.0 | 4.6  |
| 58                          | 119.25 | 48.40          | 10.06          | 4.93           | 0.0 | 5.0  | 7.5  | 5.0  | 12.5 | 5.0  | 14.7 | 5.0  | 30.7 | 5.0  | 32.1 | 5.0  | 25.7 | 5.0  | 18.7 | 5.0  | 12.9 | 5.0  | 0.0 | 5.0  |
| 59                          | 121.50 | 55.70          | 11.60          | 5.69           | 0.0 | 5.8  | 8.1  | 5.8  | 13.5 | 5.8  | 16.1 | 5.8  | 33.4 | 5.8  | 35.5 | 5.8  | 31.1 | 5.8  | 25.4 | 5.8  | 19.2 | 5.8  | 0.0 | 5.8  |
| 60                          | 123.75 | 101.00         | 12.77          | 6.26           | 0.0 | 9.8  | 13.7 | 9.8  | 22.7 | 9.8  | 27.1 | 9.8  | 56.2 | 9.8  | 59.8 | 9.8  | 52.3 | 9.8  | 42.8 | 9.8  | 32.4 | 9.8  | 0.0 | 9.8  |
| 61                          | 126.00 | 151.80         | 11.49          | 5.63           | 0.0 | 14.2 | 19.9 | 14.2 | 33.1 | 14.2 | 39.5 | 14.2 | 81.9 | 14.2 | 87.1 | 14.2 | 76.2 | 14.2 | 62.3 | 14.2 | 47.1 | 14.2 | 0.0 | 14.2 |
| 62                          | 128.25 | 105.20         | 12.59          | 6.17           | 0.0 | 10.1 | 14.2 | 10.1 | 23.6 | 10.1 | 28.1 | 10.1 | 58.4 | 10.1 | 62.1 | 10.1 | 54.3 | 10.1 | 44.4 | 10.1 | 33.6 | 10.1 | 0.0 | 10.1 |
| 63                          | 130.50 | 58.90          | 11.00          | 5.39           | 0.0 | 5.9  | 8.9  | 5.9  | 14.7 | 5.9  | 17.3 | 5.9  | 36.0 | 5.9  | 37.7 | 5.9  | 30.1 | 5.9  | 22.0 | 5.9  | 15.1 | 5.9  | 0.0 | 5.9  |
| 64                          | 132.75 | 53.10          | 10.03          | 4.92           | 0.0 | 5.4  | 8.1  | 5.4  | 13.5 | 5.4  | 15.9 | 5.4  | 33.1 | 5.4  | 34.6 | 5.4  | 27.7 | 5.4  | 20.2 | 5.4  | 13.9 | 5.4  | 0.0 | 5.4  |
| 65                          | 135.00 | 45.40          | 9.03           | 4.43           | 0.0 | 4.8  | 7.2  | 4.8  | 11.8 | 4.8  | 14.0 | 4.8  | 29.1 | 4.8  | 30.4 | 4.8  | 24.3 | 4.8  | 17.8 | 4.8  | 12.2 | 4.8  | 0.0 | 4.8  |
| 66                          | 137.25 | 42.40          | 8.17           | 4.01           | 0.0 | 4.4  | 6.7  | 4.4  | 11.0 | 4.4  | 13.0 | 4.4  | 27.1 | 4.4  | 28.3 | 4.4  | 22.7 | 4.4  | 16.5 | 4.4  | 11.4 | 4.4  | 0.0 | 4.4  |
| 67                          | 139.50 | 36.20          | 7.40           | 3.63           | 0.0 | 3.9  | 5.9  | 3.9  | 9.7  | 3.9  | 11.5 | 3.9  | 23.9 | 3.9  | 25.0 | 3.9  | 20.0 | 3.9  | 14.6 | 3.9  | 10.0 | 3.9  | 0.0 | 3.9  |
| 68                          | 141.75 | 30.40          | 6.68           | 3.28           | 0.0 | 3.4  | 5.2  | 3.4  | 8.5  | 3.4  | 10.1 | 3.4  | 21.0 | 3.4  | 21.9 | 3.4  | 17.6 | 3.4  | 12.8 | 3.4  | 8.8  | 3.4  | 0.0 | 3.4  |
| 69                          | 144.00 | 24.60          | 5.95           | 2.92           | 0.0 | 3.0  | 4.4  | 3.0  | 7.3  | 3.0  | 8.6  | 3.0  | 18.0 | 3.0  | 18.8 | 3.0  | 15.1 | 3.0  | 11.0 | 3.0  | 7.5  | 3.0  | 0.0 | 3.0  |
| 70                          | 146.25 | 19.20          | 5.35           | 2.62           | 0.0 | 2.5  | 3.8  | 2.5  | 6.2  | 2.5  | 7.3  | 2.5  | 15.3 | 2.5  | 16.0 | 2.5  | 12.8 | 2.5  | 9.3  | 2.5  | 6.4  | 2.5  | 0.0 | 2.5  |
| 71                          | 148.50 | 16.30          | 4.86           | 2.38           | 0.0 | 2.1  | 3.2  | 2.1  | 5.3  | 2.1  | 6.2  | 2.1  | 12.9 | 2.1  | 13.5 | 2.1  | 10.8 | 2.1  | 7.9  | 2.1  | 5.4  | 2.1  | 0.0 | 2.1  |
| 72                          | 150.75 | 18.60          | 5.17           | 2.53           | 0.0 | 2.5  | 3.7  | 2.5  | 6.1  | 2.5  | 7.2  | 2.5  | 15.0 | 2.5  | 15.7 | 2.5  | 12.6 | 2.5  | 9.2  | 2.5  | 6.3  | 2.5  | 0.0 | 2.5  |
| 73                          | 153.00 | 23.40          | 5.76           | 2.83           | 0.0 | 2.9  | 4.3  | 2.9  | 7.1  | 2.9  | 8.4  | 2.9  | 17.5 | 2.9  | 18.3 | 2.9  | 14.7 | 2.9  | 10.7 | 2.9  | 7.4  | 2.9  | 0.0 | 2.9  |
| 74                          | 155.25 | 28.60          | 6.51           | 3.19           | 0.0 | 3.3  | 5.0  | 3.3  | 8.3  | 3.3  | 9.7  | 3.3  | 20.3 | 3.3  | 21.2 | 3.3  | 17.0 | 3.3  | 12.4 | 3.3  | 8.5  | 3.3  | 0.0 | 3.3  |
| 75                          | 157.50 | 33.60          | 7.26           | 3.56           | 0.0 | 3.8  | 5.6  | 3.8  | 9.3  | 3.8  | 11.0 | 3.8  | 22.9 | 3.8  | 23.9 | 3.8  | 19.1 | 3.8  | 14.0 | 3.8  | 9.6  | 3.8  | 0.0 | 3.8  |
| 76                          | 159.75 | 38.50          | 8.08           | 3.96           | 0.0 | 4.2  | 6.3  | 4.2  | 10.4 | 4.2  | 12.2 | 4.2  | 25.5 | 4.2  | 26.6 | 4.2  | 21.3 | 4.2  | 15.6 | 4.2  | 10.7 | 4.2  | 0.0 | 4.2  |
| 77                          | 162.00 | 43.90          | 9.00           | 4.41           | 0.0 | 4.6  | 7.0  | 4.6  | 11.5 | 4.6  | 13.6 | 4.6  | 28.3 | 4.6  | 29.6 | 4.6  | 23.6 | 4.6  | 17.3 | 4.6  | 11.9 | 4.6  | 0.0 | 4.6  |
| 78                          | 164.25 | 49.30          | 10.06          | 4.93           | 0.0 | 5.1  | 7.7  | 5.1  | 12.7 | 5.1  | 14.9 | 5.1  | 31.1 | 5.1  | 32.6 | 5.1  | 26.1 | 5.1  | 19.0 | 5.1  | 13.1 | 5.1  | 0.0 | 5.1  |
| 79                          | 166.50 | 56.60          | 11.60          | 5.69           | 0.0 | 5.9  | 8.2  | 5.9  | 13.7 | 5.9  | 16.3 | 5.9  | 33.9 | 5.9  | 36.0 | 5.9  | 31.5 | 5.9  | 25.8 | 5.9  | 19.5 | 5.9  | 0.0 | 5.9  |
| 80                          | 168.75 | 101.90         | 12.78          | 6.26           | 0.0 | 9.8  | 13.8 | 9.8  | 22.9 | 9.8  | 27.3 | 9.8  | 56.7 | 9.8  | 60.3 | 9.8  | 52.7 | 9.8  | 43.1 | 9.8  | 32.6 | 9.8  | 0.0 | 9.8  |
| 81                          | 171.00 | 152.00         | 11.52          | 5.65           | 0.0 | 14.2 | 20.0 | 14.2 | 33.1 | 14.2 | 39.5 | 14.2 | 82.0 | 14.2 | 87.2 | 14.2 | 76.3 | 14.2 | 62.4 | 14.2 | 47   |      |     |      |



| SEC | X<br>m | Armadura de Rasante (cm2/m) |                           |                |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |          |
|-----|--------|-----------------------------|---------------------------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
|     |        | Cortante<br>Asc<br>(cm2/m)  | Torsión<br>Asl<br>(cm2/m) | Ast<br>(cm2/m) | 1<br>Vd | 1<br>Td | 2<br>Vd | 2<br>Td | 3<br>Vd | 3<br>Td | 4<br>Vd | 4<br>Td | 5<br>Vd | 5<br>Td | 6<br>Vd | 6<br>Td | 7<br>Vd | 7<br>Td | 8<br>Vd | 8<br>Td | 9<br>Vd | 9<br>Td | 10<br>Vd | 10<br>Td |
| 101 | 216.00 | 148.40                      | 11.50                     | 5.64           | 0.0     | 13.9    | 19.5    | 13.9    | 32.4    | 13.9    | 38.6    | 13.9    | 80.1    | 13.9    | 85.3    | 13.9    | 74.6    | 13.9    | 61.0    | 13.9    | 46.2    | 13.9    | 0.0      | 13.9     |
| 102 | 218.25 | 103.10                      | 12.58                     | 6.17           | 0.0     | 9.9     | 13.9    | 9.9     | 23.1    | 9.9     | 27.6    | 9.9     | 57.3    | 9.9     | 60.9    | 9.9     | 53.3    | 9.9     | 43.6    | 9.9     | 33.0    | 9.9     | 0.0      | 9.9      |
| 103 | 220.50 | 58.00                       | 10.99                     | 5.39           | 0.0     | 5.8     | 8.8     | 5.8     | 14.5    | 5.8     | 17.1    | 5.8     | 35.6    | 5.8     | 37.2    | 5.8     | 29.8    | 5.8     | 21.7    | 5.8     | 14.9    | 5.8     | 0.0      | 5.8      |
| 104 | 222.75 | 52.30                       | 10.02                     | 4.91           | 0.0     | 5.4     | 8.0     | 5.4     | 13.3    | 5.4     | 15.7    | 5.4     | 32.7    | 5.4     | 34.1    | 5.4     | 27.3    | 5.4     | 20.0    | 5.4     | 13.7    | 5.4     | 0.0      | 5.4      |
| 105 | 225.00 | 44.50                       | 9.02                      | 4.42           | 0.0     | 4.7     | 7.0     | 4.7     | 11.7    | 4.7     | 13.7    | 4.7     | 28.6    | 4.7     | 29.9    | 4.7     | 24.0    | 4.7     | 17.5    | 4.7     | 12.0    | 4.7     | 0.0      | 4.7      |
| 106 | 227.25 | 41.60                       | 8.18                      | 4.01           | 0.0     | 4.4     | 6.6     | 4.4     | 10.8    | 4.4     | 12.8    | 4.4     | 26.7    | 4.4     | 27.9    | 4.4     | 22.3    | 4.4     | 16.3    | 4.4     | 11.2    | 4.4     | 0.0      | 4.4      |
| 107 | 229.50 | 35.40                       | 7.41                      | 3.63           | 0.0     | 3.9     | 5.8     | 3.9     | 9.6     | 3.9     | 11.3    | 3.9     | 23.5    | 3.9     | 24.6    | 3.9     | 19.7    | 3.9     | 14.4    | 3.9     | 9.9     | 3.9     | 0.0      | 3.9      |
| 108 | 231.75 | 29.60                       | 6.69                      | 3.28           | 0.0     | 3.4     | 5.1     | 3.4     | 8.4     | 3.4     | 9.9     | 3.4     | 20.6    | 3.4     | 21.5    | 3.4     | 17.2    | 3.4     | 12.6    | 3.4     | 8.6     | 3.4     | 0.0      | 3.4      |
| 109 | 234.00 | 23.70                       | 5.95                      | 2.92           | 0.0     | 2.9     | 4.3     | 2.9     | 7.2     | 2.9     | 8.4     | 2.9     | 17.6    | 2.9     | 18.4    | 2.9     | 14.7    | 2.9     | 10.7    | 2.9     | 7.4     | 2.9     | 0.0      | 2.9      |
| 110 | 236.25 | 18.40                       | 5.36                      | 2.63           | 0.0     | 2.4     | 3.7     | 2.4     | 6.1     | 2.4     | 7.1     | 2.4     | 14.9    | 2.4     | 15.5    | 2.4     | 12.4    | 2.4     | 9.1     | 2.4     | 6.2     | 2.4     | 0.0      | 2.4      |
| 111 | 238.50 | 16.30                       | 4.86                      | 2.38           | 0.0     | 2.1     | 3.1     | 2.1     | 5.1     | 2.1     | 6.1     | 2.1     | 12.6    | 2.1     | 13.2    | 2.1     | 10.6    | 2.1     | 7.7     | 2.1     | 5.3     | 2.1     | 0.0      | 2.1      |
| 112 | 240.75 | 18.40                       | 5.16                      | 2.53           | 0.0     | 2.5     | 3.7     | 2.5     | 6.1     | 2.5     | 7.2     | 2.5     | 15.0    | 2.5     | 15.7    | 2.5     | 12.5    | 2.5     | 9.1     | 2.5     | 6.3     | 2.5     | 0.0      | 2.5      |
| 113 | 243.00 | 23.30                       | 5.75                      | 2.82           | 0.0     | 2.9     | 4.3     | 2.9     | 7.1     | 2.9     | 8.4     | 2.9     | 17.5    | 2.9     | 18.3    | 2.9     | 14.6    | 2.9     | 10.7    | 2.9     | 7.3     | 2.9     | 0.0      | 2.9      |
| 114 | 245.25 | 28.50                       | 6.51                      | 3.19           | 0.0     | 3.3     | 5.0     | 3.3     | 8.2     | 3.3     | 9.7     | 3.3     | 20.2    | 3.3     | 21.2    | 3.3     | 16.9    | 3.3     | 12.4    | 3.3     | 8.5     | 3.3     | 0.0      | 3.3      |
| 115 | 247.50 | 33.50                       | 7.25                      | 3.55           | 0.0     | 3.7     | 5.6     | 3.7     | 9.3     | 3.7     | 10.9    | 3.7     | 22.8    | 3.7     | 23.9    | 3.7     | 19.1    | 3.7     | 13.9    | 3.7     | 9.6     | 3.7     | 0.0      | 3.7      |
| 116 | 249.75 | 38.40                       | 8.07                      | 3.96           | 0.0     | 4.2     | 6.3     | 4.2     | 10.3    | 4.2     | 12.2    | 4.2     | 25.4    | 4.2     | 26.6    | 4.2     | 21.3    | 4.2     | 15.5    | 4.2     | 10.7    | 4.2     | 0.0      | 4.2      |
| 117 | 252.00 | 43.70                       | 8.99                      | 4.41           | 0.0     | 4.6     | 6.9     | 4.6     | 11.5    | 4.6     | 13.5    | 4.6     | 28.2    | 4.6     | 29.5    | 4.6     | 23.6    | 4.6     | 17.2    | 4.6     | 11.8    | 4.6     | 0.0      | 4.6      |
| 118 | 254.25 | 49.20                       | 10.05                     | 4.93           | 0.0     | 5.1     | 7.6     | 5.1     | 12.6    | 5.1     | 14.9    | 5.1     | 31.1    | 5.1     | 32.5    | 5.1     | 26.0    | 5.1     | 19.0    | 5.1     | 13.0    | 5.1     | 0.0      | 5.1      |
| 119 | 256.50 | 56.50                       | 11.60                     | 5.69           | 0.0     | 5.9     | 8.2     | 5.9     | 13.7    | 5.9     | 16.3    | 5.9     | 33.8    | 5.9     | 35.9    | 5.9     | 31.5    | 5.9     | 25.7    | 5.9     | 19.5    | 5.9     | 0.0      | 5.9      |
| 120 | 258.75 | 144.10                      | 12.77                     | 6.26           | 0.0     | 13.5    | 19.0    | 13.5    | 31.5    | 13.5    | 37.6    | 13.5    | 77.9    | 13.5    | 82.8    | 13.5    | 72.5    | 13.5    | 59.2    | 13.5    | 44.9    | 13.5    | 0.0      | 13.5     |
| 121 | 261.00 | 151.20                      | 11.46                     | 5.62           | 0.0     | 14.2    | 19.8    | 14.2    | 32.9    | 14.2    | 39.3    | 14.2    | 81.5    | 14.2    | 86.7    | 14.2    | 75.9    | 14.2    | 62.0    | 14.2    | 47.0    | 14.2    | 0.0      | 14.2     |
| 122 | 263.25 | 104.50                      | 12.47                     | 6.11           | 0.0     | 10.1    | 14.1    | 10.1    | 23.4    | 10.1    | 28.0    | 10.1    | 58.0    | 10.1    | 61.7    | 10.1    | 54.0    | 10.1    | 44.1    | 10.1    | 33.4    | 10.1    | 0.0      | 10.1     |
| 123 | 265.50 | 58.20                       | 10.89                     | 5.34           | 0.0     | 5.9     | 8.8     | 5.9     | 14.5    | 5.9     | 17.1    | 5.9     | 35.7    | 5.9     | 37.3    | 5.9     | 29.9    | 5.9     | 21.8    | 5.9     | 15.0    | 5.9     | 0.0      | 5.9      |
| 124 | 267.75 | 52.50                       | 9.92                      | 4.86           | 0.0     | 5.4     | 8.1     | 5.4     | 13.3    | 5.4     | 15.7    | 5.4     | 32.8    | 5.4     | 34.3    | 5.4     | 27.4    | 5.4     | 20.0    | 5.4     | 13.7    | 5.4     | 0.0      | 5.4      |
| 125 | 270.00 | 44.70                       | 8.92                      | 4.37           | 0.0     | 4.7     | 7.1     | 4.7     | 11.7    | 4.7     | 13.8    | 4.7     | 28.7    | 4.7     | 30.1    | 4.7     | 24.1    | 4.7     | 17.6    | 4.7     | 12.1    | 4.7     | 0.0      | 4.7      |
| 126 | 272.25 | 41.80                       | 8.08                      | 3.96           | 0.0     | 4.4     | 6.6     | 4.4     | 10.9    | 4.4     | 12.8    | 4.4     | 26.7    | 4.4     | 28.0    | 4.4     | 22.4    | 4.4     | 16.3    | 4.4     | 11.2    | 4.4     | 0.0      | 4.4      |
| 127 | 274.50 | 35.60                       | 7.30                      | 3.58           | 0.0     | 3.9     | 5.8     | 3.9     | 9.6     | 3.9     | 11.3    | 3.9     | 23.6    | 3.9     | 24.7    | 3.9     | 19.7    | 3.9     | 14.4    | 3.9     | 9.9     | 3.9     | 0.0      | 3.9      |
| 128 | 276.75 | 29.80                       | 6.59                      | 3.23           | 0.0     | 3.4     | 5.1     | 3.4     | 8.4     | 3.4     | 9.9     | 3.4     | 20.7    | 3.4     | 21.6    | 3.4     | 17.3    | 3.4     | 12.6    | 3.4     | 8.7     | 3.4     | 0.0      | 3.4      |
| 129 | 279.00 | 23.90                       | 5.86                      | 2.87           | 0.0     | 2.9     | 4.4     | 2.9     | 7.2     | 2.9     | 8.5     | 2.9     | 17.7    | 2.9     | 18.5    | 2.9     | 14.8    | 2.9     | 10.8    | 2.9     | 7.4     | 2.9     | 0.0      | 2.9      |
| 130 | 281.25 | 18.60                       | 5.26                      | 2.58           | 0.0     | 2.5     | 3.7     | 2.5     | 6.1     | 2.5     | 7.2     | 2.5     | 15.0    | 2.5     | 15.7    | 2.5     | 12.6    | 2.5     | 9.2     | 2.5     | 6.3     | 2.5     | 0.0      | 2.5      |
| 131 | 283.50 | 16.30                       | 4.78                      | 2.34           | 0.0     | 2.1     | 3.1     | 2.1     | 5.2     | 2.1     | 6.1     | 2.1     | 12.7    | 2.1     | 13.2    | 2.1     | 10.6    | 2.1     | 7.7     | 2.1     | 5.3     | 2.1     | 0.0      | 2.1      |
| 132 | 285.75 | 16.30                       | 5.13                      | 2.51           | 0.0     | 2.1     | 3.2     | 2.1     | 5.3     | 2.1     | 6.2     | 2.1     | 13.0    | 2.1     | 13.6    | 2.1     | 10.9    | 2.1     | 7.9     | 2.1     | 5.4     | 2.1     | 0.0      | 2.1      |
| 133 | 288.00 | 19.30                       | 5.72                      | 2.80           | 0.0     | 2.5     | 3.8     | 2.5     | 6.3     | 2.5     | 7.4     | 2.5     | 15.5    | 2.5     | 16.2    | 2.5     | 13.0    | 2.5     | 9.5     | 2.5     | 6.5     | 2.5     | 0.0      | 2.5      |
| 134 | 290.25 | 24.60                       | 6.47                      | 3.17           | 0.0     | 3.0     | 4.5     | 3.0     | 7.4     | 3.0     | 8.8     | 3.0     | 18.2    | 3.0     | 19.1    | 3.0     | 15.3    | 3.0     | 11.1    | 3.0     | 7.6     | 3.0     | 0.0      | 3.0      |
| 135 | 292.50 | 29.50                       | 7.21                      | 3.54           | 0.0     | 3.4     | 5.1     | 3.4     | 8.5     | 3.4     | 10.0    | 3.4     | 20.8    | 3.4     | 21.8    | 3.4     | 17.4    | 3.4     | 12.7    | 3.4     | 8.7     | 3.4     | 0.0      | 3.4      |
| 136 | 294.75 | 34.50                       | 8.03                      | 3.94           | 0.0     | 3.8     | 5.8     | 3.8     | 9.5     | 3.8     | 11.2    | 3.8     | 23.4    | 3.8     | 24.5    | 3.8     | 19.6    | 3.8     | 14.3    | 3.8     | 9.8     | 3.8     | 0.0      | 3.8      |
| 137 | 297.00 | 39.80                       | 8.95                      | 4.39           | 0.0     | 4.3     | 6.5     | 4.3     | 10.7    | 4.3     | 12.6    | 4.3     | 26.2    | 4.3     | 27.4    | 4.3     | 21.9    | 4.3     | 16.0    | 4.3     | 11.0    | 4.3     | 0.0      | 4.3      |
| 138 | 299.25 | 45.40                       | 10.01                     | 4.91           | 0.0     | 4.8     | 7.2     | 4.8     | 11.9    | 4.8     | 14.0    | 4.8     | 29.1    | 4.8     | 30.5    | 4.8     | 24.4    | 4.8     | 17.8    | 4.8     | 12.2    | 4.8     | 0.0      | 4.8      |
| 139 | 301.50 | 52.80                       | 11.55                     | 5.66           | 0.0     | 5.5     | 7.8     | 5.5     | 12.9    | 5.5     | 15.4    | 5.5     | 31.9    | 5.5     | 34.0    | 5.5     | 29.7    | 5.5     | 24.3    | 5.5     | 18.4    | 5.5     | 0.0      | 5.5      |
| 140 | 303.75 | 140.50                      | 12.72                     | 6.24           | 0.0     | 13.2    | 18.5    | 13.2    | 30.7    | 13.2    | 36.7    | 13.2    | 76.0    | 13.2    | 80.9    | 13.2    | 70.7    | 13.2    | 57.8    | 13.2    | 43.8    | 13.2    | 0.0      | 13.2     |
| 141 | 306.00 | 137.60                      | 10.53                     | 5.16           | 0.0     | 13.0    | 18.2    | 13.0    | 30.1    | 13.0    | 36.0    | 13.0    | 74.6    | 13.0    | 79.4    | 13.0    | 69.5    | 13.0    | 56.8    | 13.0    | 43.0    | 13.0    | 0.0      | 13.0     |
| 142 | 307.80 | 136.60                      | 10.21                     | 5.01           | 0.0     | 12.8    | 18.0    | 12.8    | 29.9    | 12.8    | 35.7    | 12.8    | 74.0    | 12.8    | 78.7    | 12.8    | 68.9    | 12.8    | 56.3    | 12.8    | 42.6    | 12.8    | 0.0      | 12.8     |
| 143 | 309.60 | 86.80                       | 8.86                      | 4.34           | 0.0     | 8.2     | 12.3    | 8.2     | 20.4    | 8.2     | 24.0    | 8.2     | 50.1    | 8.2     | 52.4    | 8.2     | 41.9    | 8.2     | 30.6    | 8.2     | 21.0    | 8.2     | 0.0      | 8.2      |
| 144 | 311.40 | 35.80                       | 7.98                      | 3.91           | 0.0     | 4.0     | 5.9     | 4.0     | 9.8     | 4.0     | 11.6    | 4.0     | 24.2    | 4.0     | 25.3    | 4.0     | 20.2    | 4.0     | 14.8    | 4.0     | 10.1    | 4.0     | 0.0      | 4.0      |
| 145 | 313.20 | 16.60                       | 7.10                      | 3.48           | 0.0     | 2.4     | 3.5     | 2.4     | 5.8     | 2.4     | 6.9     | 2.4     | 14.4    | 2.4     | 15.0    | 2.4     | 12.0    | 2.4     | 8.8     | 2.4     | 6.0     | 2.4     | 0.0      | 2.4      |
| 146 | 315.00 | 21.20                       | 6.46                      | 3.17           | 0.0     | 2.7     | 4.0     | 2.7     | 6.6     | 2.7     | 7.8     | 2.7     | 16.2    | 2.7     | 16.9    | 2.7     | 13.6    | 2.7     | 9.9     | 2.7     | 6.8     | 2.7     | 0.0      | 2.7      |
| 147 | 316.80 | 16.30                       | 5.68                      | 2.79           | 0.0     | 2.2     | 3.3     | 2.2     | 5.4     | 2.2     | 6.4     | 2.2     | 13.3    | 2.2     | 13.9    | 2.2     | 11.1    | 2.2     | 8.1     | 2.2     | 5.6     | 2.2     | 0.0      | 2.2      |
| 148 | 318.60 | 16.30                       | 4.96                      | 2.43           | 0.0     | 2.1     | 3.1     | 2.1     | 5.2     | 2.1     | 6.1     | 2.1     | 12.8    | 2.1     | 13.4    | 2.1     | 10.7    | 2.1     | 7.8     | 2.1     | 5.4     | 2.1     | 0.0      | 2.1      |
| 149 | 320.40 | 16.30                       | 4.45                      | 2.18           | 0.0     | 2.1     | 3.1     | 2.1     | 5.1     | 2.1     | 6.0     | 2.1     | 12.6    | 2.1     | 13.2    | 2.1     | 10.5    | 2.1     | 7.7     | 2.1     | 5.3     | 2.1     | 0.0      | 2.1      |
| 150 | 322.20 | 16.30                       | 3.99                      | 1.96           | 0.0     | 2.1     | 3.1     | 2.1     | 5.2     | 2.1     | 6.1     | 2.1     | 12.7    | 2.1     | 13.3    | 2.1     | 10.6    | 2.1     | 7.7     | 2.1     | 5.3     | 2.1     | 0.0      | 2.1      |
| 151 | 324.00 | 16.30                       | 3.85                      | 1.89           | 0.0     | 2.2     | 3.2     | 2.2     | 5.3     | 2.2     | 6.3     | 2.2     | 13.1    | 2.2     | 13.7    | 2.2     | 11.0    | 2.2     | 8.0     | 2.2     | 5.5     | 2.2     | 0.0      | 2.2      |
| 152 | 325.80 | 16.30                       | 4.27                      | 2.10           | 0.0     | 2.2     | 3.3     | 2.2     | 5.4     | 2.2     | 6.4     | 2.2     | 13.3    | 2.2     | 13.9    | 2.2     | 11.1    | 2.2     | 8.1     | 2.2     | 5.6     | 2.2     | 0.0      | 2.2      |
| 153 | 327.60 | 16.30                       | 4.77                      | 2.34           | 0.0     | 1.6     | 2.4     | 1.6     | 4.0     | 1.6     | 4.7     | 1.6     | 9.7     | 1.6     | 10.2    | 1.6     | 8.2     | 1.6     | 6.0     | 1.6     | 4.1     | 1.6     | 0.0      | 1.6      |
| 154 | 329.40 | 16.30                       | 5.33                      | 2.61           | 0.0     | 1.9     | 2.9     | 1.9     | 4.8     | 1.9     | 5.7     | 1.9     | 11.8    | 1.9     | 12.3    | 1.9     | 9.9     | 1.9     | 7.2     | 1.9     | 4.9     | 1.9     | 0.0      | 1.9      |
| 155 | 331.20 | 19.60                       | 5.95                      |                |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |          |

| Armadura de Rasante (cm2/m) |        |                |                |                |     |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |     |     |
|-----------------------------|--------|----------------|----------------|----------------|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|-----|-----|
| SEC                         | X<br>m | Cortante       | Torsión        |                | 1   | 1   | 2    | 2   | 3    | 3   | 4    | 4   | 5    | 5   | 6    | 6   | 7    | 7   | 8    | 8   | 9    | 9   | 10  | 10  |
|                             |        | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | Vd  | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd   | Td  | Vd  | Td  |
| 157                         | 334.80 | 35.40          | 7.27           | 3.56           | 0.0 | 3.9 | 5.8  | 3.9 | 9.6  | 3.9 | 11.4 | 3.9 | 23.7 | 3.9 | 24.8 | 3.9 | 19.8 | 3.9 | 14.5 | 3.9 | 9.9  | 3.9 | 0.0 | 3.9 |
| 158                         | 336.60 | 44.20          | 8.09           | 3.97           | 0.0 | 4.6 | 6.9  | 4.6 | 11.4 | 4.6 | 13.5 | 4.6 | 28.1 | 4.6 | 29.4 | 4.6 | 23.5 | 4.6 | 17.2 | 4.6 | 11.8 | 4.6 | 0.0 | 4.6 |
| 159                         | 338.40 | 53.20          | 8.98           | 4.40           | 0.0 | 5.4 | 8.0  | 5.4 | 13.3 | 5.4 | 15.7 | 5.4 | 32.7 | 5.4 | 34.2 | 5.4 | 27.4 | 5.4 | 20.0 | 5.4 | 13.7 | 5.4 | 0.0 | 5.4 |
| 160                         | 340.20 | 62.70          | 9.93           | 4.87           | 0.0 | 6.2 | 9.2  | 6.2 | 15.3 | 6.2 | 18.0 | 6.2 | 37.5 | 6.2 | 39.2 | 6.2 | 31.4 | 6.2 | 22.9 | 6.2 | 15.7 | 6.2 | 0.0 | 6.2 |
| 161                         | 342.00 | 74.00          | 8.94           | 4.39           | 0.0 | 7.1 | 10.6 | 7.1 | 17.6 | 7.1 | 20.8 | 7.1 | 43.2 | 7.1 | 45.2 | 7.1 | 36.2 | 7.1 | 26.4 | 7.1 | 18.1 | 7.1 | 0.0 | 7.1 |



# ARMADURA TRANSVERSAL EN TABLERO

Luz vano

|   |      |   |
|---|------|---|
| 1 | 36.0 | m |
| 2 | 45.0 | m |
| 3 | 45.0 | m |
| 4 | 45.0 | m |
| 5 | 45.0 | m |
| 6 | 45.0 | m |
| 7 | 45.0 | m |
| 8 | 36.0 | m |

| SEC | X<br>m | Armadura de Flexión transv. (cm <sup>2</sup> /m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|--------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
|     |        | 1<br>inf                                         | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 1   | 0.00   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 2   | 1.80   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 3   | 3.60   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 4   | 5.40   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 5   | 7.20   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 6   | 9.00   | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 7   | 10.80  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 8   | 12.60  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 9   | 14.40  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 10  | 16.20  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 11  | 18.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 12  | 19.80  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 13  | 21.60  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 14  | 23.40  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 15  | 25.20  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 16  | 27.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 17  | 28.80  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 18  | 30.60  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 19  | 32.40  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 20  | 34.20  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 21  | 36.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 22  | 38.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 23  | 40.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 24  | 42.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 25  | 45.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 26  | 47.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 27  | 49.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 28  | 51.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 29  | 54.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 30  | 56.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 31  | 58.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 32  | 60.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 33  | 63.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 34  | 65.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 35  | 67.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 36  | 69.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 37  | 72.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 38  | 74.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 39  | 76.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 40  | 78.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 41  | 81.00  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 42  | 83.25  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 43  | 85.50  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 44  | 87.75  | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |

| Armadura de Flexión transv. (cm2/m) |        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-------------------------------------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC                                 | X<br>m | 1<br>inf | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 45                                  | 90.00  | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 46                                  | 92.25  | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 47                                  | 94.50  | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 48                                  | 96.75  | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 49                                  | 99.00  | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 50                                  | 101.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 51                                  | 103.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 52                                  | 105.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 53                                  | 108.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 54                                  | 110.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 55                                  | 112.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 56                                  | 114.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 57                                  | 117.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 58                                  | 119.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 59                                  | 121.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 60                                  | 123.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 61                                  | 126.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 62                                  | 128.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 63                                  | 130.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 64                                  | 132.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 65                                  | 135.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 66                                  | 137.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 67                                  | 139.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 68                                  | 141.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 69                                  | 144.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 70                                  | 146.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 71                                  | 148.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 72                                  | 150.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 73                                  | 153.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 74                                  | 155.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 75                                  | 157.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 76                                  | 159.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 77                                  | 162.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 78                                  | 164.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 79                                  | 166.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 80                                  | 168.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 81                                  | 171.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 82                                  | 173.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 83                                  | 175.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 84                                  | 177.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 85                                  | 180.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 86                                  | 182.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 87                                  | 184.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 88                                  | 186.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 89                                  | 189.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 90                                  | 191.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 91                                  | 193.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 92                                  | 195.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 93                                  | 198.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 94                                  | 200.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 95                                  | 202.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 96                                  | 204.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 97                                  | 207.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 98                                  | 209.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 99                                  | 211.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 100                                 | 213.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |

| Armadura de Flexión transv. (cm2/m) |        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-------------------------------------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC                                 | X<br>m | 1<br>inf | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 101                                 | 216.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 102                                 | 218.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 103                                 | 220.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 104                                 | 222.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 105                                 | 225.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 106                                 | 227.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 107                                 | 229.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 108                                 | 231.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 109                                 | 234.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 110                                 | 236.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 111                                 | 238.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 112                                 | 240.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 113                                 | 243.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 114                                 | 245.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 115                                 | 247.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 116                                 | 249.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 117                                 | 252.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 118                                 | 254.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 119                                 | 256.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 120                                 | 258.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 121                                 | 261.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 122                                 | 263.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 123                                 | 265.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 124                                 | 267.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 125                                 | 270.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 126                                 | 272.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 127                                 | 274.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 128                                 | 276.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 129                                 | 279.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 130                                 | 281.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 131                                 | 283.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 132                                 | 285.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 133                                 | 288.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 134                                 | 290.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 135                                 | 292.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 136                                 | 294.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 137                                 | 297.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 138                                 | 299.25 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 139                                 | 301.50 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 140                                 | 303.75 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 141                                 | 306.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 142                                 | 307.80 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 143                                 | 309.60 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 144                                 | 311.40 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 145                                 | 313.20 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 146                                 | 315.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 147                                 | 316.80 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 148                                 | 318.60 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 149                                 | 320.40 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 150                                 | 322.20 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 151                                 | 324.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 152                                 | 325.80 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 153                                 | 327.60 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 154                                 | 329.40 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 155                                 | 331.20 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 156                                 | 333.00 | 11.0     | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |

| SEC | X<br>m | Armadura de Flexión transv. (cm <sup>2</sup> /m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|--------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
|     |        | 1<br>inf                                         | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 157 | 334.80 | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 158 | 336.60 | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 159 | 338.40 | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 160 | 340.20 | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |
| 161 | 342.00 | 11.0                                             | 0.0      | 6        | 6        | 0        | 20.9     | 0        | 20.9     | 5.3      | 9.5      | 5        | 5        | 5        | 5        | 0        | 4.5      | 3        | 3        | 3         | 0         |

# ARMADURA TRANSVERSAL EN TABLERO

## Luz vano

|   |      |   |
|---|------|---|
| 1 | 36.0 | m |
| 2 | 45.0 | m |
| 3 | 45.0 | m |
| 4 | 45.0 | m |
| 5 | 45.0 | m |
| 6 | 45.0 | m |
| 7 | 45.0 | m |
| 8 | 36.0 | m |

## Armadura de Introducción del pretensado (cm<sup>2</sup>/m)

| SEC | X<br>m | 1<br>inf | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>inf | 5<br>sup | 6<br>inf | 6<br>sup | 7<br>inf | 7<br>sup | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
|-----|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| 1   | 0.00   | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 2   | 1.80   | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 3   | 3.60   | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 4   | 5.40   | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 5   | 7.20   | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 6   | 9.00   | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 7   | 10.80  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 8   | 12.60  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 9   | 14.40  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 10  | 16.20  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 11  | 18.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 12  | 19.80  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 13  | 21.60  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 14  | 23.40  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 15  | 25.20  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 16  | 27.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 17  | 28.80  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 18  | 30.60  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 19  | 32.40  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 20  | 34.20  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 21  | 36.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 22  | 38.25  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 23  | 40.50  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 24  | 42.75  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 25  | 45.00  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 26  | 47.25  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 27  | 49.50  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 28  | 51.75  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 29  | 54.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 30  | 56.25  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 31  | 58.50  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 32  | 60.75  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 33  | 63.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 34  | 65.25  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 35  | 67.50  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 36  | 69.75  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 37  | 72.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 38  | 74.25  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 39  | 76.50  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 40  | 78.75  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 41  | 81.00  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 42  | 83.25  | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       | 0.0       |
| 43  | 85.50  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 44  | 87.75  | 0.0      | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |







|     |        | Armadura de Introducción del pretensado (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|-------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X<br>m | 1<br>inf                                        | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>inf | 5<br>sup | 6<br>inf | 6<br>sup | 7<br>inf | 7<br>sup | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 157 | 334.80 | 0.0                                             | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 158 | 336.60 | 0.0                                             | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 159 | 338.40 | 0.0                                             | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 160 | 340.20 | 0.0                                             | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |
| 161 | 342.00 | 0.0                                             | 0.0      | 12.2     | 12.2     | 20.8     | 20.8     | 26.5     | 26.5     | 33.7     | 33.7     | 9.5      | 9.5      | 27.5     | 27.5     | 20.1     | 20.1     | 13.6     | 13.6     | 0.0       | 0.0       |



# ARMADURA TRANSVERSAL EN TABLERO

Alpha=35°

Luz vano:

|   |      |   |          |      |
|---|------|---|----------|------|
| 1 | 36.0 | m | % As sup | 0.45 |
| 2 | 45.0 | m | % As inf | 0.55 |
| 3 | 45.0 | m |          |      |
| 4 | 45.0 | m |          |      |
| 5 | 45.0 | m |          |      |
| 6 | 45.0 | m |          |      |
| 7 | 45.0 | m |          |      |
| 8 | 36.0 | m |          |      |

|     |        | Armadura de Rasante (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X<br>m | 1<br>inf                    | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 1   | 0.00   | 4.0                         | 3.3      | 10.1     | 8.2      | 14.0     | 11.5     | 15.8     | 12.9     | 28.6     | 23.4     | 29.7     | 24.3     | 24.6     | 20.1     | 19.0     | 15.6     | 14.3     | 11.7     | 4.0       | 3.3       |
| 2   | 1.80   | 3.5                         | 2.8      | 8.7      | 7.1      | 12.1     | 9.9      | 13.6     | 11.2     | 24.7     | 20.2     | 25.7     | 21.0     | 21.2     | 17.4     | 16.4     | 13.5     | 12.4     | 10.1     | 3.5       | 2.8       |
| 3   | 3.60   | 3.0                         | 2.5      | 7.6      | 6.2      | 10.6     | 8.6      | 11.9     | 9.8      | 21.6     | 17.7     | 22.4     | 18.4     | 18.5     | 15.2     | 14.4     | 11.7     | 10.8     | 8.9      | 3.0       | 2.5       |
| 4   | 5.40   | 2.6                         | 2.2      | 6.5      | 5.4      | 9.1      | 7.5      | 10.3     | 8.4      | 18.6     | 15.2     | 19.4     | 15.8     | 16.0     | 13.1     | 12.4     | 10.1     | 9.4      | 7.7      | 2.6       | 2.2       |
| 5   | 7.20   | 2.2                         | 1.8      | 5.5      | 4.5      | 7.7      | 6.3      | 8.7      | 7.1      | 15.7     | 12.8     | 16.3     | 13.3     | 13.5     | 11.0     | 10.5     | 8.6      | 7.9      | 6.4      | 2.2       | 1.8       |
| 6   | 9.00   | 1.8                         | 1.5      | 4.6      | 3.7      | 6.3      | 5.2      | 7.2      | 5.9      | 12.9     | 10.6     | 13.5     | 11.0     | 11.1     | 9.1      | 8.6      | 7.1      | 6.5      | 5.3      | 1.8       | 1.5       |
| 7   | 10.80  | 1.5                         | 1.2      | 3.7      | 3.0      | 5.1      | 4.2      | 5.8      | 4.7      | 10.4     | 8.5      | 10.8     | 8.8      | 8.9      | 7.3      | 6.9      | 5.7      | 5.2      | 4.3      | 1.5       | 1.2       |
| 8   | 12.60  | 1.1                         | 0.9      | 2.8      | 2.3      | 3.8      | 3.1      | 4.3      | 3.5      | 7.8      | 6.3      | 8.1      | 6.6      | 6.7      | 5.4      | 5.2      | 4.2      | 3.9      | 3.2      | 1.1       | 0.9       |
| 9   | 14.40  | 0.9                         | 0.7      | 2.2      | 1.8      | 3.1      | 2.5      | 3.5      | 2.8      | 6.2      | 5.1      | 6.5      | 5.3      | 5.3      | 4.4      | 4.1      | 3.4      | 3.1      | 2.6      | 0.9       | 0.7       |
| 10  | 16.20  | 1.2                         | 1.0      | 3.0      | 2.5      | 4.2      | 3.5      | 4.8      | 3.9      | 8.6      | 7.1      | 9.0      | 7.3      | 7.4      | 6.1      | 5.7      | 4.7      | 4.3      | 3.6      | 1.2       | 1.0       |
| 11  | 18.00  | 1.3                         | 1.1      | 3.4      | 2.7      | 4.6      | 3.8      | 5.2      | 4.3      | 9.5      | 7.7      | 9.8      | 8.1      | 8.1      | 6.7      | 6.3      | 5.2      | 4.7      | 3.9      | 1.3       | 1.1       |
| 12  | 19.80  | 1.5                         | 1.2      | 3.7      | 3.0      | 5.2      | 4.2      | 5.8      | 4.8      | 10.5     | 8.6      | 10.9     | 8.9      | 9.0      | 7.4      | 7.0      | 5.7      | 5.3      | 4.3      | 1.5       | 1.2       |
| 13  | 21.60  | 1.7                         | 1.4      | 4.1      | 3.3      | 5.7      | 4.6      | 6.4      | 5.2      | 11.6     | 9.5      | 12.0     | 9.8      | 10.0     | 8.1      | 7.7      | 6.3      | 5.8      | 4.7      | 1.7       | 1.4       |
| 14  | 23.40  | 1.8                         | 1.4      | 4.4      | 3.6      | 6.2      | 5.0      | 6.9      | 5.7      | 12.6     | 10.3     | 13.1     | 10.7     | 10.8     | 8.8      | 8.4      | 6.8      | 6.3      | 5.1      | 1.8       | 1.4       |
| 15  | 25.20  | 1.9                         | 1.6      | 4.8      | 4.0      | 6.7      | 5.5      | 7.5      | 6.2      | 13.6     | 11.2     | 14.2     | 11.6     | 11.8     | 9.6      | 9.1      | 7.4      | 6.8      | 5.6      | 1.9       | 1.6       |
| 16  | 27.00  | 2.1                         | 1.7      | 5.2      | 4.2      | 7.2      | 5.9      | 8.1      | 6.7      | 14.7     | 12.0     | 15.2     | 12.5     | 12.6     | 10.3     | 9.8      | 8.0      | 7.4      | 6.0      | 2.1       | 1.7       |
| 17  | 28.80  | 2.2                         | 1.8      | 5.5      | 4.5      | 7.7      | 6.3      | 8.7      | 7.1      | 15.7     | 12.8     | 16.3     | 13.3     | 13.5     | 11.0     | 10.5     | 8.6      | 7.9      | 6.4      | 2.2       | 1.8       |
| 18  | 30.60  | 2.4                         | 1.9      | 5.9      | 4.9      | 8.3      | 6.8      | 9.3      | 7.6      | 16.8     | 13.8     | 17.5     | 14.3     | 14.5     | 11.8     | 11.2     | 9.2      | 8.4      | 6.9      | 2.4       | 1.9       |
| 19  | 32.40  | 3.1                         | 2.6      | 7.5      | 6.1      | 10.4     | 8.5      | 11.8     | 9.6      | 21.1     | 17.2     | 22.2     | 18.2     | 19.8     | 16.2     | 16.8     | 13.7     | 13.5     | 11.0     | 3.1       | 2.6       |
| 20  | 34.20  | 5.3                         | 4.3      | 12.7     | 10.4     | 17.5     | 14.4     | 20.0     | 16.3     | 35.7     | 29.2     | 37.6     | 30.8     | 33.6     | 27.5     | 28.4     | 23.3     | 22.8     | 18.7     | 5.3       | 4.3       |
| 21  | 36.00  | 7.6                         | 6.3      | 18.4     | 15.0     | 25.5     | 20.8     | 28.9     | 23.7     | 51.8     | 42.4     | 54.6     | 44.7     | 48.7     | 39.9     | 41.3     | 33.8     | 33.1     | 27.1     | 7.6       | 6.3       |
| 22  | 38.25  | 5.6                         | 4.6      | 13.5     | 11.0     | 18.6     | 15.3     | 21.2     | 17.3     | 38.0     | 31.1     | 40.0     | 32.7     | 35.7     | 29.2     | 30.2     | 24.7     | 24.2     | 19.8     | 5.6       | 4.6       |
| 23  | 40.50  | 3.4                         | 2.8      | 8.5      | 7.0      | 11.9     | 9.7      | 13.4     | 10.9     | 24.2     | 19.8     | 25.1     | 20.6     | 20.8     | 17.0     | 16.1     | 13.2     | 12.2     | 9.9      | 3.4       | 2.8       |
| 24  | 42.75  | 3.1                         | 2.5      | 7.8      | 6.3      | 10.8     | 8.8      | 12.2     | 9.9      | 22.0     | 18.0     | 22.9     | 18.7     | 18.9     | 15.5     | 14.6     | 12.0     | 11.0     | 9.0      | 3.1       | 2.5       |
| 25  | 45.00  | 2.7                         | 2.2      | 6.8      | 5.5      | 9.4      | 7.7      | 10.6     | 8.6      | 19.1     | 15.7     | 19.9     | 16.3     | 16.4     | 13.5     | 12.8     | 10.4     | 9.6      | 7.8      | 2.7       | 2.2       |
| 26  | 47.25  | 2.3                         | 1.9      | 5.8      | 4.7      | 8.0      | 6.6      | 9.0      | 7.4      | 16.3     | 13.3     | 16.9     | 13.9     | 14.0     | 11.5     | 10.8     | 8.9      | 8.2      | 6.7      | 2.3       | 1.9       |
| 27  | 49.50  | 2.0                         | 1.7      | 5.1      | 4.1      | 7.0      | 5.8      | 7.9      | 6.5      | 14.3     | 11.7     | 14.9     | 12.2     | 12.3     | 10.1     | 9.5      | 7.8      | 7.2      | 5.9      | 2.0       | 1.7       |
| 28  | 51.75  | 1.8                         | 1.4      | 4.4      | 3.6      | 6.1      | 5.0      | 6.9      | 5.6      | 12.4     | 10.2     | 12.9     | 10.5     | 10.7     | 8.7      | 8.3      | 6.8      | 6.2      | 5.1      | 1.8       | 1.4       |
| 29  | 54.00  | 1.5                         | 1.2      | 3.7      | 3.0      | 5.2      | 4.2      | 5.8      | 4.8      | 10.5     | 8.6      | 10.9     | 8.9      | 9.0      | 7.4      | 7.0      | 5.7      | 5.3      | 4.3      | 1.5       | 1.2       |
| 30  | 56.25  | 1.2                         | 1.0      | 3.1      | 2.5      | 4.3      | 3.5      | 4.8      | 4.0      | 8.7      | 7.2      | 9.1      | 7.4      | 7.5      | 6.1      | 5.8      | 4.8      | 4.3      | 3.6      | 1.2       | 1.0       |
| 31  | 58.50  | 1.1                         | 0.9      | 2.8      | 2.3      | 3.8      | 3.1      | 4.3      | 3.5      | 7.7      | 6.3      | 8.0      | 6.5      | 6.6      | 5.4      | 5.1      | 4.2      | 3.9      | 3.2      | 1.1       | 0.9       |
| 32  | 60.75  | 1.3                         | 1.1      | 3.2      | 2.7      | 4.5      | 3.7      | 5.1      | 4.2      | 9.2      | 7.5      | 9.6      | 7.8      | 7.9      | 6.5      | 6.1      | 5.0      | 4.6      | 3.8      | 1.3       | 1.1       |
| 33  | 63.00  | 1.5                         | 1.3      | 3.8      | 3.1      | 5.3      | 4.3      | 6.0      | 4.9      | 10.8     | 8.8      | 11.2     | 9.2      | 9.3      | 7.6      | 7.2      | 5.9      | 5.4      | 4.4      | 1.5       | 1.3       |
| 34  | 65.25  | 1.8                         | 1.4      | 4.4      | 3.6      | 6.1      | 5.0      | 6.9      | 5.7      | 12.5     | 10.2     | 13.0     | 10.6     | 10.7     | 8.8      | 8.3      | 6.8      | 6.3      | 5.1      | 1.8       | 1.4       |
| 35  | 67.50  | 2.0                         | 1.6      | 5.0      | 4.1      | 6.9      | 5.7      | 7.8      | 6.4      | 14.1     | 11.6     | 14.7     | 12.0     | 12.2     | 9.9      | 9.4      | 7.7      | 7.1      | 5.8      | 2.0       | 1.6       |
| 36  | 69.75  | 2.3                         | 1.8      | 5.6      | 4.6      | 7.8      | 6.4      | 8.8      | 7.2      | 15.8     | 13.0     | 16.4     | 13.5     | 13.6     | 11.2     | 10.6     | 8.6      | 8.0      | 6.5      | 2.3       | 1.8       |
| 37  | 72.00  | 2.5                         | 2.0      | 6.2      | 5.1      | 8.6      | 7.1      | 9.7      | 8.0      | 17.6     | 14.4     | 18.3     | 15.0     | 15.1     | 12.4     | 11.7     | 9.6      | 8.8      | 7.2      | 2.5       | 2.0       |
| 38  | 74.25  | 2.8                         | 2.3      | 6.9      | 5.6      | 9.6      | 7.8      | 10.8     | 8.8      | 19.5     | 15.9     | 20.2     | 16.6     | 16.7     | 13.7     | 13.0     | 10.6     | 9.7      | 8.0      | 2.8       | 2.3       |
| 39  | 76.50  | 3.1                         | 2.6      | 7.6      | 6.2      | 10.5     | 8.6      | 11.9     | 9.8      | 21.3     | 17.5     | 22.5     | 18.4     | 20.1     | 16.4     | 17.0     | 13.9     | 13.6     | 11.2     | 3.1       | 2.6       |
| 40  | 78.75  | 5.3                         | 4.4      | 12.8     | 10.5     | 17.8     | 14.5     | 20.2     | 16.5     | 36.1     | 29.5     | 38.1     | 31.1     | 33.9     | 27.8     | 28.7     | 23.5     | 23.0     | 18.9     | 5.3       | 4.4       |
| 41  | 81.00  | 7.8                         | 6.4      | 18.8     | 15.3     | 26.0     | 21.2     | 29.5     | 24.1     | 52.8     | 43.2     | 55.7     | 45.5     | 49.7     | 40.6     | 42.0     | 34.4     | 33.7     | 27.6     | 7.8       | 6.4       |
| 42  | 83.25  | 5.6                         | 4.5      | 13.4     | 10.9     | 18.5     | 15.2     | 21.0     | 17.2     | 37.6     | 30.8     | 39.7     | 32.4     | 35.4     | 29.0     | 30.0     | 24.5     | 24.0     | 19.7     | 5.6       | 4.5       |
| 43  | 85.50  | 3.2                         | 2.7      | 8.1      | 6.7      | 11.3     | 9.2      | 12.8     | 10.4     | 23.0     | 18.9     | 23.9     | 19.6     | 19.8     | 16.2     | 15.3     | 12.6     | 11.6     | 9.5      | 3.2       | 2.7       |
| 44  | 87.75  | 3.0                         | 2.4      | 7.4      | 6.1      | 10.4     | 8.5      | 11.7     | 9.6      | 21.2     | 17.3     | 22.0     | 18.0     | 18.2     | 14.9     | 14.1     | 11.5     | 10.6     | 8.7      | 3.0       | 2.4       |

| Armadura de Rasante (cm2/m) |        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----------------------------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC                         | X<br>m | 1<br>inf | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 45                          | 90.00  | 2.6      | 2.2      | 6.6      | 5.4      | 9.1      | 7.5      | 10.3     | 8.4      | 18.6     | 15.3     | 19.4     | 15.8     | 16.0     | 13.1     | 12.4     | 10.2     | 9.4      | 7.7      | 2.6       | 2.2       |
| 46                          | 92.25  | 2.4      | 2.0      | 6.1      | 5.0      | 8.5      | 6.9      | 9.6      | 7.8      | 17.3     | 14.2     | 18.0     | 14.7     | 14.9     | 12.2     | 11.5     | 9.4      | 8.7      | 7.1      | 2.4       | 2.0       |
| 47                          | 94.50  | 2.1      | 1.8      | 5.4      | 4.4      | 7.5      | 6.1      | 8.5      | 6.9      | 15.3     | 12.5     | 15.9     | 13.0     | 13.1     | 10.8     | 10.2     | 8.3      | 7.6      | 6.3      | 2.1       | 1.8       |
| 48                          | 96.75  | 1.9      | 1.5      | 4.7      | 3.9      | 6.5      | 5.4      | 7.4      | 6.1      | 13.4     | 11.0     | 13.9     | 11.4     | 11.5     | 9.4      | 8.9      | 7.3      | 6.7      | 5.5      | 1.9       | 1.5       |
| 49                          | 99.00  | 1.7      | 1.4      | 4.1      | 3.3      | 5.7      | 4.6      | 6.4      | 5.2      | 11.6     | 9.5      | 12.0     | 9.8      | 9.9      | 8.1      | 7.7      | 6.3      | 5.8      | 4.7      | 1.7       | 1.4       |
| 50                          | 101.25 | 1.4      | 1.1      | 3.5      | 2.8      | 4.8      | 3.9      | 5.4      | 4.4      | 9.8      | 8.0      | 10.2     | 8.3      | 8.4      | 6.9      | 6.5      | 5.3      | 4.9      | 4.0      | 1.4       | 1.1       |
| 51                          | 103.50 | 1.2      | 0.9      | 2.9      | 2.4      | 4.0      | 3.3      | 4.6      | 3.7      | 8.3      | 6.8      | 8.6      | 7.0      | 7.1      | 5.8      | 5.5      | 4.5      | 4.1      | 3.4      | 1.2       | 0.9       |
| 52                          | 105.75 | 1.3      | 1.1      | 3.3      | 2.7      | 4.6      | 3.7      | 5.2      | 4.2      | 9.4      | 7.7      | 9.7      | 7.9      | 8.0      | 6.6      | 6.2      | 5.1      | 4.7      | 3.8      | 1.3       | 1.1       |
| 53                          | 108.00 | 1.5      | 1.3      | 3.9      | 3.2      | 5.4      | 4.4      | 6.1      | 5.0      | 10.9     | 9.0      | 11.4     | 9.3      | 9.4      | 7.7      | 7.3      | 5.9      | 5.5      | 4.5      | 1.5       | 1.3       |
| 54                          | 110.25 | 1.8      | 1.5      | 4.5      | 3.7      | 6.3      | 5.1      | 7.0      | 5.8      | 12.7     | 10.4     | 13.2     | 10.8     | 10.9     | 9.0      | 8.5      | 6.9      | 6.4      | 5.2      | 1.8       | 1.5       |
| 55                          | 112.50 | 2.0      | 1.7      | 5.1      | 4.1      | 7.0      | 5.8      | 7.9      | 6.5      | 14.4     | 11.7     | 14.9     | 12.2     | 12.3     | 10.1     | 9.6      | 7.8      | 7.2      | 5.9      | 2.0       | 1.7       |
| 56                          | 114.75 | 2.3      | 1.8      | 5.7      | 4.6      | 7.9      | 6.4      | 8.9      | 7.2      | 16.0     | 13.1     | 16.7     | 13.6     | 13.8     | 11.3     | 10.7     | 8.7      | 8.0      | 6.6      | 2.3       | 1.8       |
| 57                          | 117.00 | 2.5      | 2.1      | 6.3      | 5.1      | 8.7      | 7.2      | 9.8      | 8.1      | 17.8     | 14.6     | 18.5     | 15.2     | 15.3     | 12.5     | 11.9     | 9.7      | 9.0      | 7.3      | 2.5       | 2.1       |
| 58                          | 119.25 | 2.8      | 2.3      | 6.9      | 5.6      | 9.6      | 7.9      | 10.8     | 8.9      | 19.6     | 16.1     | 20.4     | 16.7     | 16.9     | 13.8     | 13.0     | 10.7     | 9.8      | 8.1      | 2.8       | 2.3       |
| 59                          | 121.50 | 3.2      | 2.6      | 7.6      | 6.3      | 10.6     | 8.7      | 12.0     | 9.9      | 21.6     | 17.6     | 22.7     | 18.6     | 20.3     | 16.6     | 17.2     | 14.0     | 13.8     | 11.3     | 3.2       | 2.6       |
| 60                          | 123.75 | 5.4      | 4.4      | 12.9     | 10.6     | 17.9     | 14.6     | 20.3     | 16.6     | 36.3     | 29.7     | 38.3     | 31.3     | 34.2     | 27.9     | 28.9     | 23.7     | 23.2     | 19.0     | 5.4       | 4.4       |
| 61                          | 126.00 | 7.8      | 6.4      | 18.8     | 15.3     | 26.0     | 21.3     | 29.5     | 24.2     | 52.9     | 43.2     | 55.7     | 45.6     | 49.7     | 40.7     | 42.1     | 34.4     | 33.7     | 27.6     | 7.8       | 6.4       |
| 62                          | 128.25 | 5.6      | 4.5      | 13.4     | 10.9     | 18.5     | 15.2     | 21.0     | 17.2     | 37.7     | 30.8     | 39.7     | 32.5     | 35.4     | 29.0     | 30.0     | 24.5     | 24.0     | 19.7     | 5.6       | 4.5       |
| 63                          | 130.50 | 3.2      | 2.7      | 8.1      | 6.7      | 11.3     | 9.3      | 12.8     | 10.4     | 23.0     | 18.9     | 24.0     | 19.6     | 19.8     | 16.2     | 15.3     | 12.6     | 11.6     | 9.5      | 3.2       | 2.7       |
| 64                          | 132.75 | 3.0      | 2.4      | 7.4      | 6.1      | 10.4     | 8.5      | 11.7     | 9.6      | 21.2     | 17.3     | 22.0     | 18.0     | 18.2     | 14.9     | 14.1     | 11.5     | 10.6     | 8.7      | 3.0       | 2.4       |
| 65                          | 135.00 | 2.6      | 2.2      | 6.6      | 5.4      | 9.1      | 7.5      | 10.3     | 8.5      | 18.6     | 15.3     | 19.4     | 15.8     | 16.0     | 13.1     | 12.4     | 10.2     | 9.4      | 7.7      | 2.6       | 2.2       |
| 66                          | 137.25 | 2.4      | 2.0      | 6.1      | 5.0      | 8.5      | 6.9      | 9.6      | 7.8      | 17.3     | 14.2     | 18.0     | 14.7     | 14.9     | 12.2     | 11.5     | 9.4      | 8.7      | 7.1      | 2.4       | 2.0       |
| 67                          | 139.50 | 2.1      | 1.8      | 5.4      | 4.4      | 7.5      | 6.1      | 8.5      | 6.9      | 15.3     | 12.5     | 15.9     | 13.0     | 13.1     | 10.8     | 10.2     | 8.3      | 7.6      | 6.3      | 2.1       | 1.8       |
| 68                          | 141.75 | 1.9      | 1.5      | 4.7      | 3.9      | 6.5      | 5.4      | 7.4      | 6.1      | 13.4     | 11.0     | 13.9     | 11.4     | 11.6     | 9.5      | 8.9      | 7.3      | 6.7      | 5.5      | 1.9       | 1.5       |
| 69                          | 144.00 | 1.7      | 1.4      | 4.1      | 3.3      | 5.7      | 4.6      | 6.4      | 5.2      | 11.6     | 9.5      | 12.0     | 9.8      | 10.0     | 8.1      | 7.7      | 6.3      | 5.8      | 4.7      | 1.7       | 1.4       |
| 70                          | 146.25 | 1.4      | 1.1      | 3.5      | 2.8      | 4.8      | 3.9      | 5.4      | 4.4      | 9.8      | 8.0      | 10.2     | 8.3      | 8.4      | 6.9      | 6.5      | 5.3      | 4.9      | 4.0      | 1.4       | 1.1       |
| 71                          | 148.50 | 1.2      | 0.9      | 2.9      | 2.4      | 4.1      | 3.3      | 4.6      | 3.7      | 8.3      | 6.8      | 8.6      | 7.0      | 7.1      | 5.8      | 5.5      | 4.5      | 4.1      | 3.4      | 1.2       | 0.9       |
| 72                          | 150.75 | 1.4      | 1.1      | 3.4      | 2.8      | 4.7      | 3.9      | 5.3      | 4.4      | 9.6      | 7.9      | 10.0     | 8.2      | 8.3      | 6.8      | 6.4      | 5.3      | 4.8      | 4.0      | 1.4       | 1.1       |
| 73                          | 153.00 | 1.6      | 1.3      | 4.0      | 3.2      | 5.5      | 4.5      | 6.2      | 5.1      | 11.2     | 9.2      | 11.7     | 9.5      | 9.7      | 7.9      | 7.5      | 6.1      | 5.7      | 4.6      | 1.6       | 1.3       |
| 74                          | 155.25 | 1.8      | 1.5      | 4.6      | 3.7      | 6.4      | 5.2      | 7.2      | 5.9      | 13.0     | 10.6     | 13.5     | 11.0     | 11.2     | 9.1      | 8.6      | 7.1      | 6.5      | 5.3      | 1.8       | 1.5       |
| 75                          | 157.50 | 2.1      | 1.7      | 5.2      | 4.2      | 7.2      | 5.9      | 8.1      | 6.7      | 14.7     | 12.0     | 15.2     | 12.5     | 12.6     | 10.3     | 9.8      | 8.0      | 7.4      | 6.0      | 2.1       | 1.7       |
| 76                          | 159.75 | 2.3      | 1.9      | 5.8      | 4.7      | 8.0      | 6.6      | 9.0      | 7.4      | 16.3     | 13.4     | 16.9     | 13.9     | 14.0     | 11.5     | 10.9     | 8.9      | 8.2      | 6.7      | 2.3       | 1.9       |
| 77                          | 162.00 | 2.5      | 2.1      | 6.4      | 5.2      | 8.9      | 7.2      | 10.0     | 8.2      | 18.1     | 14.8     | 18.8     | 15.4     | 15.5     | 12.7     | 12.0     | 9.9      | 9.1      | 7.4      | 2.5       | 2.1       |
| 78                          | 164.25 | 2.8      | 2.3      | 7.0      | 5.8      | 9.8      | 8.0      | 11.0     | 9.0      | 19.9     | 16.3     | 20.7     | 17.0     | 17.2     | 14.0     | 13.3     | 10.8     | 10.0     | 8.2      | 2.8       | 2.3       |
| 79                          | 166.50 | 3.2      | 2.7      | 7.8      | 6.3      | 10.8     | 8.8      | 12.2     | 10.0     | 21.9     | 17.9     | 23.0     | 18.9     | 20.6     | 16.8     | 17.4     | 14.3     | 14.0     | 11.4     | 3.2       | 2.7       |
| 80                          | 168.75 | 5.4      | 4.4      | 13.0     | 10.6     | 18.0     | 14.7     | 20.4     | 16.7     | 36.6     | 29.9     | 38.6     | 31.5     | 34.4     | 28.1     | 29.1     | 23.8     | 23.3     | 19.1     | 5.4       | 4.4       |
| 81                          | 171.00 | 7.8      | 6.4      | 18.8     | 15.4     | 26.0     | 21.3     | 29.5     | 24.2     | 52.9     | 43.3     | 55.8     | 45.6     | 49.8     | 40.7     | 42.1     | 34.5     | 33.8     | 27.6     | 7.8       | 6.4       |
| 82                          | 173.25 | 5.6      | 4.6      | 13.4     | 11.0     | 18.6     | 15.2     | 21.1     | 17.3     | 37.8     | 30.9     | 39.8     | 32.6     | 35.5     | 29.1     | 30.1     | 24.6     | 24.1     | 19.8     | 5.6       | 4.6       |
| 83                          | 175.50 | 3.2      | 2.7      | 8.1      | 6.7      | 11.3     | 9.3      | 12.8     | 10.5     | 23.2     | 18.9     | 24.0     | 19.7     | 19.9     | 16.3     | 15.4     | 12.6     | 11.6     | 9.5      | 3.2       | 2.7       |
| 84                          | 177.75 | 3.0      | 2.5      | 7.5      | 6.2      | 10.5     | 8.6      | 11.8     | 9.6      | 21.3     | 17.4     | 22.1     | 18.1     | 18.3     | 15.0     | 14.2     | 11.6     | 10.7     | 8.7      | 3.0       | 2.5       |
| 85                          | 180.00 | 2.6      | 2.2      | 6.6      | 5.4      | 9.2      | 7.5      | 10.3     | 8.5      | 18.7     | 15.3     | 19.4     | 15.9     | 16.1     | 13.1     | 12.4     | 10.2     | 9.4      | 7.7      | 2.6       | 2.2       |
| 86                          | 182.25 | 2.5      | 2.0      | 6.2      | 5.0      | 8.6      | 7.0      | 9.7      | 7.9      | 17.4     | 14.3     | 18.2     | 14.9     | 15.0     | 12.3     | 11.6     | 9.5      | 8.7      | 7.2      | 2.5       | 2.0       |
| 87                          | 184.50 | 2.2      | 1.8      | 5.4      | 4.5      | 7.6      | 6.2      | 8.5      | 7.0      | 15.5     | 12.6     | 16.1     | 13.1     | 13.3     | 10.8     | 10.3     | 8.4      | 7.8      | 6.3      | 2.2       | 1.8       |
| 88                          | 186.75 | 1.9      | 1.6      | 4.8      | 3.9      | 6.7      | 5.4      | 7.5      | 6.1      | 13.5     | 11.1     | 14.1     | 11.5     | 11.7     | 9.5      | 9.0      | 7.4      | 6.8      | 5.6      | 1.9       | 1.6       |
| 89                          | 189.00 | 1.7      | 1.4      | 4.1      | 3.4      | 5.7      | 4.7      | 6.4      | 5.3      | 11.6     | 9.5      | 12.1     | 9.9      | 10.0     | 8.2      | 7.8      | 6.3      | 5.8      | 4.8      | 1.7       | 1.4       |
| 90                          | 191.25 | 1.4      | 1.1      | 3.5      | 2.8      | 4.8      | 4.0      | 5.4      | 4.5      | 9.8      | 8.1      | 10.2     | 8.4      | 8.5      | 6.9      | 6.5      | 5.4      | 5.0      | 4.1      | 1.4       | 1.1       |
| 91                          | 193.50 | 1.2      | 0.9      | 2.9      | 2.4      | 4.1      | 3.3      | 4.6      | 3.8      | 8.4      | 6.8      | 8.6      | 7.1      | 7.2      | 5.9      | 5.6      | 4.5      | 4.2      | 3.4      | 1.2       | 0.9       |
| 92                          | 195.75 | 1.3      | 1.1      | 3.4      | 2.7      | 4.7      | 3.8      | 5.3      | 4.3      | 9.5      | 7.8      | 9.9      | 8.1      | 8.2      | 6.7      | 6.3      | 5.2      | 4.8      | 3.9      | 1.3       | 1.1       |
| 93                          | 198.00 | 1.6      | 1.3      | 4.0      | 3.2      | 5.5      | 4.5      | 6.2      | 5.1      | 11.2     | 9.1      | 11.6     | 9.5      | 9.6      | 7.9      | 7.4      | 6.1      | 5.6      | 4.6      | 1.6       | 1.3       |
| 94                          | 200.25 | 1.8      | 1.5      | 4.6      | 3.7      | 6.3      | 5.2      | 7.2      | 5.9      | 12.9     | 10.5     | 13.4     | 11.0     | 11.1     | 9.1      | 8.6      | 7.0      | 6.4      | 5.3      | 1.8       | 1.5       |
| 95                          | 202.50 | 2.0      | 1.7      | 5.1      | 4.2      | 7.1      | 5.8      | 8.0      | 6.6      | 14.5     | 11.9     | 15.1     | 12.4     | 12.5     | 10.2     | 9.7      | 7.9      | 7.3      | 5.9      | 2.0       | 1.7       |
| 96                          | 204.75 | 2.3      | 1.9      | 5.7      | 4.7      | 8.0      | 6.5      | 9.0      | 7.4      | 16.2     | 13.3     | 16.9     | 13.8     | 14.0     | 11.4     | 10.8     | 8.9      | 8.1      | 6.7      | 2.3       | 1.9       |
| 97                          | 207.00 | 2.5      | 2.1      | 6.3      | 5.2      | 8.8      | 7.2      | 10.0     | 8.1      | 18.0     | 14.7     | 18.7     | 15.3     | 15.5     | 12.6     | 12.0     | 9.8      | 9.0      | 7.4      | 2.5       | 2.1       |
| 98                          | 209.25 | 2.8      | 2.3      | 7.0      | 5.7      | 9.7      | 8.0      | 11.0     | 9.0      | 19.9     | 16.2     | 20.6     | 16.9     | 17.1     | 14.0     | 13.2     | 10.8     | 10.0     | 8.1      | 2.8       | 2.3       |
| 99                          | 211.50 | 3.2      | 2.7      | 7.8      | 6.3      | 10.7     | 8.8      | 12.2     | 10.0     | 21.8     | 17.8     | 23.0     | 18.8     | 20.5     | 16.8     | 17.4     | 14.2     | 13.9     | 11.4     | 3.2       | 2.7       |
| 100                         | 213.75 | 5.3      | 4.4      | 12.8     | 10.5     | 17.8     | 14.5     | 20.2     | 16.5     | 36.1     | 29.5     | 38.1     | 31.1     | 33.9     | 27.8     | 28.7     | 23.5     | 23.0     | 18.9     | 5.3       | 4.4       |

|     |        | Armadura de Rasante (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X<br>m | 1<br>inf                    | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 101 | 216.00 | 7.6                         | 6.3      | 18.4     | 15.0     | 25.5     | 20.8     | 28.9     | 23.6     | 51.7     | 42.3     | 54.6     | 44.6     | 48.7     | 39.8     | 41.2     | 33.7     | 33.1     | 27.0     | 7.6       | 6.3       |
| 102 | 218.25 | 5.4                         | 4.5      | 13.1     | 10.7     | 18.2     | 14.9     | 20.6     | 16.9     | 37.0     | 30.2     | 38.9     | 31.9     | 34.8     | 28.4     | 29.4     | 24.1     | 23.6     | 19.3     | 5.4       | 4.5       |
| 103 | 220.50 | 3.2                         | 2.6      | 8.0      | 6.6      | 11.2     | 9.1      | 12.6     | 10.3     | 22.8     | 18.6     | 23.7     | 19.4     | 19.6     | 16.0     | 15.1     | 12.4     | 11.4     | 9.3      | 3.2       | 2.6       |
| 104 | 222.75 | 3.0                         | 2.4      | 7.4      | 6.0      | 10.3     | 8.4      | 11.6     | 9.5      | 21.0     | 17.1     | 21.7     | 17.8     | 18.0     | 14.7     | 14.0     | 11.4     | 10.5     | 8.6      | 3.0       | 2.4       |
| 105 | 225.00 | 2.6                         | 2.1      | 6.4      | 5.3      | 9.0      | 7.4      | 10.1     | 8.3      | 18.3     | 15.0     | 19.0     | 15.6     | 15.8     | 12.9     | 12.2     | 10.0     | 9.2      | 7.5      | 2.6       | 2.1       |
| 106 | 227.25 | 2.4                         | 2.0      | 6.1      | 5.0      | 8.4      | 6.8      | 9.5      | 7.7      | 17.1     | 14.0     | 17.8     | 14.5     | 14.7     | 12.0     | 11.4     | 9.3      | 8.6      | 7.0      | 2.4       | 2.0       |
| 107 | 229.50 | 2.1                         | 1.8      | 5.3      | 4.4      | 7.4      | 6.1      | 8.4      | 6.8      | 15.1     | 12.3     | 15.7     | 12.8     | 13.0     | 10.6     | 10.1     | 8.2      | 7.6      | 6.2      | 2.1       | 1.8       |
| 108 | 231.75 | 1.9                         | 1.5      | 4.7      | 3.8      | 6.5      | 5.3      | 7.3      | 6.0      | 13.2     | 10.8     | 13.7     | 11.2     | 11.3     | 9.3      | 8.8      | 7.2      | 6.6      | 5.4      | 1.9       | 1.5       |
| 109 | 234.00 | 1.6                         | 1.3      | 4.0      | 3.2      | 5.6      | 4.5      | 6.2      | 5.1      | 11.3     | 9.2      | 11.7     | 9.6      | 9.7      | 7.9      | 7.5      | 6.1      | 5.7      | 4.6      | 1.6       | 1.3       |
| 110 | 236.25 | 1.3                         | 1.1      | 3.4      | 2.7      | 4.7      | 3.8      | 5.2      | 4.3      | 9.5      | 7.8      | 9.8      | 8.1      | 8.1      | 6.7      | 6.3      | 5.2      | 4.7      | 3.9      | 1.3       | 1.1       |
| 111 | 238.50 | 1.2                         | 0.9      | 2.9      | 2.3      | 4.0      | 3.2      | 4.5      | 3.7      | 8.1      | 6.6      | 8.4      | 6.9      | 7.0      | 5.7      | 5.4      | 4.4      | 4.1      | 3.3      | 1.2       | 0.9       |
| 112 | 240.75 | 1.4                         | 1.1      | 3.4      | 2.8      | 4.7      | 3.9      | 5.3      | 4.4      | 9.6      | 7.9      | 10.0     | 8.2      | 8.3      | 6.8      | 6.4      | 5.2      | 4.8      | 4.0      | 1.4       | 1.1       |
| 113 | 243.00 | 1.6                         | 1.3      | 4.0      | 3.2      | 5.5      | 4.5      | 6.2      | 5.1      | 11.2     | 9.2      | 11.7     | 9.5      | 9.6      | 7.9      | 7.5      | 6.1      | 5.6      | 4.6      | 1.6       | 1.3       |
| 114 | 245.25 | 1.8                         | 1.5      | 4.6      | 3.7      | 6.3      | 5.2      | 7.2      | 5.9      | 12.9     | 10.6     | 13.5     | 11.0     | 11.1     | 9.1      | 8.6      | 7.1      | 6.5      | 5.3      | 1.8       | 1.5       |
| 115 | 247.50 | 2.0                         | 1.7      | 5.1      | 4.2      | 7.2      | 5.9      | 8.0      | 6.6      | 14.6     | 11.9     | 15.2     | 12.4     | 12.5     | 10.3     | 9.7      | 7.9      | 7.3      | 6.0      | 2.0       | 1.7       |
| 116 | 249.75 | 2.3                         | 1.9      | 5.8      | 4.7      | 8.0      | 6.5      | 9.0      | 7.4      | 16.3     | 13.3     | 16.9     | 13.9     | 14.0     | 11.5     | 10.8     | 8.9      | 8.2      | 6.7      | 2.3       | 1.9       |
| 117 | 252.00 | 2.5                         | 2.1      | 6.3      | 5.2      | 8.9      | 7.2      | 10.0     | 8.1      | 18.0     | 14.8     | 18.8     | 15.3     | 15.5     | 12.7     | 12.0     | 9.8      | 9.0      | 7.4      | 2.5       | 2.1       |
| 118 | 254.25 | 2.8                         | 2.3      | 7.0      | 5.7      | 9.7      | 8.0      | 11.0     | 9.0      | 19.9     | 16.3     | 20.7     | 16.9     | 17.1     | 14.0     | 13.3     | 10.8     | 10.0     | 8.1      | 2.8       | 2.3       |
| 119 | 256.50 | 3.2                         | 2.7      | 7.8      | 6.3      | 10.8     | 8.8      | 12.2     | 10.0     | 21.8     | 17.9     | 23.0     | 18.8     | 20.6     | 16.8     | 17.4     | 14.2     | 14.0     | 11.4     | 3.2       | 2.7       |
| 120 | 258.75 | 7.4                         | 6.1      | 17.9     | 14.6     | 24.8     | 20.3     | 28.1     | 23.0     | 50.3     | 41.1     | 53.0     | 43.3     | 47.3     | 38.7     | 40.0     | 32.7     | 32.1     | 26.3     | 7.4       | 6.1       |
| 121 | 261.00 | 7.8                         | 6.4      | 18.7     | 15.3     | 25.9     | 21.2     | 29.4     | 24.1     | 52.6     | 43.1     | 55.5     | 45.4     | 49.6     | 40.5     | 41.9     | 34.3     | 33.7     | 27.5     | 7.8       | 6.4       |
| 122 | 263.25 | 5.6                         | 4.5      | 13.3     | 10.9     | 18.4     | 15.1     | 21.0     | 17.1     | 37.5     | 30.6     | 39.5     | 32.3     | 35.3     | 28.8     | 29.8     | 24.4     | 23.9     | 19.6     | 5.6       | 4.5       |
| 123 | 265.50 | 3.2                         | 2.7      | 8.1      | 6.6      | 11.2     | 9.2      | 12.7     | 10.4     | 22.9     | 18.7     | 23.8     | 19.4     | 19.7     | 16.1     | 15.2     | 12.5     | 11.5     | 9.4      | 3.2       | 2.7       |
| 124 | 267.75 | 3.0                         | 2.4      | 7.4      | 6.1      | 10.3     | 8.4      | 11.6     | 9.5      | 21.0     | 17.2     | 21.8     | 17.9     | 18.0     | 14.8     | 14.0     | 11.4     | 10.5     | 8.6      | 3.0       | 2.4       |
| 125 | 270.00 | 2.6                         | 2.1      | 6.5      | 5.3      | 9.0      | 7.4      | 10.2     | 8.3      | 18.4     | 15.0     | 19.1     | 15.7     | 15.8     | 13.0     | 12.3     | 10.0     | 9.2      | 7.6      | 2.6       | 2.1       |
| 126 | 272.25 | 2.4                         | 2.0      | 6.1      | 5.0      | 8.4      | 6.9      | 9.5      | 7.7      | 17.1     | 14.0     | 17.8     | 14.6     | 14.7     | 12.1     | 11.4     | 9.3      | 8.6      | 7.0      | 2.4       | 2.0       |
| 127 | 274.50 | 2.1                         | 1.8      | 5.3      | 4.4      | 7.4      | 6.1      | 8.4      | 6.8      | 15.1     | 12.4     | 15.7     | 12.9     | 13.0     | 10.6     | 10.1     | 8.2      | 7.6      | 6.2      | 2.1       | 1.8       |
| 128 | 276.75 | 1.9                         | 1.5      | 4.7      | 3.8      | 6.5      | 5.3      | 7.3      | 6.0      | 13.3     | 10.8     | 13.8     | 11.3     | 11.4     | 9.3      | 8.8      | 7.2      | 6.7      | 5.4      | 1.9       | 1.5       |
| 129 | 279.00 | 1.6                         | 1.3      | 4.0      | 3.3      | 5.6      | 4.5      | 6.3      | 5.1      | 11.3     | 9.3      | 11.8     | 9.6      | 9.7      | 8.0      | 7.5      | 6.2      | 5.7      | 4.6      | 1.6       | 1.3       |
| 130 | 281.25 | 1.4                         | 1.1      | 3.4      | 2.8      | 4.7      | 3.9      | 5.3      | 4.4      | 9.6      | 7.9      | 10.0     | 8.2      | 8.3      | 6.8      | 6.4      | 5.3      | 4.8      | 4.0      | 1.4       | 1.1       |
| 131 | 283.50 | 1.2                         | 0.9      | 2.9      | 2.3      | 4.0      | 3.3      | 4.5      | 3.7      | 8.1      | 6.7      | 8.4      | 6.9      | 7.0      | 5.7      | 5.4      | 4.4      | 4.1      | 3.3      | 1.2       | 0.9       |
| 132 | 285.75 | 1.2                         | 0.9      | 2.9      | 2.4      | 4.1      | 3.3      | 4.6      | 3.7      | 8.3      | 6.8      | 8.6      | 7.1      | 7.2      | 5.9      | 5.5      | 4.5      | 4.1      | 3.4      | 1.2       | 0.9       |
| 133 | 288.00 | 1.4                         | 1.1      | 3.5      | 2.8      | 4.8      | 4.0      | 5.4      | 4.5      | 9.9      | 8.1      | 10.3     | 8.4      | 8.5      | 7.0      | 6.6      | 5.4      | 5.0      | 4.1      | 1.4       | 1.1       |
| 134 | 290.25 | 1.7                         | 1.4      | 4.1      | 3.4      | 5.7      | 4.7      | 6.5      | 5.3      | 11.7     | 9.5      | 12.2     | 9.9      | 10.1     | 8.2      | 7.8      | 6.3      | 5.8      | 4.8      | 1.7       | 1.4       |
| 135 | 292.50 | 1.9                         | 1.5      | 4.7      | 3.8      | 6.5      | 5.4      | 7.4      | 6.0      | 13.3     | 10.9     | 13.9     | 11.3     | 11.4     | 9.4      | 8.9      | 7.2      | 6.7      | 5.4      | 1.9       | 1.5       |
| 136 | 294.75 | 2.1                         | 1.7      | 5.3      | 4.3      | 7.3      | 6.0      | 8.3      | 6.8      | 15.0     | 12.2     | 15.6     | 12.7     | 12.9     | 10.5     | 10.0     | 8.1      | 7.5      | 6.1      | 2.1       | 1.7       |
| 137 | 297.00 | 2.4                         | 1.9      | 5.9      | 4.9      | 8.3      | 6.8      | 9.3      | 7.6      | 16.8     | 13.7     | 17.4     | 14.3     | 14.4     | 11.8     | 11.2     | 9.1      | 8.4      | 6.9      | 2.4       | 1.9       |
| 138 | 299.25 | 2.6                         | 2.2      | 6.6      | 5.4      | 9.2      | 7.5      | 10.3     | 8.5      | 18.6     | 15.3     | 19.4     | 15.9     | 16.1     | 13.1     | 12.4     | 10.2     | 9.4      | 7.7      | 2.6       | 2.2       |
| 139 | 301.50 | 3.0                         | 2.5      | 7.3      | 6.0      | 10.1     | 8.3      | 11.5     | 9.4      | 20.6     | 16.8     | 21.7     | 17.8     | 19.4     | 15.8     | 16.4     | 13.4     | 13.1     | 10.8     | 3.0       | 2.5       |
| 140 | 303.75 | 7.3                         | 5.9      | 17.4     | 14.3     | 24.1     | 19.8     | 27.4     | 22.5     | 49.1     | 40.1     | 51.8     | 42.3     | 46.1     | 37.8     | 39.1     | 32.0     | 31.4     | 25.7     | 7.3       | 5.9       |
| 141 | 306.00 | 7.2                         | 5.9      | 17.2     | 14.0     | 23.7     | 19.4     | 27.0     | 22.1     | 48.2     | 39.4     | 50.8     | 41.6     | 45.4     | 37.1     | 38.4     | 31.4     | 30.8     | 25.2     | 7.2       | 5.9       |
| 142 | 307.80 | 7.0                         | 5.8      | 16.9     | 13.9     | 23.5     | 19.2     | 26.7     | 21.8     | 47.7     | 39.1     | 50.3     | 41.2     | 44.9     | 36.8     | 38.0     | 31.1     | 30.5     | 24.9     | 7.0       | 5.8       |
| 143 | 309.60 | 4.5                         | 3.7      | 11.3     | 9.2      | 15.7     | 12.9     | 17.7     | 14.5     | 32.1     | 26.2     | 33.3     | 27.3     | 27.6     | 22.5     | 21.3     | 17.5     | 16.1     | 13.1     | 4.5       | 3.7       |
| 144 | 311.40 | 2.2                         | 1.8      | 5.4      | 4.5      | 7.6      | 6.2      | 8.6      | 7.0      | 15.5     | 12.7     | 16.1     | 13.2     | 13.3     | 10.9     | 10.3     | 8.5      | 7.8      | 6.3      | 2.2       | 1.8       |
| 145 | 313.20 | 1.3                         | 1.1      | 3.2      | 2.7      | 4.5      | 3.7      | 5.1      | 4.2      | 9.2      | 7.6      | 9.6      | 7.8      | 7.9      | 6.5      | 6.2      | 5.0      | 4.6      | 3.8      | 1.3       | 1.1       |
| 146 | 315.00 | 1.5                         | 1.2      | 3.7      | 3.0      | 5.1      | 4.2      | 5.8      | 4.7      | 10.4     | 8.5      | 10.8     | 8.8      | 9.0      | 7.3      | 6.9      | 5.7      | 5.2      | 4.3      | 1.5       | 1.2       |
| 147 | 316.80 | 1.2                         | 1.0      | 3.0      | 2.5      | 4.2      | 3.4      | 4.7      | 3.9      | 8.5      | 7.0      | 8.9      | 7.2      | 7.3      | 6.0      | 5.7      | 4.6      | 4.3      | 3.5      | 1.2       | 1.0       |
| 148 | 318.60 | 1.2                         | 0.9      | 2.9      | 2.3      | 4.0      | 3.3      | 4.5      | 3.7      | 8.2      | 6.7      | 8.5      | 7.0      | 7.0      | 5.8      | 5.4      | 4.5      | 4.1      | 3.4      | 1.2       | 0.9       |
| 149 | 320.40 | 1.2                         | 0.9      | 2.9      | 2.3      | 4.0      | 3.2      | 4.5      | 3.6      | 8.1      | 6.6      | 8.4      | 6.9      | 6.9      | 5.7      | 5.4      | 4.4      | 4.1      | 3.3      | 1.2       | 0.9       |
| 150 | 322.20 | 1.2                         | 0.9      | 2.9      | 2.3      | 4.0      | 3.3      | 4.5      | 3.7      | 8.1      | 6.7      | 8.5      | 6.9      | 7.0      | 5.7      | 5.4      | 4.4      | 4.1      | 3.3      | 1.2       | 0.9       |
| 151 | 324.00 | 1.2                         | 1.0      | 3.0      | 2.4      | 4.1      | 3.4      | 4.7      | 3.8      | 8.4      | 6.9      | 8.7      | 7.2      | 7.3      | 5.9      | 5.6      | 4.6      | 4.2      | 3.5      | 1.2       | 1.0       |
| 152 | 325.80 | 1.2                         | 1.0      | 3.0      | 2.5      | 4.2      | 3.4      | 4.7      | 3.9      | 8.5      | 7.0      | 8.9      | 7.2      | 7.3      | 6.0      | 5.7      | 4.6      | 4.3      | 3.5      | 1.2       | 1.0       |
|     |        |                             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |

|     |        | Armadura de Rasante (cm <sup>2</sup> /m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X<br>m | 1<br>inf                                 | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 157 | 334.80 | 2.1                                      | 1.8      | 5.3      | 4.4      | 7.4      | 6.1      | 8.4      | 6.9      | 15.2     | 12.4     | 15.8     | 12.9     | 13.0     | 10.7     | 10.1     | 8.3      | 7.6      | 6.2      | 2.1       | 1.8       |
| 158 | 336.60 | 2.5                                      | 2.1      | 6.3      | 5.2      | 8.8      | 7.2      | 10.0     | 8.1      | 18.0     | 14.7     | 18.7     | 15.3     | 15.5     | 12.6     | 12.0     | 9.8      | 9.0      | 7.4      | 2.5       | 2.1       |
| 159 | 338.40 | 3.0                                      | 2.4      | 7.4      | 6.0      | 10.3     | 8.4      | 11.6     | 9.5      | 21.0     | 17.1     | 21.8     | 17.8     | 18.0     | 14.8     | 14.0     | 11.4     | 10.5     | 8.6      | 3.0       | 2.4       |
| 160 | 340.20 | 3.4                                      | 2.8      | 8.5      | 6.9      | 11.8     | 9.7      | 13.3     | 10.9     | 24.0     | 19.7     | 25.0     | 20.4     | 20.7     | 16.9     | 16.0     | 13.1     | 12.0     | 9.9      | 3.4       | 2.8       |
| 161 | 342.00 | 3.9                                      | 3.2      | 9.7      | 8.0      | 13.6     | 11.1     | 15.3     | 12.6     | 27.7     | 22.6     | 28.8     | 23.5     | 23.8     | 19.5     | 18.4     | 15.1     | 13.9     | 11.3     | 3.9       | 3.2       |

# ARMADURA TRANSVERSAL EN TABLERO

Alpha=35°

Luz vano

|   |      |   |
|---|------|---|
| 1 | 36.0 | m |
| 2 | 45.0 | m |
| 3 | 45.0 | m |
| 4 | 45.0 | m |
| 5 | 45.0 | m |
| 6 | 45.0 | m |
| 7 | 45.0 | m |
| 8 | 36.0 | m |

|     |       | Armadura de Rasante (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|-------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X     | 1<br>inf                    | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 1   | 0.00  | 15.0                        | 3.3      | 28.2     | 26.4     | 34.8     | 53.1     | 42.2     | 60.3     | 67.6     | 66.6     | 44.2     | 38.8     | 57.0     | 52.6     | 39.2     | 40.2     | 30.9     | 28.3     | 7.0       | 3.3       |
| 2   | 1.80  | 14.5                        | 2.8      | 26.8     | 25.3     | 32.9     | 51.6     | 40.1     | 58.5     | 63.7     | 63.4     | 40.2     | 35.5     | 53.7     | 49.8     | 36.6     | 38.1     | 29.0     | 26.7     | 6.5       | 2.8       |
| 3   | 3.60  | 14.0                        | 2.5      | 25.7     | 24.4     | 31.3     | 50.3     | 38.4     | 57.1     | 60.6     | 60.9     | 36.9     | 32.9     | 51.0     | 47.6     | 34.5     | 36.4     | 27.4     | 25.5     | 6.0       | 2.5       |
| 4   | 5.40  | 13.6                        | 2.2      | 24.7     | 23.5     | 29.9     | 49.1     | 36.7     | 55.8     | 57.6     | 58.4     | 33.9     | 30.3     | 48.5     | 45.5     | 32.5     | 34.7     | 26.0     | 24.3     | 5.6       | 2.2       |
| 5   | 7.20  | 13.2                        | 1.8      | 23.7     | 22.7     | 28.5     | 48.0     | 35.1     | 54.5     | 54.7     | 56.0     | 30.8     | 27.8     | 45.9     | 43.5     | 30.6     | 33.2     | 24.5     | 23.0     | 5.2       | 1.8       |
| 6   | 9.00  | 12.8                        | 1.5      | 10.6     | 9.7      | 6.3      | 26.1     | 7.2      | 26.8     | 18.2     | 20.1     | 18.5     | 16.0     | 16.1     | 14.1     | 8.6      | 11.6     | 9.5      | 8.3      | 4.8       | 1.5       |
| 7   | 10.80 | 12.5                        | 1.2      | 9.7      | 9.0      | 5.1      | 25.1     | 5.8      | 25.6     | 15.7     | 18.0     | 15.8     | 13.8     | 13.9     | 12.3     | 6.9      | 10.2     | 8.2      | 7.3      | 4.5       | 1.2       |
| 8   | 12.60 | 12.1                        | 0.9      | 8.8      | 8.3      | 3.8      | 24.0     | 4.3      | 24.4     | 13.1     | 15.8     | 13.1     | 11.6     | 11.7     | 10.4     | 5.2      | 8.7      | 6.9      | 6.2      | 4.1       | 0.9       |
| 9   | 14.40 | 11.9                        | 0.7      | 8.2      | 7.8      | 3.1      | 23.4     | 3.5      | 23.7     | 11.5     | 14.6     | 11.5     | 10.3     | 10.3     | 9.4      | 4.1      | 7.9      | 6.1      | 5.6      | 3.9       | 0.7       |
| 10  | 16.20 | 12.2                        | 1.0      | 9.0      | 8.5      | 4.2      | 24.4     | 4.8      | 24.8     | 13.9     | 16.6     | 14.0     | 12.3     | 12.4     | 11.1     | 5.7      | 9.2      | 7.3      | 6.6      | 4.2       | 1.0       |
| 11  | 18.00 | 12.3                        | 1.1      | 9.4      | 8.7      | 4.6      | 24.7     | 5.2      | 25.2     | 14.8     | 17.2     | 14.8     | 13.1     | 13.1     | 11.7     | 6.3      | 9.7      | 7.7      | 6.9      | 4.3       | 1.1       |
| 12  | 19.80 | 12.5                        | 1.2      | 9.7      | 9.0      | 5.2      | 25.1     | 5.8      | 25.7     | 15.8     | 18.1     | 15.9     | 13.9     | 14.0     | 12.4     | 7.0      | 10.2     | 8.3      | 7.3      | 4.5       | 1.2       |
| 13  | 21.60 | 12.7                        | 1.4      | 10.1     | 9.3      | 5.7      | 25.5     | 6.4      | 26.1     | 16.9     | 19.0     | 17.0     | 14.8     | 15.0     | 13.1     | 7.7      | 10.8     | 8.8      | 7.7      | 4.7       | 1.4       |
| 14  | 23.40 | 12.8                        | 1.4      | 10.4     | 9.6      | 6.2      | 25.9     | 6.9      | 26.6     | 17.9     | 19.8     | 18.1     | 15.7     | 15.8     | 13.8     | 8.4      | 11.3     | 9.3      | 8.1      | 4.8       | 1.4       |
| 15  | 25.20 | 12.9                        | 1.6      | 10.8     | 10.0     | 6.7      | 26.4     | 7.5      | 27.1     | 18.9     | 20.7     | 19.2     | 16.6     | 16.8     | 14.6     | 9.1      | 11.9     | 9.8      | 8.6      | 4.9       | 1.6       |
| 16  | 27.00 | 13.1                        | 1.7      | 11.2     | 10.2     | 7.2      | 26.8     | 8.1      | 27.6     | 20.0     | 21.5     | 20.2     | 17.5     | 17.6     | 15.3     | 9.8      | 12.5     | 10.4     | 9.0      | 5.1       | 1.7       |
| 17  | 28.80 | 13.2                        | 1.8      | 11.5     | 10.5     | 7.7      | 27.2     | 8.7      | 28.0     | 21.0     | 22.3     | 21.3     | 18.3     | 18.5     | 16.0     | 10.5     | 13.1     | 10.9     | 9.4      | 5.2       | 1.8       |
| 18  | 30.60 | 13.4                        | 1.9      | 11.9     | 10.9     | 8.3      | 27.7     | 9.3      | 28.5     | 22.1     | 23.3     | 22.5     | 19.3     | 19.5     | 16.8     | 11.2     | 13.7     | 11.4     | 9.9      | 5.4       | 1.9       |
| 19  | 32.40 | 14.1                        | 2.6      | 13.5     | 12.1     | 10.4     | 29.4     | 11.8     | 30.5     | 26.4     | 26.7     | 27.2     | 23.2     | 24.8     | 21.2     | 16.8     | 18.2     | 16.5     | 14.0     | 6.1       | 2.6       |
| 20  | 34.20 | 16.3                        | 4.3      | 18.7     | 16.4     | 17.5     | 35.3     | 20.0     | 37.2     | 41.0     | 38.7     | 42.6     | 35.8     | 38.6     | 32.5     | 28.4     | 27.8     | 25.8     | 21.7     | 8.3       | 4.3       |
| 21  | 36.00 | 18.6                        | 6.3      | 24.4     | 21.0     | 25.5     | 41.7     | 28.9     | 44.6     | 57.1     | 51.9     | 59.6     | 49.7     | 53.7     | 44.9     | 41.3     | 38.3     | 36.1     | 30.1     | 10.6      | 6.3       |
| 22  | 38.25 | 16.6                        | 4.6      | 19.5     | 17.0     | 18.6     | 36.2     | 21.2     | 38.2     | 43.3     | 40.6     | 45.0     | 37.7     | 40.7     | 34.2     | 30.2     | 29.2     | 27.2     | 22.8     | 8.6       | 4.6       |
| 23  | 40.50 | 14.4                        | 2.8      | 26.7     | 25.1     | 32.6     | 51.4     | 39.8     | 58.3     | 63.2     | 63.0     | 39.6     | 35.1     | 53.2     | 49.5     | 36.2     | 37.8     | 28.8     | 26.5     | 6.4       | 2.8       |
| 24  | 42.75 | 14.1                        | 2.5      | 25.9     | 24.5     | 31.5     | 50.5     | 38.6     | 57.3     | 61.0     | 61.2     | 37.4     | 33.2     | 51.4     | 47.9     | 34.8     | 36.6     | 27.6     | 25.6     | 6.1       | 2.5       |
| 25  | 45.00 | 13.7                        | 2.2      | 24.9     | 23.7     | 30.2     | 49.3     | 37.0     | 56.0     | 58.1     | 58.9     | 34.4     | 30.8     | 48.9     | 45.9     | 32.9     | 35.1     | 26.2     | 24.4     | 5.7       | 2.2       |
| 26  | 47.25 | 13.3                        | 1.9      | 23.9     | 22.9     | 28.8     | 48.2     | 35.5     | 54.7     | 55.3     | 56.5     | 31.4     | 28.4     | 46.5     | 43.9     | 31.0     | 33.5     | 24.8     | 23.3     | 5.3       | 1.9       |
| 27  | 49.50 | 13.0                        | 1.7      | 11.1     | 10.1     | 7.0      | 26.7     | 7.9      | 27.4     | 19.6     | 21.2     | 19.9     | 17.2     | 17.3     | 15.1     | 9.5      | 12.3     | 10.2     | 8.9      | 5.0       | 1.7       |
| 28  | 51.75 | 12.8                        | 1.4      | 10.4     | 9.6      | 6.1      | 25.9     | 6.9      | 26.5     | 17.7     | 19.7     | 17.9     | 15.5     | 15.7     | 13.7     | 8.3      | 11.3     | 9.2      | 8.1      | 4.8       | 1.4       |
| 29  | 54.00 | 12.5                        | 1.2      | 9.7      | 9.0      | 5.2      | 25.1     | 5.8      | 25.7     | 15.8     | 18.1     | 15.9     | 13.9     | 14.0     | 12.4     | 7.0      | 10.2     | 8.3      | 7.3      | 4.5       | 1.2       |
| 30  | 56.25 | 12.2                        | 1.0      | 9.1      | 8.5      | 4.3      | 24.4     | 4.8      | 24.9     | 14.0     | 16.7     | 14.1     | 12.4     | 12.5     | 11.1     | 5.8      | 9.3      | 7.3      | 6.6      | 4.2       | 1.0       |
| 31  | 58.50 | 12.1                        | 0.9      | 8.8      | 8.3      | 3.8      | 24.0     | 4.3      | 24.4     | 13.0     | 15.8     | 13.0     | 11.5     | 11.6     | 10.4     | 5.1      | 8.7      | 6.9      | 6.2      | 4.1       | 0.9       |
| 32  | 60.75 | 12.3                        | 1.1      | 9.2      | 8.7      | 4.5      | 24.6     | 5.1      | 25.1     | 14.5     | 17.0     | 14.6     | 12.8     | 12.9     | 11.5     | 6.1      | 9.5      | 7.6      | 6.8      | 4.3       | 1.1       |
| 33  | 63.00 | 12.5                        | 1.3      | 9.8      | 9.1      | 5.3      | 25.2     | 6.0      | 25.8     | 16.1     | 18.3     | 16.2     | 14.2     | 14.3     | 12.6     | 7.2      | 10.4     | 8.4      | 7.4      | 4.5       | 1.3       |
| 34  | 65.25 | 12.8                        | 1.4      | 10.4     | 9.6      | 6.1      | 25.9     | 6.9      | 26.6     | 17.8     | 19.7     | 18.0     | 15.6     | 15.7     | 13.8     | 8.3      | 11.3     | 9.3      | 8.1      | 4.8       | 1.4       |
| 35  | 67.50 | 13.0                        | 1.6      | 11.0     | 10.1     | 6.9      | 26.6     | 7.8      | 27.3     | 19.4     | 21.1     | 19.7     | 17.0     | 17.2     | 14.9     | 9.4      | 12.2     | 10.1     | 8.8      | 5.0       | 1.6       |
| 36  | 69.75 | 13.3                        | 1.8      | 11.6     | 10.6     | 7.8      | 27.3     | 8.8      | 28.1     | 21.1     | 22.5     | 21.4     | 18.5     | 18.6     | 16.2     | 10.6     | 13.1     | 11.0     | 9.5      | 5.3       | 1.8       |
| 37  | 72.00 | 13.5                        | 2.0      | 12.2     | 11.1     | 8.6      | 28.0     | 9.7      | 28.9     | 22.9     | 23.9     | 23.3     | 20.0     | 20.1     | 17.4     | 11.7     | 14.1     | 11.8     | 10.2     | 5.5       | 2.0       |
| 38  | 74.25 | 13.8                        | 2.3      | 12.9     | 11.6     | 9.6      | 28.7     | 10.8     | 29.7     | 24.8     | 25.4     | 25.2     | 21.6     | 21.7     | 18.7     | 13.0     | 15.1     | 12.7     | 11.0     | 5.8       | 2.3       |
| 39  | 76.50 | 14.1                        | 2.6      | 13.6     | 12.2     | 10.5     | 29.5     | 11.9     | 30.7     | 26.6     | 27.0     | 27.5     | 23.4     | 25.1     | 21.4     | 17.0     | 18.4     | 16.6     | 14.2     | 6.1       | 2.6       |
| 40  | 78.75 | 16.3                        | 4.4      | 18.8     | 16.5     | 17.8     | 35.4     | 20.2     | 37.4     | 41.4     | 39.0     | 43.1     | 36.1     | 38.9     | 32.8     | 28.7     | 28.0     | 26.0     | 21.9     | 8.3       | 4.4       |
| 41  | 81.00 | 18.8                        | 6.4      | 24.8     | 21.3     | 26.0     | 42.1     | 29.5     | 45.0     | 58.1     | 52.7     | 60.7     | 50.5     | 54.7     | 45.6     | 42.0     | 38.9     | 36.7     | 30.6     | 10.8      | 6.4       |
| 42  | 83.25 | 16.6                        | 4.5      | 19.4     | 16.9     | 18.5     | 36.1     | 21.0     | 38.1     | 42.9     | 40.3     | 44.7     | 37.4     | 40.4     | 34.0     | 30.0     | 29.0     | 27.0     | 22.7     | 8.6       | 4.5       |
| 43  | 85.50 | 14.2                        | 2.7      | 26.3     | 24.8     | 32.0     | 50.9     | 39.2     | 57.8     | 62.0     | 62.1     | 38.4     | 34.1     | 52.3     | 48.7     | 35.5     | 37.2     | 28.2     | 26.1     | 6.2       | 2.7       |
| 44  | 87.75 | 14.0                        | 2.4      | 25.6     | 24.2     | 31.1     | 50.2     | 38.2     | 56.9     | 60.2     | 60.5     | 36.5     | 32.5     | 50.7     | 47.3     | 34.2     | 36.1     | 27.2     | 25.3     | 6.0       | 2.4       |
| 45  | 90.00 | 13.6                        | 2.2      | 24.8     | 23.6     | 29.9     | 49.1     | 36.7     | 55.8     | 57.6     | 58.5     | 33.9     | 30.3     | 48.5     | 45.5     | 32.6     | 34.8     | 26.0     | 24.3     | 5.6       | 2.2       |

| Armadura de Rasante (cm2/m) |        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----------------------------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC                         | X      | 1<br>inf | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 46                          | 92.25  | 13.4     | 2.0      | 24.3     | 23.1     | 29.2     | 48.6     | 36.0     | 55.2     | 56.3     | 57.4     | 32.5     | 29.2     | 47.4     | 44.6     | 31.6     | 34.0     | 25.3     | 23.7     | 5.4       | 2.0       |
| 47                          | 94.50  | 13.1     | 1.8      | 11.4     | 10.4     | 7.5      | 27.0     | 8.5      | 27.8     | 20.6     | 22.0     | 20.9     | 18.0     | 18.1     | 15.8     | 10.2     | 12.8     | 10.6     | 9.3      | 5.1       | 1.8       |
| 48                          | 96.75  | 12.9     | 1.5      | 10.7     | 9.9      | 6.5      | 26.3     | 7.4      | 27.0     | 18.7     | 20.5     | 18.9     | 16.4     | 16.5     | 14.4     | 8.9      | 11.8     | 9.7      | 8.5      | 4.9       | 1.5       |
| 49                          | 99.00  | 12.7     | 1.4      | 10.1     | 9.3      | 5.7      | 25.5     | 6.4      | 26.1     | 16.9     | 19.0     | 17.0     | 14.8     | 14.9     | 13.1     | 7.7      | 10.8     | 8.8      | 7.7      | 4.7       | 1.4       |
| 50                          | 101.25 | 12.4     | 1.1      | 9.5      | 8.8      | 4.8      | 24.8     | 5.4      | 25.3     | 15.1     | 17.5     | 15.2     | 13.3     | 13.4     | 11.9     | 6.5      | 9.8      | 7.9      | 7.0      | 4.4       | 1.1       |
| 51                          | 103.50 | 12.2     | 0.9      | 8.9      | 8.4      | 4.0      | 24.2     | 4.6      | 24.6     | 13.6     | 16.3     | 13.6     | 12.0     | 12.1     | 10.8     | 5.5      | 9.0      | 7.1      | 6.4      | 4.2       | 0.9       |
| 52                          | 105.75 | 12.3     | 1.1      | 9.3      | 8.7      | 4.6      | 24.6     | 5.2      | 25.1     | 14.7     | 17.2     | 14.7     | 12.9     | 13.0     | 11.6     | 6.2      | 9.6      | 7.7      | 6.8      | 4.3       | 1.1       |
| 53                          | 108.00 | 12.5     | 1.3      | 9.9      | 9.2      | 5.4      | 25.3     | 6.1      | 25.9     | 16.2     | 18.5     | 16.4     | 14.3     | 14.4     | 12.7     | 7.3      | 10.4     | 8.5      | 7.5      | 4.5       | 1.3       |
| 54                          | 110.25 | 12.8     | 1.5      | 10.5     | 9.7      | 6.3      | 26.0     | 7.0      | 26.7     | 18.0     | 19.9     | 18.2     | 15.8     | 15.9     | 14.0     | 8.5      | 11.4     | 9.4      | 8.2      | 4.8       | 1.5       |
| 55                          | 112.50 | 13.0     | 1.7      | 11.1     | 10.1     | 7.0      | 26.7     | 7.9      | 27.4     | 19.7     | 21.2     | 19.9     | 17.2     | 17.3     | 15.1     | 9.6      | 12.3     | 10.2     | 8.9      | 5.0       | 1.7       |
| 56                          | 114.75 | 13.3     | 1.8      | 11.7     | 10.6     | 7.9      | 27.3     | 8.9      | 28.1     | 21.3     | 22.6     | 21.7     | 18.6     | 18.8     | 16.3     | 10.7     | 13.2     | 11.0     | 9.6      | 5.3       | 1.8       |
| 57                          | 117.00 | 13.5     | 2.1      | 12.3     | 11.1     | 8.7      | 28.1     | 9.8      | 29.0     | 23.1     | 24.1     | 23.5     | 20.2     | 20.3     | 17.5     | 11.9     | 14.2     | 12.0     | 10.3     | 5.5       | 2.1       |
| 58                          | 119.25 | 13.8     | 2.3      | 12.9     | 11.6     | 9.6      | 28.8     | 10.8     | 29.8     | 24.9     | 25.6     | 25.4     | 21.7     | 21.9     | 18.8     | 13.0     | 15.2     | 12.8     | 11.1     | 5.8       | 2.3       |
| 59                          | 121.50 | 14.2     | 2.6      | 13.6     | 12.3     | 10.6     | 29.6     | 12.0     | 30.8     | 26.9     | 27.1     | 27.7     | 23.6     | 25.3     | 21.6     | 17.2     | 18.5     | 16.8     | 14.3     | 6.2       | 2.6       |
| 60                          | 123.75 | 16.4     | 4.4      | 18.9     | 16.6     | 17.9     | 35.5     | 20.3     | 37.5     | 41.6     | 39.2     | 43.3     | 36.3     | 39.2     | 32.9     | 28.9     | 28.2     | 26.2     | 22.0     | 8.4       | 4.4       |
| 61                          | 126.00 | 18.8     | 6.4      | 24.8     | 21.3     | 26.0     | 42.2     | 29.5     | 45.1     | 58.2     | 52.7     | 60.7     | 50.6     | 54.7     | 45.7     | 42.1     | 38.9     | 36.7     | 30.6     | 10.8      | 6.4       |
| 62                          | 128.25 | 16.6     | 4.5      | 19.4     | 16.9     | 18.5     | 36.1     | 21.0     | 38.1     | 43.0     | 40.3     | 44.7     | 37.5     | 40.4     | 34.0     | 30.0     | 29.0     | 27.0     | 22.7     | 8.6       | 4.5       |
| 63                          | 130.50 | 14.2     | 2.7      | 26.3     | 24.8     | 32.1     | 50.9     | 39.2     | 57.8     | 62.0     | 62.1     | 38.5     | 34.1     | 52.3     | 48.7     | 35.5     | 37.2     | 28.2     | 26.1     | 6.2       | 2.7       |
| 64                          | 132.75 | 14.0     | 2.4      | 25.6     | 24.2     | 31.1     | 50.2     | 38.2     | 56.9     | 60.2     | 60.5     | 36.5     | 32.5     | 50.7     | 47.3     | 34.2     | 36.1     | 27.2     | 25.3     | 6.0       | 2.4       |
| 65                          | 135.00 | 13.6     | 2.2      | 24.8     | 23.6     | 29.9     | 49.1     | 36.8     | 55.8     | 57.6     | 58.5     | 33.9     | 30.3     | 48.5     | 45.5     | 32.6     | 34.8     | 26.0     | 24.3     | 5.6       | 2.2       |
| 66                          | 137.25 | 13.4     | 2.0      | 24.3     | 23.1     | 29.2     | 48.6     | 36.0     | 55.2     | 56.3     | 57.4     | 32.5     | 29.2     | 47.4     | 44.6     | 31.6     | 34.0     | 25.3     | 23.7     | 5.4       | 2.0       |
| 67                          | 139.50 | 13.1     | 1.8      | 11.4     | 10.4     | 7.5      | 27.0     | 8.5      | 27.8     | 20.6     | 22.0     | 20.9     | 18.0     | 18.1     | 15.8     | 10.2     | 12.8     | 10.6     | 9.3      | 5.1       | 1.8       |
| 68                          | 141.75 | 12.9     | 1.5      | 10.7     | 9.9      | 6.5      | 26.3     | 7.4      | 27.0     | 18.7     | 20.5     | 18.9     | 16.4     | 16.6     | 14.5     | 8.9      | 11.8     | 9.7      | 8.5      | 4.9       | 1.5       |
| 69                          | 144.00 | 12.7     | 1.4      | 10.1     | 9.3      | 5.7      | 25.5     | 6.4      | 26.1     | 16.9     | 19.0     | 17.0     | 14.8     | 15.0     | 13.1     | 7.7      | 10.8     | 8.8      | 7.7      | 4.7       | 1.4       |
| 70                          | 146.25 | 12.4     | 1.1      | 9.5      | 8.8      | 4.8      | 24.8     | 5.4      | 25.3     | 15.1     | 17.5     | 15.2     | 13.3     | 13.4     | 11.9     | 6.5      | 9.8      | 7.9      | 7.0      | 4.4       | 1.1       |
| 71                          | 148.50 | 12.2     | 0.9      | 8.9      | 8.4      | 4.1      | 24.2     | 4.6      | 24.6     | 13.6     | 16.3     | 13.6     | 12.0     | 12.1     | 10.8     | 5.5      | 9.0      | 7.1      | 6.4      | 4.2       | 0.9       |
| 72                          | 150.75 | 12.4     | 1.1      | 9.4      | 8.8      | 4.7      | 24.8     | 5.3      | 25.3     | 14.9     | 17.4     | 15.0     | 13.2     | 13.3     | 11.8     | 6.4      | 9.8      | 7.8      | 7.0      | 4.4       | 1.1       |
| 73                          | 153.00 | 12.6     | 1.3      | 10.0     | 9.2      | 5.5      | 25.4     | 6.2      | 26.0     | 16.5     | 18.7     | 16.7     | 14.5     | 14.7     | 12.9     | 7.5      | 10.6     | 8.7      | 7.6      | 4.6       | 1.3       |
| 74                          | 155.25 | 12.8     | 1.5      | 10.6     | 9.7      | 6.4      | 26.1     | 7.2      | 26.8     | 18.3     | 20.1     | 18.5     | 16.0     | 16.2     | 14.1     | 8.6      | 11.6     | 9.5      | 8.3      | 4.8       | 1.5       |
| 75                          | 157.50 | 13.1     | 1.7      | 11.2     | 10.2     | 7.2      | 26.8     | 8.1      | 27.6     | 20.0     | 21.5     | 20.2     | 17.5     | 17.6     | 15.3     | 9.8      | 12.5     | 10.4     | 9.0      | 5.1       | 1.7       |
| 76                          | 159.75 | 13.3     | 1.9      | 11.8     | 10.7     | 8.0      | 27.5     | 9.0      | 28.3     | 21.6     | 22.9     | 21.9     | 18.9     | 19.0     | 16.5     | 10.9     | 13.4     | 11.2     | 9.7      | 5.3       | 1.9       |
| 77                          | 162.00 | 13.5     | 2.1      | 12.4     | 11.2     | 8.9      | 28.1     | 10.0     | 29.1     | 23.4     | 24.3     | 23.8     | 20.4     | 20.5     | 17.7     | 12.0     | 14.4     | 12.1     | 10.4     | 5.5       | 2.1       |
| 78                          | 164.25 | 13.8     | 2.3      | 13.0     | 11.8     | 9.8      | 28.9     | 11.0     | 29.9     | 25.2     | 25.8     | 25.7     | 22.0     | 22.2     | 19.0     | 13.3     | 15.3     | 13.0     | 11.2     | 5.8       | 2.3       |
| 79                          | 166.50 | 14.2     | 2.7      | 13.8     | 12.3     | 10.8     | 29.7     | 12.2     | 30.9     | 27.2     | 27.4     | 28.0     | 23.9     | 25.6     | 21.8     | 17.4     | 18.8     | 17.0     | 14.4     | 6.2       | 2.7       |
| 80                          | 168.75 | 16.4     | 4.4      | 19.0     | 16.6     | 18.0     | 35.6     | 20.4     | 37.6     | 41.9     | 39.4     | 43.6     | 36.5     | 39.4     | 33.1     | 29.1     | 28.3     | 26.3     | 22.1     | 8.4       | 4.4       |
| 81                          | 171.00 | 18.8     | 6.4      | 24.8     | 21.4     | 26.0     | 42.2     | 29.5     | 45.1     | 58.2     | 52.8     | 60.8     | 50.6     | 54.8     | 45.7     | 42.1     | 39.0     | 36.8     | 30.6     | 10.8      | 6.4       |
| 82                          | 173.25 | 16.6     | 4.6      | 19.4     | 17.0     | 18.6     | 36.1     | 21.1     | 38.2     | 43.1     | 40.4     | 44.8     | 37.6     | 40.5     | 34.1     | 30.1     | 29.1     | 27.1     | 22.8     | 8.6       | 4.6       |
| 83                          | 175.50 | 14.2     | 2.7      | 26.3     | 24.8     | 32.1     | 50.9     | 39.3     | 57.8     | 62.2     | 62.1     | 38.5     | 34.2     | 52.4     | 48.7     | 35.5     | 37.2     | 28.2     | 26.1     | 6.2       | 2.7       |
| 84                          | 177.75 | 14.0     | 2.5      | 25.7     | 24.3     | 31.2     | 50.2     | 38.2     | 57.0     | 60.3     | 60.6     | 36.6     | 32.6     | 50.8     | 47.4     | 34.3     | 36.2     | 27.3     | 25.3     | 6.0       | 2.5       |
| 85                          | 180.00 | 13.6     | 2.2      | 24.8     | 23.6     | 29.9     | 49.2     | 36.8     | 55.8     | 57.7     | 58.5     | 33.9     | 30.4     | 48.5     | 45.6     | 32.6     | 34.8     | 26.0     | 24.3     | 5.6       | 2.2       |
| 86                          | 182.25 | 13.5     | 2.0      | 24.3     | 23.2     | 29.3     | 48.7     | 36.1     | 55.3     | 56.4     | 57.5     | 32.7     | 29.4     | 47.5     | 44.7     | 31.7     | 34.1     | 25.3     | 23.8     | 5.5       | 2.0       |
| 87                          | 184.50 | 13.2     | 1.8      | 11.4     | 10.5     | 7.6      | 27.1     | 8.5      | 27.9     | 20.8     | 22.1     | 21.1     | 18.1     | 18.3     | 15.8     | 10.3     | 12.9     | 10.8     | 9.3      | 5.2       | 1.8       |
| 88                          | 186.75 | 12.9     | 1.6      | 10.8     | 9.9      | 6.7      | 26.3     | 7.5      | 27.0     | 18.8     | 20.6     | 19.1     | 16.5     | 16.7     | 14.5     | 9.0      | 11.9     | 9.8      | 8.6      | 4.9       | 1.6       |
| 89                          | 189.00 | 12.7     | 1.4      | 10.1     | 9.4      | 5.7      | 25.6     | 6.4      | 26.2     | 16.9     | 19.0     | 17.1     | 14.9     | 15.0     | 13.2     | 7.8      | 10.8     | 8.8      | 7.8      | 4.7       | 1.4       |
| 90                          | 191.25 | 12.4     | 1.1      | 9.5      | 8.8      | 4.8      | 24.9     | 5.4      | 25.4     | 15.1     | 17.6     | 15.2     | 13.4     | 13.5     | 11.9     | 6.5      | 9.9      | 8.0      | 7.1      | 4.4       | 1.1       |
| 91                          | 193.50 | 12.2     | 0.9      | 8.9      | 8.4      | 4.1      | 24.2     | 4.6      | 24.7     | 13.7     | 16.3     | 13.6     | 12.1     | 12.2     | 10.9     | 5.6      | 9.0      | 7.2      | 6.4      | 4.2       | 0.9       |
| 92                          | 195.75 | 12.3     | 1.1      | 9.4      | 8.7      | 4.7      | 24.7     | 5.3      | 25.2     | 14.8     | 17.3     | 14.9     | 13.1     | 13.2     | 11.7     | 6.3      | 9.7      |          |          |           |           |



|     |        | Armadura de Rasante (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X      | 1<br>inf                    | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 103 | 220.50 | 14.2                        | 2.6      | 26.2     | 24.7     | 31.9     | 50.8     | 39.0     | 57.7     | 61.8     | 61.8     | 38.2     | 33.9     | 52.0     | 48.5     | 35.2     | 37.0     | 28.0     | 25.9     | 6.2       | 2.6       |
| 104 | 222.75 | 14.0                        | 2.4      | 25.5     | 24.2     | 31.0     | 50.1     | 38.1     | 56.8     | 60.0     | 60.3     | 36.2     | 32.3     | 50.4     | 47.2     | 34.1     | 36.1     | 27.1     | 25.2     | 6.0       | 2.4       |
| 105 | 225.00 | 13.6                        | 2.1      | 24.6     | 23.4     | 29.8     | 49.0     | 36.6     | 55.6     | 57.3     | 58.2     | 33.5     | 30.1     | 48.2     | 45.4     | 32.3     | 34.6     | 25.8     | 24.1     | 5.6       | 2.1       |
| 106 | 227.25 | 13.4                        | 2.0      | 24.2     | 23.1     | 29.1     | 48.5     | 35.9     | 55.1     | 56.1     | 57.2     | 32.3     | 29.0     | 47.1     | 44.5     | 31.5     | 33.9     | 25.2     | 23.6     | 5.4       | 2.0       |
| 107 | 229.50 | 13.1                        | 1.8      | 11.3     | 10.4     | 7.4      | 27.0     | 8.4      | 27.7     | 20.4     | 21.8     | 20.7     | 17.8     | 18.0     | 15.6     | 10.1     | 12.7     | 10.6     | 9.2      | 5.1       | 1.8       |
| 108 | 231.75 | 12.9                        | 1.5      | 10.7     | 9.8      | 6.5      | 26.2     | 7.3      | 26.9     | 18.5     | 20.3     | 18.7     | 16.2     | 16.3     | 14.3     | 8.8      | 11.7     | 9.6      | 8.4      | 4.9       | 1.5       |
| 109 | 234.00 | 12.6                        | 1.3      | 10.0     | 9.2      | 5.6      | 25.4     | 6.2      | 26.0     | 16.6     | 18.7     | 16.7     | 14.6     | 14.7     | 12.9     | 7.5      | 10.6     | 8.7      | 7.6      | 4.6       | 1.3       |
| 110 | 236.25 | 12.3                        | 1.1      | 9.4      | 8.7      | 4.7      | 24.7     | 5.2      | 25.2     | 14.8     | 17.3     | 14.8     | 13.1     | 13.1     | 11.7     | 6.3      | 9.7      | 7.7      | 6.9      | 4.3       | 1.1       |
| 111 | 238.50 | 12.2                        | 0.9      | 8.9      | 8.3      | 4.0      | 24.1     | 4.5      | 24.6     | 13.4     | 16.1     | 13.4     | 11.9     | 12.0     | 10.7     | 5.4      | 8.9      | 7.1      | 6.3      | 4.2       | 0.9       |
| 112 | 240.75 | 12.4                        | 1.1      | 9.4      | 8.8      | 4.7      | 24.8     | 5.3      | 25.3     | 14.9     | 17.4     | 15.0     | 13.2     | 13.3     | 11.8     | 6.4      | 9.7      | 7.8      | 7.0      | 4.4       | 1.1       |
| 113 | 243.00 | 12.6                        | 1.3      | 10.0     | 9.2      | 5.5      | 25.4     | 6.2      | 26.0     | 16.5     | 18.7     | 16.7     | 14.5     | 14.6     | 12.9     | 7.5      | 10.6     | 8.6      | 7.6      | 4.6       | 1.3       |
| 114 | 245.25 | 12.8                        | 1.5      | 10.6     | 9.7      | 6.3      | 26.1     | 7.2      | 26.8     | 18.2     | 20.1     | 18.5     | 16.0     | 16.1     | 14.1     | 8.6      | 11.6     | 9.5      | 8.3      | 4.8       | 1.5       |
| 115 | 247.50 | 13.0                        | 1.7      | 11.1     | 10.2     | 7.2      | 26.8     | 8.0      | 27.5     | 19.9     | 21.4     | 20.2     | 17.4     | 17.5     | 15.3     | 9.7      | 12.4     | 10.3     | 9.0      | 5.0       | 1.7       |
| 116 | 249.75 | 13.3                        | 1.9      | 11.8     | 10.7     | 8.0      | 27.4     | 9.0      | 28.3     | 21.6     | 22.8     | 21.9     | 18.9     | 19.0     | 16.5     | 10.8     | 13.4     | 11.2     | 9.7      | 5.3       | 1.9       |
| 117 | 252.00 | 13.5                        | 2.1      | 12.3     | 11.2     | 8.9      | 28.1     | 10.0     | 29.0     | 23.3     | 24.3     | 23.8     | 20.3     | 20.5     | 17.7     | 12.0     | 14.3     | 12.0     | 10.4     | 5.5       | 2.1       |
| 118 | 254.25 | 13.8                        | 2.3      | 13.0     | 11.7     | 9.7      | 28.9     | 11.0     | 29.9     | 25.2     | 25.8     | 25.7     | 21.9     | 22.1     | 19.0     | 13.3     | 15.3     | 13.0     | 11.1     | 5.8       | 2.3       |
| 119 | 256.50 | 14.2                        | 2.7      | 13.8     | 12.3     | 10.8     | 29.7     | 12.2     | 30.9     | 27.1     | 27.4     | 28.0     | 23.8     | 25.6     | 21.8     | 17.4     | 18.7     | 17.0     | 14.4     | 6.2       | 2.7       |
| 120 | 258.75 | 18.4                        | 6.1      | 23.9     | 20.6     | 24.8     | 41.2     | 28.1     | 43.9     | 55.6     | 50.6     | 58.0     | 48.3     | 52.3     | 43.7     | 40.0     | 37.2     | 35.1     | 29.3     | 10.4      | 6.1       |
| 121 | 261.00 | 18.8                        | 6.4      | 24.7     | 21.3     | 25.9     | 42.1     | 29.4     | 45.0     | 57.9     | 52.6     | 60.5     | 50.4     | 54.6     | 45.5     | 41.9     | 38.8     | 36.7     | 30.5     | 10.8      | 6.4       |
| 122 | 263.25 | 16.6                        | 4.5      | 19.3     | 16.9     | 18.4     | 36.0     | 21.0     | 38.0     | 42.8     | 40.1     | 44.5     | 37.3     | 40.3     | 33.8     | 29.8     | 28.9     | 26.9     | 22.6     | 8.6       | 4.5       |
| 123 | 265.50 | 14.2                        | 2.7      | 26.2     | 24.8     | 32.0     | 50.8     | 39.1     | 57.7     | 61.9     | 61.9     | 38.3     | 33.9     | 52.1     | 48.6     | 35.4     | 37.1     | 28.1     | 26.0     | 6.2       | 2.7       |
| 124 | 267.75 | 14.0                        | 2.4      | 25.6     | 24.2     | 31.0     | 50.1     | 38.1     | 56.8     | 60.0     | 60.4     | 36.3     | 32.4     | 50.5     | 47.2     | 34.1     | 36.1     | 27.1     | 25.2     | 6.0       | 2.4       |
| 125 | 270.00 | 13.6                        | 2.1      | 24.6     | 23.5     | 29.8     | 49.0     | 36.6     | 55.7     | 57.4     | 58.2     | 33.6     | 30.2     | 48.3     | 45.4     | 32.4     | 34.7     | 25.8     | 24.2     | 5.6       | 2.1       |
| 126 | 272.25 | 13.4                        | 2.0      | 24.2     | 23.1     | 29.2     | 48.5     | 35.9     | 55.1     | 56.1     | 57.2     | 32.3     | 29.1     | 47.2     | 44.5     | 31.5     | 33.9     | 25.2     | 23.6     | 5.4       | 2.0       |
| 127 | 274.50 | 13.1                        | 1.8      | 11.3     | 10.4     | 7.4      | 27.0     | 8.4      | 27.7     | 20.4     | 21.9     | 20.7     | 17.9     | 18.0     | 15.6     | 10.1     | 12.7     | 10.6     | 9.2      | 5.1       | 1.8       |
| 128 | 276.75 | 12.9                        | 1.5      | 10.7     | 9.8      | 6.5      | 26.2     | 7.3      | 26.9     | 18.6     | 20.3     | 18.8     | 16.3     | 16.4     | 14.3     | 8.8      | 11.7     | 9.7      | 8.4      | 4.9       | 1.5       |
| 129 | 279.00 | 12.6                        | 1.3      | 10.0     | 9.3      | 5.6      | 25.4     | 6.3      | 26.0     | 16.6     | 18.8     | 16.8     | 14.6     | 14.7     | 13.0     | 7.5      | 10.7     | 8.7      | 7.6      | 4.6       | 1.3       |
| 130 | 281.25 | 12.4                        | 1.1      | 9.4      | 8.8      | 4.7      | 24.8     | 5.3      | 25.3     | 14.9     | 17.4     | 15.0     | 13.2     | 13.3     | 11.8     | 6.4      | 9.8      | 7.8      | 7.0      | 4.4       | 1.1       |
| 131 | 283.50 | 12.2                        | 0.9      | 8.9      | 8.3      | 4.0      | 24.2     | 4.5      | 24.6     | 13.4     | 16.2     | 13.4     | 11.9     | 12.0     | 10.7     | 5.4      | 8.9      | 7.1      | 6.3      | 4.2       | 0.9       |
| 132 | 285.75 | 12.2                        | 0.9      | 8.9      | 8.4      | 4.1      | 24.2     | 4.6      | 24.6     | 13.6     | 16.3     | 13.6     | 12.1     | 12.2     | 10.9     | 5.5      | 9.0      | 7.1      | 6.4      | 4.2       | 0.9       |
| 133 | 288.00 | 12.4                        | 1.1      | 9.5      | 8.8      | 4.8      | 24.9     | 5.4      | 25.4     | 15.2     | 17.6     | 15.3     | 13.4     | 13.5     | 12.0     | 6.6      | 9.9      | 8.0      | 7.1      | 4.4       | 1.1       |
| 134 | 290.25 | 12.7                        | 1.4      | 10.1     | 9.4      | 5.7      | 25.6     | 6.5      | 26.2     | 17.0     | 19.0     | 17.2     | 14.9     | 15.1     | 13.2     | 7.8      | 10.8     | 8.8      | 7.8      | 4.7       | 1.4       |
| 135 | 292.50 | 12.9                        | 1.5      | 10.7     | 9.8      | 6.5      | 26.3     | 7.4      | 26.9     | 18.6     | 20.4     | 18.9     | 16.3     | 16.4     | 14.4     | 8.9      | 11.7     | 9.7      | 8.4      | 4.9       | 1.5       |
| 136 | 294.75 | 13.1                        | 1.7      | 11.3     | 10.3     | 7.3      | 26.9     | 8.3      | 27.7     | 20.3     | 21.7     | 20.6     | 17.7     | 17.9     | 15.5     | 10.0     | 12.6     | 10.5     | 9.1      | 5.1       | 1.7       |
| 137 | 297.00 | 13.4                        | 1.9      | 11.9     | 10.9     | 8.3      | 27.7     | 9.3      | 28.5     | 22.1     | 23.2     | 22.4     | 19.3     | 19.4     | 16.8     | 11.2     | 13.6     | 11.4     | 9.9      | 5.4       | 1.9       |
| 138 | 299.25 | 13.6                        | 2.2      | 12.6     | 11.4     | 9.2      | 28.4     | 10.3     | 29.4     | 23.9     | 24.8     | 24.4     | 20.9     | 21.1     | 18.1     | 12.4     | 14.7     | 12.4     | 10.7     | 5.6       | 2.2       |
| 139 | 301.50 | 14.0                        | 2.5      | 13.3     | 12.0     | 10.1     | 29.2     | 11.5     | 30.3     | 25.9     | 26.3     | 26.7     | 22.8     | 24.4     | 20.8     | 16.4     | 17.9     | 16.1     | 13.8     | 6.0       | 2.5       |
| 140 | 303.75 | 18.3                        | 5.9      | 23.4     | 20.3     | 24.1     | 40.7     | 27.4     | 43.4     | 54.4     | 49.6     | 56.8     | 47.3     | 51.1     | 42.8     | 39.1     | 36.5     | 34.4     | 28.7     | 10.3      | 5.9       |
| 141 | 306.00 | 18.2                        | 5.9      | 23.2     | 20.0     | 23.7     | 40.3     | 27.0     | 43.0     | 53.5     | 48.9     | 55.8     | 46.6     | 50.4     | 42.1     | 38.4     | 35.9     | 33.8     | 28.2     | 10.2      | 5.9       |
| 142 | 307.80 | 18.0                        | 5.8      | 35.1     | 32.0     | 44.2     | 60.9     | 53.1     | 69.2     | 86.7     | 82.3     | 64.8     | 55.7     | 77.4     | 69.2     | 58.1     | 55.7     | 47.1     | 41.5     | 10.0      | 5.8       |
| 143 | 309.60 | 15.5                        | 3.7      | 29.4     | 27.4     | 36.5     | 54.5     | 44.2     | 61.8     | 71.1     | 69.4     | 47.8     | 41.8     | 60.0     | 55.0     | 41.5     | 42.1     | 32.7     | 29.7     | 7.5       | 3.7       |
| 144 | 311.40 | 13.2                        | 1.8      | 23.6     | 22.6     | 28.3     | 47.9     | 35.0     | 54.4     | 54.5     | 55.9     | 30.6     | 27.7     | 45.8     | 43.3     | 30.5     | 33.1     | 24.4     | 22.9     | 5.2       | 1.8       |
| 145 | 313.20 | 12.3                        | 1.1      | 21.4     | 20.8     | 25.3     | 45.3     | 31.6     | 51.5     | 48.2     | 50.8     | 24.1     | 22.3     | 40.4     | 38.9     | 26.3     | 29.7     | 21.2     | 20.4     | 4.3       | 1.1       |
| 146 | 315.00 | 12.5                        | 1.2      | 21.8     | 21.2     | 25.9     | 45.8     | 32.2     | 52.1     | 49.4     | 51.7     | 25.3     | 23.3     | 41.4     | 39.8     | 27.1     | 30.3     | 21.8     | 20.9     | 4.5       | 1.2       |
| 147 | 316.80 | 12.2                        | 1.0      | 9.0      | 8.5      | 4.2      | 24.3     | 4.7      | 24.8     | 13.8     | 16.5     | 13.9     | 12.2     | 12.3     | 11.0     | 5.7      | 9.1      | 7.3      | 6.5      | 4.2       | 1.0       |
| 148 | 318.60 | 12.2                        | 0.9      | 8.9      | 8.3      | 4.0      | 24.2     | 4.5      | 24.6     | 13.5     | 16.2     | 13.5     | 12.0     | 12.0     | 10.8     | 5.4      | 9.0      | 7.1      | 6.4      | 4.2       | 0.9       |
| 149 | 320.40 | 12.2                        | 0.9      | 8.9      | 8.3      | 4.0      | 24.1     | 4.5      | 24.5     | 13.4     | 16.1     | 13.4     | 11.9     | 11.9     | 10.7     | 5.4      | 8.9      | 7.1      | 6.3      | 4.2       | 0.9       |
| 150 | 322.20 | 12.2                        | 0.9      | 8.9      | 8.3      | 4.0      | 24.2     | 4.5      | 24.6     | 13.4     | 16.2     | 13.5     | 11.9     | 12.0     | 10.7     | 5.4      | 8.9      | 7.1      | 6.3      | 4.2       | 0.9       |
| 151 | 324.00 | 12.2                        | 1.0      | 9.0      | 8.4      | 4.1      | 24.3     | 4.7      | 24.7     | 13.7     | 16.4     | 13.7     | 12.2     | 12.3     | 10.9     | 5.6      | 9.1      | 7.2      | 6.5      | 4.2       | 1.0       |
| 152 | 325.80 | 12.2                        | 1.0      | 9.0      | 8.5      | 4.2      | 24.3     | 4.7      | 24.8     | 13.8     | 16.5     | 13.9     | 12.2     | 12.3     | 11.0     | 5.7      | 9.1      | 7.3      | 6.5      | 4.2       | 1.0       |
| 153 | 327.60 | 11.9                        | 0.7      | 8.2      | 7.8      | 3.1      | 23.4     | 3.5      | 23.7     | 11.5     | 14.6     | 11.5     | 10.3     | 10.4     | 9.4      | 4.2      | 7.9      | 6.1      | 5.6      | 3.9       | 0.7       |
| 154 | 329.40 | 12.0                        | 0.9      | 8.6      | 8.2      | 3.7      | 23.9     | 4.2      | 24.3     | 12.8     | 15.7     | 12.8     | 11.4     | 11.5     | 10.3     | 5.0      | 8.6      | 6.7      | 6.1      | 4.0       | 0.9       |
| 155 | 331.20 | 12.4                        | 1.2      | 9.6      | 8.9      | 5.0      | 25.0     | 5.6      | 25.4     | 15.4     | 17.7     | 15.5     | 13.6     | 13.6     | 12.1     | 6.7      | 10.0     | 8.1      | 7.1      | 4.4       | 1.2       |
| 156 | 333.00 | 12.8                        | 1.4      | 10.4     | 9.6      | 6.1      | 25.9     | 6.9      | 26.5     | 17.7     | 19.7     | 15.6     | 13.6     | 13.6     | 12.1     | 6.7      | 10.0     | 8.1      | 7.1      | 4.4       | 1.2       |
| 157 | 334.80 | 13.1                        | 1.8      | 23.5     | 22.5     | 28.2     | 47.7     | 34.9     | 54.2     | 54.2     | 55.6     | 30.3     | 27.4     | 45.5     | 43.1     | 30.2     | 32.9     | 24.2     | 22.8     | 5.1       | 1.8       |
| 158 | 336.60 | 13.5                        | 2.1      | 24.5     | 23.3     | 29.6     | 48.9     | 36.4     | 55.5     | 57.0     | 57.9     | 33.2     | 29.8     | 47.9     | 45.1     | 32.1     | 34.4     | 25.6     | 24.0     | 5.5       | 2.1       |
| 159 | 338.40 | 14.0                        | 2.4      | 25.5     | 24.2     | 31.0     | 50.1     | 38.1     | 56.8     | 60.0     | 60.3     | 36.3     | 32.3     | 50.5     | 47.2     | 34.1     | 36.1     | 27.1     | 25.2     | 6.0       | 2.4       |



|     |        | Armadura de Rasante (cm2/m) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |
|-----|--------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| SEC | X      | 1<br>inf                    | 1<br>sup | 2<br>inf | 2<br>sup | 3<br>inf | 3<br>sup | 4<br>inf | 4<br>sup | 5<br>int | 5<br>ext | 6<br>int | 6<br>ext | 7<br>int | 7<br>ext | 8<br>inf | 8<br>sup | 9<br>inf | 9<br>sup | 10<br>inf | 10<br>sup |
| 160 | 340.20 | 14.4                        | 2.8      | 26.6     | 25.1     | 32.6     | 51.3     | 39.8     | 58.2     | 63.0     | 62.9     | 39.5     | 34.9     | 53.1     | 49.4     | 36.1     | 37.7     | 28.6     | 26.5     | 6.4       | 2.8       |
| 161 | 342.00 | 14.9                        | 3.2      | 27.9     | 26.1     | 34.3     | 52.8     | 41.8     | 59.9     | 66.7     | 65.8     | 43.3     | 38.0     | 56.3     | 51.9     | 38.5     | 39.7     | 30.5     | 27.9     | 6.9       | 3.2       |



# ARMADURA TRANSVERSAL EN TABLERO

Luz vano 1= 36.0 m  
 Luz vano 2= 45.0 m  
 Luz vano 3= 45.0 m  
 Luz vano 4= 45.0 m  
 Luz vano 5= 45.0 m  
 Luz vano 6= 45.0 m  
 Luz vano 7= 45.0 m  
 Luz vano 8= 36.0 m

Alpha=35°

| SEC | X<br>m | Flexión transv.       | Pretensado         | Rasante               | Cortante       | Torsión        |                | Voladizo           |                    |
|-----|--------|-----------------------|--------------------|-----------------------|----------------|----------------|----------------|--------------------|--------------------|
|     |        | Asup, flex<br>(cm2/m) | Ar,pret<br>(cm2/m) | Ar, volad.<br>(cm2/m) | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | As, sup<br>(cm2/m) | As, inf<br>(cm2/m) |
| 1   | 0.0    | 21.3                  | 52.9               | 28.7                  | 78.3           | 10.7           | 5.2            | 53.9               | 49.0               |
| 2   | 1.8    | 21.3                  | 52.9               | 24.8                  | 66.2           | 9.9            | 4.9            | 52.4               | 46.6               |
| 3   | 3.6    | 21.3                  | 52.9               | 21.7                  | 56.6           | 9.0            | 4.4            | 51.1               | 44.8               |
| 4   | 5.4    | 21.3                  | 52.9               | 18.7                  | 47.3           | 8.2            | 4.0            | 49.9               | 43.0               |
| 5   | 7.2    | 21.3                  | 52.9               | 15.8                  | 38.3           | 7.4            | 3.6            | 48.8               | 41.2               |
| 6   | 9.0    | 21.3                  | 0.0                | 13.0                  | 29.9           | 6.7            | 3.3            | 26.5               | 7.8                |
| 7   | 10.8   | 21.3                  | 0.0                | 10.5                  | 21.9           | 6.1            | 3.0            | 25.5               | 6.3                |
| 8   | 12.6   | 21.3                  | 0.0                | 7.8                   | 16.3           | 5.5            | 2.7            | 24.4               | 4.7                |
| 9   | 14.4   | 21.3                  | 0.0                | 6.3                   | 16.3           | 4.9            | 2.4            | 23.8               | 3.8                |
| 10  | 16.2   | 21.3                  | 0.0                | 8.7                   | 16.5           | 4.5            | 2.2            | 24.8               | 5.2                |
| 11  | 18.0   | 21.3                  | 0.0                | 9.5                   | 19.1           | 4.0            | 2.0            | 25.1               | 5.7                |
| 12  | 19.8   | 21.3                  | 0.0                | 10.6                  | 22.0           | 4.1            | 2.0            | 25.5               | 6.4                |
| 13  | 21.6   | 21.3                  | 0.0                | 11.6                  | 25.1           | 4.5            | 2.2            | 25.9               | 7.0                |
| 14  | 23.4   | 21.3                  | 0.0                | 12.6                  | 28.2           | 5.1            | 2.5            | 26.3               | 7.6                |
| 15  | 25.2   | 21.3                  | 0.0                | 13.7                  | 31.4           | 5.8            | 2.8            | 26.8               | 8.2                |
| 16  | 27.0   | 21.3                  | 0.0                | 14.8                  | 34.2           | 6.3            | 3.1            | 27.2               | 8.9                |
| 17  | 28.8   | 21.3                  | 0.0                | 15.8                  | 37.4           | 7.1            | 3.5            | 27.6               | 9.5                |
| 18  | 30.6   | 21.3                  | 0.0                | 16.9                  | 40.8           | 8.0            | 3.9            | 28.1               | 10.1               |
| 19  | 32.4   | 21.3                  | 0.0                | 21.4                  | 54.9           | 9.3            | 4.5            | 29.9               | 12.8               |
| 20  | 34.2   | 21.3                  | 0.0                | 36.3                  | 100.0          | 10.3           | 5.0            | 35.8               | 21.8               |
| 21  | 36.0   | 21.3                  | 0.0                | 52.6                  | 149.6          | 11.5           | 5.6            | 42.3               | 31.6               |
| 22  | 38.3   | 21.3                  | 52.9               | 38.5                  | 106.9          | 12.6           | 6.2            | 57.9               | 54.8               |
| 23  | 40.5   | 21.3                  | 52.9               | 24.3                  | 63.3           | 11.0           | 5.4            | 52.2               | 46.3               |
| 24  | 42.8   | 21.3                  | 52.9               | 22.1                  | 56.6           | 10.0           | 4.9            | 51.3               | 45.0               |
| 25  | 45.0   | 21.3                  | 52.9               | 19.2                  | 47.9           | 9.0            | 4.4            | 50.1               | 43.3               |
| 26  | 47.3   | 21.3                  | 0.0                | 16.4                  | 39.2           | 8.2            | 4.0            | 27.9               | 9.8                |
| 27  | 49.5   | 21.3                  | 0.0                | 14.4                  | 33.0           | 7.4            | 3.6            | 27.1               | 8.6                |
| 28  | 51.8   | 21.3                  | 0.0                | 12.5                  | 27.2           | 6.7            | 3.3            | 26.3               | 7.5                |
| 29  | 54.0   | 21.3                  | 0.0                | 10.6                  | 21.4           | 5.9            | 2.9            | 25.5               | 6.4                |
| 30  | 56.3   | 21.3                  | 0.0                | 8.8                   | 16.3           | 5.3            | 2.6            | 24.8               | 5.3                |
| 31  | 58.5   | 21.3                  | 0.0                | 7.8                   | 16.3           | 4.8            | 2.4            | 24.4               | 4.7                |
| 32  | 60.8   | 21.3                  | 0.0                | 9.3                   | 17.1           | 5.1            | 2.5            | 25.0               | 5.6                |
| 33  | 63.0   | 21.3                  | 0.0                | 10.9                  | 21.9           | 5.6            | 2.8            | 25.7               | 6.5                |
| 34  | 65.3   | 21.3                  | 0.0                | 12.6                  | 27.2           | 6.4            | 3.1            | 26.3               | 7.6                |
| 35  | 67.5   | 21.3                  | 0.0                | 14.2                  | 32.1           | 7.1            | 3.5            | 27.0               | 8.5                |
| 36  | 69.8   | 21.3                  | 0.0                | 16.0                  | 37.0           | 8.0            | 3.9            | 27.7               | 9.6                |
| 37  | 72.0   | 21.3                  | 0.0                | 17.7                  | 42.4           | 8.9            | 4.4            | 28.4               | 10.6               |
| 38  | 74.3   | 21.3                  | 0.0                | 19.6                  | 47.8           | 9.9            | 4.9            | 29.1               | 11.8               |
| 39  | 76.5   | 21.3                  | 0.0                | 21.7                  | 55.1           | 11.5           | 5.6            | 30.0               | 13.0               |
| 40  | 78.8   | 21.3                  | 0.0                | 36.7                  | 100.4          | 12.7           | 6.2            | 36.0               | 22.0               |
| 41  | 81.0   | 21.3                  | 0.0                | 53.6                  | 151.7          | 11.5           | 5.6            | 42.7               | 32.2               |

| SEC | X<br>m | Flexión transv.       | Pretensado         | Rasante               | Cortante       | Torsión        |                | Voladizo           |                    |
|-----|--------|-----------------------|--------------------|-----------------------|----------------|----------------|----------------|--------------------|--------------------|
|     |        | Asup, flex<br>(cm2/m) | Ar,pret<br>(cm2/m) | Ar, volad.<br>(cm2/m) | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | As, sup<br>(cm2/m) | As, inf<br>(cm2/m) |
| 42  | 83.3   | 21.3                  | 52.9               | 38.2                  | 105.1          | 12.6           | 6.2            | 57.7               | 54.7               |
| 43  | 85.5   | 21.3                  | 52.9               | 23.2                  | 58.8           | 11.0           | 5.4            | 51.7               | 45.7               |
| 44  | 87.8   | 21.3                  | 52.9               | 21.3                  | 53.1           | 10.0           | 4.9            | 51.0               | 44.5               |
| 45  | 90.0   | 21.3                  | 52.9               | 18.7                  | 45.3           | 9.0            | 4.4            | 49.9               | 43.0               |
| 46  | 92.3   | 21.3                  | 0.0                | 17.4                  | 42.4           | 8.2            | 4.0            | 28.3               | 10.4               |
| 47  | 94.5   | 21.3                  | 0.0                | 15.4                  | 36.2           | 7.4            | 3.6            | 27.5               | 9.2                |
| 48  | 96.8   | 21.3                  | 0.0                | 13.5                  | 30.4           | 6.7            | 3.3            | 26.7               | 8.1                |
| 49  | 99.0   | 21.3                  | 0.0                | 11.6                  | 24.5           | 6.0            | 2.9            | 25.9               | 7.0                |
| 50  | 101.3  | 21.3                  | 0.0                | 9.8                   | 19.2           | 5.4            | 2.6            | 25.2               | 5.9                |
| 51  | 103.5  | 21.3                  | 0.0                | 8.3                   | 16.3           | 4.9            | 2.4            | 24.6               | 5.0                |
| 52  | 105.8  | 21.3                  | 0.0                | 9.4                   | 17.6           | 5.2            | 2.5            | 25.1               | 5.6                |
| 53  | 108.0  | 21.3                  | 0.0                | 11.0                  | 22.5           | 5.8            | 2.8            | 25.7               | 6.6                |
| 54  | 110.3  | 21.3                  | 0.0                | 12.8                  | 27.7           | 6.5            | 3.2            | 26.4               | 7.7                |
| 55  | 112.5  | 21.3                  | 0.0                | 14.4                  | 32.7           | 7.3            | 3.6            | 27.1               | 8.6                |
| 56  | 114.8  | 21.3                  | 0.0                | 16.1                  | 37.6           | 8.1            | 4.0            | 27.7               | 9.7                |
| 57  | 117.0  | 21.3                  | 0.0                | 17.9                  | 42.9           | 9.0            | 4.4            | 28.5               | 10.7               |
| 58  | 119.3  | 21.3                  | 0.0                | 19.7                  | 48.4           | 10.1           | 4.9            | 29.2               | 11.8               |
| 59  | 121.5  | 21.3                  | 0.0                | 21.9                  | 55.7           | 11.6           | 5.7            | 30.1               | 13.1               |
| 60  | 123.8  | 21.3                  | 0.0                | 36.9                  | 101.0          | 12.8           | 6.3            | 36.1               | 22.1               |
| 61  | 126.0  | 21.3                  | 0.0                | 53.7                  | 151.8          | 11.5           | 5.6            | 42.8               | 32.2               |
| 62  | 128.3  | 21.3                  | 52.9               | 38.2                  | 105.2          | 12.59          | 6.17           | 57.7               | 54.7               |
| 63  | 130.5  | 21.3                  | 52.9               | 23.2                  | 58.9           | 11             | 5.39           | 51.7               | 45.7               |
| 64  | 132.8  | 21.3                  | 52.9               | 21.3                  | 53.1           | 10.03          | 4.92           | 51.0               | 44.5               |
| 65  | 135.0  | 21.3                  | 52.9               | 18.8                  | 45.4           | 9.03           | 4.43           | 50.0               | 43.0               |
| 66  | 137.3  | 21.3                  | 0.0                | 17.4                  | 42.4           | 8.17           | 4.01           | 28.3               | 10.4               |
| 67  | 139.5  | 21.3                  | 0.0                | 15.4                  | 36.2           | 7.4            | 3.63           | 27.5               | 9.2                |
| 68  | 141.8  | 21.3                  | 0.0                | 13.5                  | 30.4           | 6.68           | 3.28           | 26.7               | 8.1                |
| 69  | 144.0  | 21.3                  | 0.0                | 11.6                  | 24.6           | 5.95           | 2.92           | 25.9               | 7.0                |
| 70  | 146.3  | 21.3                  | 0.0                | 9.8                   | 19.2           | 5.35           | 2.62           | 25.2               | 5.9                |
| 71  | 148.5  | 21.3                  | 0.0                | 8.3                   | 16.3           | 4.86           | 2.38           | 24.6               | 5.0                |
| 72  | 150.8  | 21.3                  | 0.0                | 9.7                   | 18.6           | 5.17           | 2.53           | 25.2               | 5.8                |
| 73  | 153.0  | 21.3                  | 0.0                | 11.3                  | 23.4           | 5.76           | 2.83           | 25.8               | 6.8                |
| 74  | 155.3  | 21.3                  | 0.0                | 13.0                  | 28.6           | 6.51           | 3.19           | 26.5               | 7.8                |
| 75  | 157.5  | 21.3                  | 0.0                | 14.8                  | 33.6           | 7.26           | 3.56           | 27.2               | 8.9                |
| 76  | 159.8  | 21.3                  | 0.0                | 16.4                  | 38.5           | 8.08           | 3.96           | 27.9               | 9.8                |
| 77  | 162.0  | 21.3                  | 0.0                | 18.2                  | 43.9           | 9              | 4.41           | 28.6               | 10.9               |
| 78  | 164.3  | 21.3                  | 0.0                | 20.0                  | 49.3           | 10.06          | 4.93           | 29.3               | 12.0               |
| 79  | 166.5  | 21.3                  | 0.0                | 22.2                  | 56.6           | 11.6           | 5.69           | 30.2               | 13.3               |
| 80  | 168.8  | 21.3                  | 0.0                | 37.1                  | 101.9          | 12.78          | 6.26           | 36.1               | 22.3               |
| 81  | 171.0  | 21.3                  | 0.0                | 53.7                  | 152.0          | 11.52          | 5.65           | 42.8               | 32.2               |
| 82  | 173.3  | 21.3                  | 52.9               | 38.4                  | 105.5          | 12.56          | 6.16           | 57.8               | 54.8               |
| 83  | 175.5  | 21.3                  | 52.9               | 23.3                  | 59.1           | 10.98          | 5.38           | 51.8               | 45.7               |
| 84  | 177.8  | 21.3                  | 52.9               | 21.4                  | 53.4           | 10.01          | 4.91           | 51.0               | 44.6               |
| 85  | 180.0  | 21.3                  | 52.9               | 18.8                  | 45.6           | 9.01           | 4.42           | 50.0               | 43.0               |
| 86  | 182.3  | 21.3                  | 0.0                | 17.6                  | 42.7           | 8.19           | 4.01           | 28.3               | 10.6               |
| 87  | 184.5  | 21.3                  | 0.0                | 15.5                  | 36.5           | 7.4            | 3.63           | 27.5               | 9.3                |
| 88  | 186.8  | 21.3                  | 0.0                | 13.6                  | 30.7           | 6.69           | 3.28           | 26.7               | 8.2                |
| 89  | 189.0  | 21.3                  | 0.0                | 11.7                  | 24.8           | 5.97           | 2.93           | 26.0               | 7.0                |
| 90  | 191.3  | 21.3                  | 0.0                | 9.9                   | 19.5           | 5.37           | 2.63           | 25.3               | 5.9                |
| 91  | 193.5  | 21.3                  | 0.0                | 8.4                   | 16.3           | 4.87           | 2.39           | 24.7               | 5.0                |
| 92  | 195.8  | 21.3                  | 0.0                | 9.6                   | 18.3           | 5.16           | 2.53           | 25.1               | 5.8                |
| 93  | 198.0  | 21.3                  | 0.0                | 11.3                  | 23.1           | 5.75           | 2.82           | 25.8               | 6.8                |
| 94  | 200.3  | 21.3                  | 0.0                | 13.0                  | 28.4           | 6.51           | 3.19           | 26.5               | 7.8                |
| 95  | 202.5  | 21.3                  | 0.0                | 14.6                  | 33.3           | 7.25           | 3.55           | 27.1               | 8.8                |
| 96  | 204.8  | 21.3                  | 0.0                | 16.4                  | 38.3           | 8.07           | 3.96           | 27.9               | 9.8                |
| 97  | 207.0  | 21.3                  | 0.0                | 18.1                  | 43.6           | 8.99           | 4.41           | 28.5               | 10.9               |

| SEC | X<br>m | Flexión transv.       | Pretensado         | Rasante               | Cortante       | Torsión        |                | Voladizo           |                    |
|-----|--------|-----------------------|--------------------|-----------------------|----------------|----------------|----------------|--------------------|--------------------|
|     |        | Asup, flex<br>(cm2/m) | Ar,pret<br>(cm2/m) | Ar, volad.<br>(cm2/m) | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | As, sup<br>(cm2/m) | As, inf<br>(cm2/m) |
| 98  | 209.3  | 21.3                  | 0.0                | 20.0                  | 49.1           | 10.05          | 4.93           | 29.3               | 12.0               |
| 99  | 211.5  | 21.3                  | 0.0                | 22.2                  | 56.4           | 11.6           | 5.69           | 30.2               | 13.3               |
| 100 | 213.8  | 21.3                  | 0.0                | 36.7                  | 100.4          | 12.77          | 6.26           | 36.0               | 22.0               |
| 101 | 216.0  | 21.3                  | 0.0                | 52.5                  | 148.4          | 11.5           | 5.64           | 42.3               | 31.5               |
| 102 | 218.3  | 21.3                  | 52.9               | 37.5                  | 103.1          | 12.58          | 6.17           | 57.5               | 54.2               |
| 103 | 220.5  | 21.3                  | 52.9               | 22.9                  | 58.0           | 10.99          | 5.39           | 51.6               | 45.5               |
| 104 | 222.8  | 21.3                  | 52.9               | 21.1                  | 52.3           | 10.02          | 4.91           | 50.9               | 44.4               |
| 105 | 225.0  | 21.3                  | 52.9               | 18.4                  | 44.5           | 9.02           | 4.42           | 49.8               | 42.8               |
| 106 | 227.3  | 21.3                  | 0.0                | 17.2                  | 41.6           | 8.18           | 4.01           | 28.2               | 10.3               |
| 107 | 229.5  | 21.3                  | 0.0                | 15.2                  | 35.4           | 7.41           | 3.63           | 27.4               | 9.1                |
| 108 | 231.8  | 21.3                  | 0.0                | 13.3                  | 29.6           | 6.69           | 3.28           | 26.6               | 8.0                |
| 109 | 234.0  | 21.3                  | 0.0                | 11.3                  | 23.7           | 5.95           | 2.92           | 25.8               | 6.8                |
| 110 | 236.3  | 21.3                  | 0.0                | 9.5                   | 18.4           | 5.36           | 2.63           | 25.1               | 5.7                |
| 111 | 238.5  | 21.3                  | 0.0                | 8.2                   | 16.3           | 4.86           | 2.38           | 24.6               | 4.9                |
| 112 | 240.8  | 21.3                  | 0.0                | 9.7                   | 18.4           | 5.16           | 2.53           | 25.2               | 5.8                |
| 113 | 243.0  | 21.3                  | 0.0                | 11.3                  | 23.3           | 5.75           | 2.82           | 25.8               | 6.8                |
| 114 | 245.3  | 21.3                  | 0.0                | 13.0                  | 28.5           | 6.51           | 3.19           | 26.5               | 7.8                |
| 115 | 247.5  | 21.3                  | 0.0                | 14.6                  | 33.5           | 7.25           | 3.55           | 27.1               | 8.8                |
| 116 | 249.8  | 21.3                  | 0.0                | 16.4                  | 38.4           | 8.07           | 3.96           | 27.9               | 9.8                |
| 117 | 252.0  | 21.3                  | 0.0                | 18.1                  | 43.7           | 8.99           | 4.41           | 28.5               | 10.9               |
| 118 | 254.3  | 21.3                  | 0.0                | 20.0                  | 49.2           | 10.05          | 4.93           | 29.3               | 12.0               |
| 119 | 256.5  | 21.3                  | 0.0                | 22.2                  | 56.5           | 11.6           | 5.69           | 30.2               | 13.3               |
| 120 | 258.8  | 21.3                  | 0.0                | 51.1                  | 144.1          | 12.77          | 6.26           | 41.7               | 30.7               |
| 121 | 261.0  | 21.3                  | 0.0                | 53.5                  | 151.2          | 11.46          | 5.62           | 42.7               | 32.1               |
| 122 | 263.3  | 21.3                  | 52.9               | 38.1                  | 104.5          | 12.47          | 6.11           | 57.7               | 54.6               |
| 123 | 265.5  | 21.3                  | 52.9               | 23.0                  | 58.2           | 10.89          | 5.34           | 51.7               | 45.5               |
| 124 | 267.8  | 21.3                  | 52.9               | 21.1                  | 52.5           | 9.92           | 4.86           | 50.9               | 44.4               |
| 125 | 270.0  | 21.3                  | 52.9               | 18.5                  | 44.7           | 8.92           | 4.37           | 49.9               | 42.8               |
| 126 | 272.3  | 21.3                  | 0.0                | 17.2                  | 41.8           | 8.08           | 3.96           | 28.2               | 10.3               |
| 127 | 274.5  | 21.3                  | 0.0                | 15.2                  | 35.6           | 7.3            | 3.58           | 27.4               | 9.1                |
| 128 | 276.8  | 21.3                  | 0.0                | 13.3                  | 29.8           | 6.59           | 3.23           | 26.6               | 8.0                |
| 129 | 279.0  | 21.3                  | 0.0                | 11.4                  | 23.9           | 5.86           | 2.87           | 25.9               | 6.8                |
| 130 | 281.3  | 21.3                  | 0.0                | 9.7                   | 18.6           | 5.26           | 2.58           | 25.2               | 5.8                |
| 131 | 283.5  | 21.3                  | 0.0                | 8.2                   | 16.3           | 4.78           | 2.34           | 24.6               | 4.9                |
| 132 | 285.8  | 21.3                  | 0.0                | 8.3                   | 16.3           | 5.13           | 2.51           | 24.6               | 5.0                |
| 133 | 288.0  | 21.3                  | 0.0                | 9.9                   | 19.3           | 5.72           | 2.8            | 25.3               | 5.9                |
| 134 | 290.3  | 21.3                  | 0.0                | 11.8                  | 24.6           | 6.47           | 3.17           | 26.0               | 7.1                |
| 135 | 292.5  | 21.3                  | 0.0                | 13.4                  | 29.5           | 7.21           | 3.54           | 26.7               | 8.0                |
| 136 | 294.8  | 21.3                  | 0.0                | 15.0                  | 34.5           | 8.03           | 3.94           | 27.3               | 9.0                |
| 137 | 297.0  | 21.3                  | 0.0                | 16.9                  | 39.8           | 8.95           | 4.39           | 28.1               | 10.1               |
| 138 | 299.3  | 21.3                  | 0.0                | 18.8                  | 45.4           | 10.01          | 4.91           | 28.8               | 11.3               |
| 139 | 301.5  | 21.3                  | 0.0                | 20.9                  | 52.8           | 11.55          | 5.66           | 29.7               | 12.5               |
| 140 | 303.8  | 21.3                  | 0.0                | 49.9                  | 140.5          | 12.72          | 6.24           | 41.3               | 29.9               |
| 141 | 306.0  | 21.3                  | 52.9               | 49.0                  | 137.6          | 10.53          | 5.16           | 62.1               | 61.1               |
| 142 | 307.8  | 21.3                  | 52.9               | 48.5                  | 136.6          | 10.21          | 5.01           | 61.9               | 60.8               |
| 143 | 309.6  | 21.3                  | 52.9               | 32.2                  | 86.8           | 8.86           | 4.34           | 55.3               | 51.1               |
| 144 | 311.4  | 21.3                  | 52.9               | 15.6                  | 35.8           | 7.98           | 3.91           | 48.7               | 41.1               |
| 145 | 313.2  | 21.3                  | 52.9               | 9.3                   | 16.6           | 7.1            | 3.48           | 46.2               | 37.3               |
| 146 | 315.0  | 21.3                  | 0.0                | 10.5                  | 21.2           | 6.46           | 3.17           | 25.5               | 6.3                |
| 147 | 316.8  | 21.3                  | 0.0                | 8.6                   | 16.3           | 5.68           | 2.79           | 24.7               | 5.2                |
| 148 | 318.6  | 21.3                  | 0.0                | 8.2                   | 16.3           | 4.96           | 2.43           | 24.6               | 4.9                |
| 149 | 320.4  | 21.3                  | 0.0                | 8.1                   | 16.3           | 4.45           | 2.18           | 24.5               | 4.9                |
| 150 | 322.2  | 21.3                  | 0.0                | 8.2                   | 16.3           | 3.99           | 1.96           | 24.6               | 4.9                |
| 151 | 324.0  | 21.3                  | 0.0                | 8.5                   | 16.3           | 3.85           | 1.89           | 24.7               | 5.1                |
| 152 | 325.8  | 21.3                  | 0.0                | 8.6                   | 16.3           | 4.27           | 2.1            | 24.7               | 5.2                |
| 153 | 327.6  | 21.3                  | 0.0                | 6.3                   | 16.3           | 4.77           | 2.34           | 23.8               | 3.8                |

| SEC | X<br>m | Flexión transv.       | Pretensado         | Rasante               | Cortante       | Torsión        |                | Voladizo           |                    |
|-----|--------|-----------------------|--------------------|-----------------------|----------------|----------------|----------------|--------------------|--------------------|
|     |        | Asup, flex<br>(cm2/m) | Ar,pret<br>(cm2/m) | Ar, volad.<br>(cm2/m) | Asc<br>(cm2/m) | Asl<br>(cm2/m) | Ast<br>(cm2/m) | As, sup<br>(cm2/m) | As, inf<br>(cm2/m) |
| 154 | 329.4  | 21.3                  | 0.0                | 7.6                   | 16.3           | 5.33           | 2.61           | 24.3               | 4.6                |
| 155 | 331.2  | 21.3                  | 0.0                | 10.1                  | 19.6           | 5.95           | 2.92           | 25.3               | 6.1                |
| 156 | 333.0  | 21.3                  | 0.0                | 12.5                  | 27.1           | 6.52           | 3.2            | 26.3               | 7.5                |
| 157 | 334.8  | 21.3                  | 52.9               | 15.3                  | 35.4           | 7.27           | 3.56           | 48.6               | 40.9               |
| 158 | 336.6  | 21.3                  | 52.9               | 18.1                  | 44.2           | 8.09           | 3.97           | 49.7               | 42.6               |
| 159 | 338.4  | 21.3                  | 52.9               | 21.1                  | 53.2           | 8.98           | 4.4            | 50.9               | 44.4               |
| 160 | 340.2  | 21.3                  | 52.9               | 24.2                  | 62.7           | 9.93           | 4.87           | 52.1               | 46.3               |
| 161 | 342.0  | 21.3                  | 52.9               | 27.9                  | 74.0           | 8.94           | 4.39           | 53.6               | 48.5               |

## 8 APARATOS DE APOYO Y JUNTAS

## 8.1 REACCIONES VERTICALES



Referencia del Proyecto: Viaducto sobre rio Anoia

APOYO N = 162

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 167.90508 | 0.00000 |
| G2                         | 0.00000 | 120.52719 | 0.00000 |
| Pii                        | 0.00000 | 46.39803  | 0.00000 |
| Pi                         | 0.00000 | 71.63473  | 0.00000 |
| Pd                         | 0.00000 | 59.69722  | 0.00000 |
| TEMP                       | 0.00000 | 11.58715  | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 12.67546  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -2.56901  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 16.26505  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -0.71563  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 16.20549  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -5.62776  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 30.66117  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -21.00981 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 29.60339  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -19.39840 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 26.85283  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -19.77769 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 24.44231  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -18.57270 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 38.44846  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -21.75843 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 3.21522   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | 0.26178   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 67.29771  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -3.87851  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 162.81918 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -8.91695  | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 150.77142 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -8.91695  | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 146.40706 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -12.02411 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 148.78516 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -11.52763 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 188.45068 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -11.70296 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 17.03574  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | 0.98221   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

|                             |         |
|-----------------------------|---------|
| Reaccion permanente (ELS) = | 348.129 |
| Reaccion maxima (ELS) =     | 554.786 |
| Reaccion minima (ELS) =     | 318.012 |
| Reaccion minima (ELU) =     | 291.573 |

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00076 | 0.00000 | 0.00067  |
| G2                         | -0.00055 | 0.00000 | 0.00050  |
| Pii                        | 0.00159  | 0.00000 | -0.00228 |
| Pi                         | 0.00247  | 0.00000 | -0.00355 |
| Pd                         | 0.00203  | 0.00000 | -0.00292 |
| TEMP                       | 0.00020  | 0.00000 | -0.00019 |
| SC peatonal(100%) Max      | 0.00003  | 0.00000 | 0.00008  |
| SC peatonal(100%) Min      | -0.00008 | 0.00000 | -0.00004 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00004  |
| SC peatonal(50%) Min       | -0.00005 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 1 (Max)  | 0.00006  | 0.00000 | 0.00019  |
| IPF-75 TREN A via 1 (Min)  | -0.00017 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 1 (Max) | 0.00001  | 0.00000 | 0.00013  |
| IPF-75 TREN B1 via 1 (Min) | -0.00012 | 0.00000 | -0.00001 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000  | 0.00000 | 0.00010  |
| IPF-75 TREN B2 via 1 (Min) | -0.00009 | 0.00000 | 0.00000  |
| EC-1 TREN LM71 via 1 (Max) | 0.00003  | 0.00000 | 0.00010  |
| EC-1 TREN LM71 via 1 (Min) | -0.00009 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00019  | 0.00000 | 0.00048  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00044 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00021  | 0.00000 | 0.00064  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00058 | 0.00000 | -0.00024 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000  | 0.00000 | 0.00006  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00005 | 0.00000 | 0.00000  |
| IPF-75 TREN A via 2 (Max)  | 0.00006  | 0.00000 | 0.00019  |
| IPF-75 TREN A via 2 (Min)  | -0.00019 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000  | 0.00000 | 0.00014  |
| IPF-75 TREN B1 via 2 (Min) | -0.00014 | 0.00000 | -0.00002 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000  | 0.00000 | 0.00010  |
| IPF-75 TREN B2 via 2 (Min) | -0.00010 | 0.00000 | 0.00000  |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00010  |
| EC-1 TREN LM71 via 2 (Min) | -0.00010 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00019  | 0.00000 | 0.00048  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00052 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00020  | 0.00000 | 0.00065  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00067 | 0.00000 | -0.00025 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000  | 0.00000 | 0.00006  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00006 | 0.00000 | 0.00000  |

## COMBINACION DE GIROS DE FLEXION

|                              |           |
|------------------------------|-----------|
| Acciones permanentes (ELS) = | -0.001748 |
| Giro maximo (ELS) =          | -0.000458 |
| Giro minimo (ELS) =          | -0.002428 |

APOYO N = 163

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 182.62532 | 0.00000 |
| G2                         | 0.00000 | 100.00771 | 0.00000 |
| Pii                        | 0.00000 | 39.02286  | 0.00000 |
| Pi                         | 0.00000 | 60.13924  | 0.00000 |
| Pd                         | 0.00000 | 50.36201  | 0.00000 |
| TEMP                       | 0.00000 | 10.77198  | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 13.91345  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -2.89920  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.37595   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -5.44271  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 68.82579  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.53090  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 167.82652 | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -10.85810 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 155.39003 | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -10.85810 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 151.74657 | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -14.08807 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 154.00397 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -13.55520 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 189.97647 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -14.26353 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 17.14812  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | 0.98397   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 17.39995  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -6.31722  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 34.69967  | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -23.34079 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 33.35268  | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -21.53508 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 31.23569  | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -21.81558 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 28.17677  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -20.72701 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 38.95128  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -24.68465 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 3.25562   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | 0.25880   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

|                             |         |
|-----------------------------|---------|
| Reaccion permanente (ELS) = | 332.995 |
| Reaccion maxima (ELS) =     | 566.417 |
| Reaccion minima (ELS) =     | 298.580 |
| Reaccion minima (ELU) =     | 269.724 |

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00060 | 0.00000 | 0.00116  |
| G2                         | -0.00043 | 0.00000 | 0.00080  |
| Pii                        | 0.00235  | 0.00000 | -0.00302 |
| Pi                         | 0.00371  | 0.00000 | -0.00476 |
| Pd                         | 0.00299  | 0.00000 | -0.00383 |
| TEMP                       | 0.00017  | 0.00000 | -0.00032 |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00013  |
| SC peatonal(100%) Min      | -0.00008 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00007  |
| SC peatonal(50%) Min       | -0.00004 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00007  | 0.00000 | 0.00028  |
| IPF-75 TREN A via 1 (Min)  | -0.00017 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 1 (Max) | 0.00002  | 0.00000 | 0.00020  |
| IPF-75 TREN B1 via 1 (Min) | -0.00011 | 0.00000 | -0.00002 |
| IPF-75 TREN B2 via 1 (Max) | 0.00001  | 0.00000 | 0.00015  |
| IPF-75 TREN B2 via 1 (Min) | -0.00009 | 0.00000 | 0.00000  |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00016  |
| EC-1 TREN LM71 via 1 (Min) | -0.00010 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00022  | 0.00000 | 0.00074  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00039 | 0.00000 | -0.00033 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00024  | 0.00000 | 0.00094  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00054 | 0.00000 | -0.00035 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000  | 0.00000 | 0.00009  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00005 | 0.00000 | 0.00000  |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00029  |
| IPF-75 TREN A via 2 (Min)  | -0.00019 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 2 (Max) | 0.00001  | 0.00000 | 0.00021  |
| IPF-75 TREN B1 via 2 (Min) | -0.00013 | 0.00000 | -0.00001 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000  | 0.00000 | 0.00015  |
| IPF-75 TREN B2 via 2 (Min) | -0.00009 | 0.00000 | 0.00000  |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00015  |
| EC-1 TREN LM71 via 2 (Min) | -0.00010 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00022  | 0.00000 | 0.00075  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00046 | 0.00000 | -0.00032 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00024  | 0.00000 | 0.00096  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00061 | 0.00000 | -0.00035 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000  | 0.00000 | 0.00009  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00006 | 0.00000 | 0.00000  |

## COMBINACION DE GIROS DE FLEXION

|                              |           |
|------------------------------|-----------|
| Acciones permanentes (ELS) = | -0.001865 |
| Giro maximo (ELS) =          | 0.000027  |
| Giro minimo (ELS) =          | -0.002894 |



APOYO N = 164

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 602.57904 | 0.00000 |
| G2                         | 0.00000 | 455.97318 | 0.00000 |
| Pii                        | 0.00000 | -62.41280 | 0.00000 |
| Pi                         | 0.00000 | -96.53976 | 0.00000 |
| Pd                         | 0.00000 | -80.07973 | 0.00000 |
| TEMP                       | 0.00000 | -13.89847 | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 40.00475  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -3.44057  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 70.98061  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -0.73657  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.71072   | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -10.86427 | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 5.05831   | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -64.80158 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 5.05831   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -62.49599 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 5.46992   | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -66.66983 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.33263   | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -33.71068 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 5.79359   | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -39.15680 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | -0.06357  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -5.55576  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.52077 | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.78493  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 598.30023 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -13.40046 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 564.98816 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -13.40046 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 501.58575 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -14.57441 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 393.32764 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -13.86687 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 604.91302 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -13.52282 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 67.64886  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | 0.10841   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 978.473  
 Reaccion maxima (ELS) = 1585.287  
 Reaccion minima (ELS) = 886.116  
 Reaccion minima (ELU) = 814.144

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00016 | 0.00000 | -0.00007 |
| G2                         | -0.00009 | 0.00000 | -0.00006 |
| Pii                        | -0.00014 | 0.00000 | 0.00020  |
| Pi                         | -0.00020 | 0.00000 | 0.00029  |
| Pd                         | -0.00016 | 0.00000 | 0.00024  |
| TEMP                       | 0.00000  | 0.00000 | 0.00006  |
| SC peatonal(100%) Max      | 0.00003  | 0.00000 | 0.00004  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00001  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 1 (Max)  | 0.00005  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 1 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 1 (Min) | -0.00004 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 1 (Min) | -0.00004 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00015  | 0.00000 | 0.00024  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00022 | 0.00000 | -0.00022 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00019  | 0.00000 | 0.00027  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00024 | 0.00000 | -0.00028 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00000  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00005  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 2 (Min)  | -0.00008 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 2 (Min) | -0.00005 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00003 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00014  | 0.00000 | 0.00023  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00025 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00017  | 0.00000 | 0.00024  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00027 | 0.00000 | -0.00030 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00000  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00002 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000112  
 Giro maximo (ELS) = 0.000708  
 Giro minimo (ELS) = -0.000457

APOYO N = 165

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 591.73541 | 0.00000 |
| G2                         | 0.00000 | 300.72006 | 0.00000 |
| Pii                        | 0.00000 | -50.59743 | 0.00000 |
| Pi                         | 0.00000 | -78.05596 | 0.00000 |
| Pd                         | 0.00000 | -65.19340 | 0.00000 |
| TEMP                       | 0.00000 | -13.11871 | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 39.42135  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -3.56572  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.44666   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -34.38754 | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.62745 | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -5.10993  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 572.83258 | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -14.47889 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 540.75983 | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -14.47889 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 485.20667 | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -15.54125 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 382.03040 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.84013 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 563.93353 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.21424 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 62.83935  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | 0.07945   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.77384   | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -14.71707 | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 5.08784   | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -88.83180 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 5.08784   | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -86.42056 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 5.67573   | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -83.12732 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.53314   | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -42.39340 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 5.98331   | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -58.89174 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | -0.09530  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -10.40334 | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente. (ELS) = 827.262  
 Reaccion maxima (ELS) = 1406.980  
 Reaccion minima (ELS) = 709.174  
 Reaccion minima (ELU) = 625.154

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00011 | 0.00000 | 0.00013  |
| G2                         | 0.00007  | 0.00000 | 0.00006  |
| Pii                        | -0.00016 | 0.00000 | 0.00019  |
| Pi                         | -0.00024 | 0.00000 | 0.00027  |
| Pd                         | -0.00018 | 0.00000 | 0.00021  |
| TEMP                       | -0.00007 | 0.00000 | 0.00003  |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00006  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00011  |
| IPF-75 TREN A via 1 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00007  |
| IPF-75 TREN B1 via 1 (Min) | -0.00004 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00005  | 0.00000 | 0.00004  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00006  |
| EC-1 TREN LM71 via 1 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00023  | 0.00000 | 0.00034  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00021 | 0.00000 | -0.00021 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00030  | 0.00000 | 0.00039  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00022 | 0.00000 | -0.00029 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00003  | 0.00000 | 0.00002  |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000  | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00010  |
| IPF-75 TREN A via 2 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 2 (Min) | -0.00004 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00020  | 0.00000 | 0.00032  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00023 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00026  | 0.00000 | 0.00035  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00025 | 0.00000 | -0.00030 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000  | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000399  
 Giro maximo (ELS) = 0.001216  
 Giro minimo (ELS) = -0.000191

APOYO N = 166

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 601.09564 | 0.00000 |
| G2                         | 0.00000 | 457.85687 | 0.00000 |
| Pii                        | 0.00000 | 14.51562  | 0.00000 |
| Pi                         | 0.00000 | 22.56646  | 0.00000 |
| Pd                         | 0.00000 | 18.26796  | 0.00000 |
| TEMP                       | 0.00000 | 3.98524   | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 41.90465  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -5.85611  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 76.22511  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -1.13337  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.73264   | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -11.23212 | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 5.15654   | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -95.82082 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 5.15654   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -93.48981 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 5.51751   | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -92.87000 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.40114   | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -36.47142 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 5.86842   | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -39.23759 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | -0.00512  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -9.22831  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.93851 | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.85720  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 634.03271 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -25.34815 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 600.45782 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -24.61732 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 531.50409 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -22.34698 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 399.67850 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.08646 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 623.10168 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -13.75149 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 70.94002  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.19935  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 1077.220  
 Reaccion maxima (ELS) = 1723.867  
 Reaccion minima (ELS) = 955.792  
 Reaccion minima (ELU) = 864.110

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00014 | 0.00000 | -0.00008 |
| G2                         | -0.00008 | 0.00000 | -0.00008 |
| Pii                        | 0.00002  | 0.00000 | -0.00002 |
| Pi                         | 0.00003  | 0.00000 | -0.00005 |
| Pd                         | 0.00002  | 0.00000 | -0.00003 |
| TEMP                       | 0.00003  | 0.00000 | 0.00001  |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00006  |
| SC peatonal(100%) Min      | -0.00005 | 0.00000 | -0.00006 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00003 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00007  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 1 (Min)  | -0.00008 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 1 (Min) | -0.00005 | 0.00000 | -0.00008 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00003 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00023  | 0.00000 | 0.00029  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00026 | 0.00000 | -0.00032 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00025  | 0.00000 | 0.00032  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00029 | 0.00000 | -0.00036 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00006  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 2 (Min)  | -0.00009 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 2 (Max) | 0.00005  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00004 | 0.00000 | -0.00006 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00005 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00020  | 0.00000 | 0.00029  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00029 | 0.00000 | -0.00033 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00023  | 0.00000 | 0.00032  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00033 | 0.00000 | -0.00040 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00002 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000190  
 Giro maximo (ELS) = 0.000455  
 Giro minimo (ELS) = -0.000918

APOYO N = 167

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 600.77783  | 0.00000 |
| G2                         | 0.00000 | 295.09482  | 0.00000 |
| Pii                        | 0.00000 | 8.69641    | 0.00000 |
| Pi                         | 0.00000 | 13.62621   | 0.00000 |
| Pd                         | 0.00000 | 10.74208   | 0.00000 |
| TEMP                       | 0.00000 | 2.00437    | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 41.92450   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -5.89604   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.43268    | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -39.50565  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.97691  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.95113   | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 611.06573  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -26.18902  | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 578.72797  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -25.41545  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 517.55994  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -22.84583  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 389.28018  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.33616  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 584.30640  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -14.66024  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 66.26084   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.28343   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.73068    | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -15.18035  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 5.14342    | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -117.93423 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 5.14342    | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -115.56074 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 5.51333    | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -107.45154 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.39669    | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -46.47356  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 5.83374    | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -64.90978  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | -0.00696   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -14.01641  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 906.615  
 Reaccion maxima (ELS) = 1526.623  
 Reaccion minima (ELS) = 760.815  
 Reaccion minima (ELU) = 657.339

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00016  | 0.00000 | 0.00007  |
| G2                         | 0.00008  | 0.00000 | 0.00006  |
| Pii                        | 0.00001  | 0.00000 | 0.00000  |
| Pi                         | 0.00001  | 0.00000 | -0.00001 |
| Pd                         | 0.00000  | 0.00000 | 0.00000  |
| TEMP                       | -0.00002 | 0.00000 | -0.00003 |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00005  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00007  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 1 (Min)  | -0.00005 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 1 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00024  | 0.00000 | 0.00028  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00016 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00028  | 0.00000 | 0.00031  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00017 | 0.00000 | -0.00026 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 2 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00005  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00022  | 0.00000 | 0.00026  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00018 | 0.00000 | -0.00024 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00025  | 0.00000 | 0.00029  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00020 | 0.00000 | -0.00027 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000124  
 Giro maximo (ELS) = 0.000755  
 Giro minimo (ELS) = -0.000427

APOYO N = 168

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 598.64929  | 0.00000 |
| G2                         | 0.00000 | 457.45267  | 0.00000 |
| Pii                        | 0.00000 | 1.97197    | 0.00000 |
| Pi                         | 0.00000 | 2.96161    | 0.00000 |
| Pd                         | 0.00000 | 2.93330    | 0.00000 |
| TEMP                       | 0.00000 | 0.15918    | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.60648   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.62945   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 76.63417   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -1.33751   | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.72550    | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -11.24418  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 9.72347    | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -100.97095 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 9.40016    | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -98.64647  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 8.53285    | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -97.35789  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.37802    | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -36.23264  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 5.84517    | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -39.30744  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 0.49197    | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -9.43447   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.93848  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.83316   | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 638.34283  | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -29.23767  | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 604.76562  | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -28.12364  | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 535.27863  | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -25.30640  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 399.79285  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.02741  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 623.46057  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -14.26563  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 71.05245   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.14146   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 1059.035  
 Reaccion maxima (ELS) = 1710.733  
 Reaccion minima (ELS) = 928.568  
 Reaccion minima (ELU) = 833.255

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00013 | 0.00000 | -0.00010 |
| G2                         | -0.00009 | 0.00000 | -0.00006 |
| Pii                        | -0.00002 | 0.00000 | 0.00002  |
| Pi                         | -0.00003 | 0.00000 | 0.00004  |
| Pd                         | -0.00003 | 0.00000 | 0.00003  |
| TEMP                       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00005  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00005  | 0.00000 | 0.00007  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 1 (Min) | -0.00004 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00017  | 0.00000 | 0.00022  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00020 | 0.00000 | -0.00024 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00019  | 0.00000 | 0.00024  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00023 | 0.00000 | -0.00028 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00005  | 0.00000 | 0.00007  |
| IPF-75 TREN A via 2 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 2 (Min) | -0.00005 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00003 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00015  | 0.00000 | 0.00021  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00023 | 0.00000 | -0.00027 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00016  | 0.00000 | 0.00022  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00026 | 0.00000 | -0.00032 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00001  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00002 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000131  
 Giro maximo (ELS) = 0.000375  
 Giro minimo (ELS) = -0.000685

APOYO N = 169

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 599.12616  | 0.00000 |
| G2                         | 0.00000 | 294.56116  | 0.00000 |
| Pii                        | 0.00000 | -3.67688   | 0.00000 |
| Pi                         | 0.00000 | -5.72867   | 0.00000 |
| Pd                         | 0.00000 | -4.32585   | 0.00000 |
| TEMP                       | 0.00000 | -1.94339   | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.64861   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.64171   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.71803    | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -40.01784  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.99046  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.94270   | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 615.48163  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -30.05842  | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 583.13647  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -28.91359  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 521.39789  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -25.78770  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 389.48801  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.30885  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 584.80487  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.18933  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 66.38081   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.23223   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.72798    | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -15.17827  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 9.74635    | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -122.75767 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 9.42128    | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -120.38603 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 8.56000    | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -111.64765 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.38736    | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -46.20037  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 5.82563    | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -64.33679  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.49254    | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -14.18602  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 889.361  
 Reaccion maxima (ELS) = 1516.385  
 Reaccion minima (ELS) = 732.925  
 Reaccion minima (ELU) = 625.701

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00012  | 0.00000 | 0.00012  |
| G2                         | 0.00007  | 0.00000 | 0.00006  |
| Pii                        | -0.00002 | 0.00000 | 0.00003  |
| Pi                         | -0.00004 | 0.00000 | 0.00005  |
| Pd                         | -0.00003 | 0.00000 | 0.00003  |
| TEMP                       | -0.00003 | 0.00000 | -0.00002 |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00005  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00007  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 1 (Min)  | -0.00005 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 1 (Min) | -0.00002 | 0.00000 | -0.00005 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00023  | 0.00000 | 0.00028  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00016 | 0.00000 | -0.00021 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00027  | 0.00000 | 0.00029  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00017 | 0.00000 | -0.00023 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00002  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00006  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 2 (Min)  | -0.00006 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 2 (Max) | 0.00005  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00021  | 0.00000 | 0.00025  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00017 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00023  | 0.00000 | 0.00027  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00019 | 0.00000 | -0.00025 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000211  
 Giro maximo (ELS) = 0.000804  
 Giro minimo (ELS) = -0.000273



APOYO N = 170

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| =====                      | =====   | =====      | =====   |
| G1                         | 0.00000 | 599.31653  | 0.00000 |
| G2                         | 0.00000 | 457.65359  | 0.00000 |
| Pii                        | 0.00000 | 8.45087    | 0.00000 |
| Pi                         | 0.00000 | 13.03794   | 0.00000 |
| Pd                         | 0.00000 | 10.61209   | 0.00000 |
| TEMP                       | 0.00000 | 1.51183    | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.77445   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.77794   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 76.71547   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -1.41081   | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.71670    | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -11.23935  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 10.77584   | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -101.71390 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 10.34324   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -99.39079  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 9.30378    | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -98.02574  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.39030    | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -36.15548  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 6.00732    | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -39.31334  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 0.51365    | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -9.42100   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.93250  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.83806   | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 639.28076  | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -30.09085  | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 605.70538  | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -28.96131  | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 536.10406  | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -26.04887  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 399.79575  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.19942  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 623.47284  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -14.25329  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 71.06258   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.13340   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 1067.582  
 Reaccion maxima (ELS) = 1722.622  
 Reaccion minima (ELS) = 935.519  
 Reaccion minima (ELU) = 838.991

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| =====                      | =====    | =====   | =====    |
| G1                         | -0.00016 | 0.00000 | -0.00006 |
| G2                         | -0.00009 | 0.00000 | -0.00006 |
| Pii                        | 0.00001  | 0.00000 | -0.00001 |
| Pi                         | 0.00001  | 0.00000 | -0.00001 |
| Pd                         | 0.00001  | 0.00000 | -0.00002 |
| TEMP                       | 0.00003  | 0.00000 | 0.00002  |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00006  |
| SC peatonal(100%) Min      | -0.00006 | 0.00000 | -0.00007 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00003 | 0.00000 | -0.00004 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00010  |
| IPF-75 TREN A via 1 (Min)  | -0.00009 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 1 (Min) | -0.00005 | 0.00000 | -0.00008 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00003 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00005 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00024  | 0.00000 | 0.00030  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00027 | 0.00000 | -0.00033 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00026  | 0.00000 | 0.00033  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00030 | 0.00000 | -0.00037 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00010  |
| IPF-75 TREN A via 2 (Min)  | -0.00009 | 0.00000 | -0.00011 |
| IPF-75 TREN B1 via 2 (Max) | 0.00006  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00006 | 0.00000 | -0.00009 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00004 | 0.00000 | -0.00006 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00005 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00022  | 0.00000 | 0.00030  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00031 | 0.00000 | -0.00035 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00024  | 0.00000 | 0.00032  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00034 | 0.00000 | -0.00040 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00002 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000143  
 Giro maximo (ELS) = 0.000534  
 Giro minimo (ELS) = -0.000882

APOYO N = 171

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 599.64612  | 0.00000 |
| G2                         | 0.00000 | 294.65997  | 0.00000 |
| Pii                        | 0.00000 | 3.46230    | 0.00000 |
| Pi                         | 0.00000 | 5.36349    | 0.00000 |
| Pd                         | 0.00000 | 4.20478    | 0.00000 |
| TEMP                       | 0.00000 | -0.58912   | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.80290   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.78586   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.78744    | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -40.08733  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.98550  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.93868   | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 616.36505  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -30.86941  | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 584.02301  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -29.71118  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 522.17896  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -26.49684  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 389.43491  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.44793  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 584.72620  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.15405  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 66.38802   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.21641   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.71632    | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -15.17305  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 10.76520   | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -123.57215 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 10.33340   | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -121.20219 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 9.30636    | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -112.37028 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.38564    | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -46.20149  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 5.97048    | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -64.32214  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.50910    | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -14.18485  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 898.511  
 Reaccion maxima (ELS) = 1527.436  
 Reaccion minima (ELS) = 741.804  
 Reaccion minima (ELU) = 633.611

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00013  | 0.00000 | 0.00010  |
| G2                         | 0.00008  | 0.00000 | 0.00006  |
| Pii                        | 0.00000  | 0.00000 | 0.00000  |
| Pi                         | 0.00000  | 0.00000 | 0.00000  |
| Pd                         | 0.00000  | 0.00000 | 0.00000  |
| TEMP                       | -0.00002 | 0.00000 | -0.00002 |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00006  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 1 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00024  | 0.00000 | 0.00029  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00018 | 0.00000 | -0.00022 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00029  | 0.00000 | 0.00032  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00018 | 0.00000 | -0.00025 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00002  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 2 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00005  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00022  | 0.00000 | 0.00026  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00019 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00025  | 0.00000 | 0.00029  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00020 | 0.00000 | -0.00027 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000156  
 Giro maximo (ELS) = 0.000799  
 Giro minimo (ELS) = -0.000366



APOYO N = 172

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 598.97229  | 0.00000 |
| G2                         | 0.00000 | 457.47894  | 0.00000 |
| Pii                        | 0.00000 | 2.16873    | 0.00000 |
| Pi                         | 0.00000 | 3.26516    | 0.00000 |
| Pd                         | 0.00000 | 3.33607    | 0.00000 |
| TEMP                       | 0.00000 | 0.15862    | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.61414   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.63561   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 76.64501   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -1.33981   | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.72732    | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -11.25542  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 9.90188    | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -100.96590 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | -9.46543   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -98.65230  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 8.53025    | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -97.38860  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.43232    | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -36.23342  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 6.02021    | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -39.18385  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 0.51102    | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -9.41845   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.94990  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.83819   | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 638.45038  | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -29.29092  | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 604.86865  | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -28.16098  | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 535.35687  | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -25.33689  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 399.87280  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.20210  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 623.59161  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -14.24284  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 71.07478   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.13442   | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 1059.787  
 Reaccion maxima (ELS) = 1711.771  
 Reaccion minima (ELS) = 929.272  
 Reaccion minima (ELU) = 833.899

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00011 | 0.00000 | -0.00012 |
| G2                         | -0.00007 | 0.00000 | -0.00009 |
| Pii                        | 0.00003  | 0.00000 | -0.00004 |
| Pi                         | 0.00005  | 0.00000 | -0.00006 |
| Pd                         | 0.00003  | 0.00000 | -0.00004 |
| TEMP                       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(100%) Max      | 0.00003  | 0.00000 | 0.00004  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00001  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00005  | 0.00000 | 0.00006  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B1 via 1 (Min) | -0.00004 | 0.00000 | -0.00005 |
| IPF-75 TREN B2 via 1 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00003  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00016  | 0.00000 | 0.00019  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00018 | 0.00000 | -0.00023 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00017  | 0.00000 | 0.00020  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00020 | 0.00000 | -0.00025 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00005  | 0.00000 | 0.00006  |
| IPF-75 TREN A via 2 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00003  | 0.00000 | 0.00003  |
| IPF-75 TREN B1 via 2 (Min) | -0.00005 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| IPF-75 TREN B2 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00014  | 0.00000 | 0.00018  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00021 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00015  | 0.00000 | 0.00018  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00024 | 0.00000 | -0.00029 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00001  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000256  
 Giro maximo (ELS) = 0.000175  
 Giro minimo (ELS) = -0.000766

APOYO N = 173

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| =====                      | =====   | =====      | =====   |
| G1                         | 0.00000 | 599.24060  | 0.00000 |
| G2                         | 0.00000 | 294.42587  | 0.00000 |
| Pii                        | 0.00000 | -3.13960   | 0.00000 |
| Pi                         | 0.00000 | -4.90174   | 0.00000 |
| Pd                         | 0.00000 | -3.48613   | 0.00000 |
| TEMP                       | 0.00000 | -1.94232   | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 42.62760   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -6.63212   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.71301    | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -40.02985  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 101.00297  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.92430   | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 615.43085  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -30.01290  | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 583.08502  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -28.85609  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 521.35040  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -25.73054  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 389.46518  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.42755  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 584.74927  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.12062  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 66.39029   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.21676   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.72314    | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -15.19183  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 9.87785    | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -122.80997 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 9.44274    | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -120.45332 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 8.51892    | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -111.72575 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.42081    | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -46.30026  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 5.97711    | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -64.47974  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.50719    | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -14.18305  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 890.180  
 Reaccion maxima (ELS) = 1517.284  
 Reaccion minima (ELS) = 733.738  
 Reaccion minima (ELU) = 626.546

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| =====                      | =====    | =====   | =====    |
| G1                         | 0.00013  | 0.00000 | 0.00010  |
| G2                         | 0.00008  | 0.00000 | 0.00005  |
| Pii                        | 0.00004  | 0.00000 | -0.00005 |
| Pi                         | 0.00006  | 0.00000 | -0.00007 |
| Pd                         | 0.00004  | 0.00000 | -0.00005 |
| TEMP                       | -0.00002 | 0.00000 | -0.00002 |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00006  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00006 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00007  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 1 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00027  | 0.00000 | 0.00031  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00019 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00031  | 0.00000 | 0.00034  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00020 | 0.00000 | -0.00027 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00003  | 0.00000 | 0.00002  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00008  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 2 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00006  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 2 (Min) | -0.00004 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00004 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00024  | 0.00000 | 0.00028  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00021 | 0.00000 | -0.00027 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00028  | 0.00000 | 0.00031  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00023 | 0.00000 | -0.00029 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = 0.000101  
 Giro maximo (ELS) = 0.000781  
 Giro minimo (ELS) = -0.000462

APOYO N = 174

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 600.00305 | 0.00000 |
| G2                         | 0.00000 | 457.88364 | 0.00000 |
| Pii                        | 0.00000 | 13.52441  | 0.00000 |
| Pi                         | 0.00000 | 21.04650  | 0.00000 |
| Pd                         | 0.00000 | 16.35049  | 0.00000 |
| TEMP                       | 0.00000 | 4.03361   | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 41.90799  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -5.85887  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 76.23595  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -1.12921  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.73222   | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -11.23651 | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 6.50285   | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -94.96536 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 6.06504   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -93.10095 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 5.51666   | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -92.94102 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.44895   | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -36.06598 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 6.03664   | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -37.95937 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 0.51332   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -8.71879  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.95140 | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.85578  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 634.15057 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -25.88983 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 600.57910 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -24.75550 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 531.56982 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -22.32856 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 399.78351 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.25734 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 623.22913 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -14.30524 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 71.00887  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.13929  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 1074.237  
 Reaccion maxima (ELS) = 1722.397  
 Reaccion minima (ELS) = 953.123  
 Reaccion minima (ELU) = 861.748

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00018 | 0.00000 | -0.00004 |
| G2                         | -0.00011 | 0.00000 | -0.00005 |
| Pii                        | 0.00001  | 0.00000 | -0.00002 |
| Pi                         | 0.00002  | 0.00000 | -0.00003 |
| Pd                         | 0.00003  | 0.00000 | -0.00004 |
| TEMP                       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00007  |
| SC peatonal(100%) Min      | -0.00006 | 0.00000 | -0.00007 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00003  |
| SC peatonal(50%) Min       | -0.00003 | 0.00000 | -0.00004 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00010  |
| IPF-75 TREN A via 1 (Min)  | -0.00009 | 0.00000 | -0.00011 |
| IPF-75 TREN B1 via 1 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 1 (Min) | -0.00006 | 0.00000 | -0.00009 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00003 | 0.00000 | -0.00006 |
| EC-1 TREN LM71 via 1 (Max) | 0.00005  | 0.00000 | 0.00006  |
| EC-1 TREN LM71 via 1 (Min) | -0.00005 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00026  | 0.00000 | 0.00033  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00030 | 0.00000 | -0.00035 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00029  | 0.00000 | 0.00036  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00033 | 0.00000 | -0.00039 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00003  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00008  | 0.00000 | 0.00010  |
| IPF-75 TREN A via 2 (Min)  | -0.00010 | 0.00000 | -0.00011 |
| IPF-75 TREN B1 via 2 (Max) | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN B1 via 2 (Min) | -0.00007 | 0.00000 | -0.00009 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 2 (Min) | -0.00004 | 0.00000 | -0.00006 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00005 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00025  | 0.00000 | 0.00032  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00032 | 0.00000 | -0.00037 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00027  | 0.00000 | 0.00034  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00037 | 0.00000 | -0.00042 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00002 | 0.00000 | -0.00004 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000122  
 Giro maximo (ELS) = 0.000625  
 Giro minimo (ELS) = -0.000914

APOYO N = 175

| REACCIONES                 | Flector | Reac_vert  | Torsor  |
|----------------------------|---------|------------|---------|
| G1                         | 0.00000 | 600.04382  | 0.00000 |
| G2                         | 0.00000 | 295.36032  | 0.00000 |
| Pii                        | 0.00000 | 6.89849    | 0.00000 |
| Pi                         | 0.00000 | 10.85173   | 0.00000 |
| Pd                         | 0.00000 | 7.77991    | 0.00000 |
| TEMP                       | 0.00000 | 1.94698    | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 41.91529   | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -5.86190   | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.43285    | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -39.48939  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.98112  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.95246   | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 611.10059  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -26.58694  | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 578.77020  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -25.42299  | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 517.55774  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -22.73168  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 389.32944  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.51783  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 584.34271  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.22033  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 66.31789   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.22422   | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.73133    | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -15.19437  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 6.49491    | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -116.83073 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 6.05760    | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -114.92356 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 5.51572    | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -107.32200 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.44774    | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -46.16389  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 6.00492    | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -64.35563  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.51007    | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -13.47781  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

|                             |          |
|-----------------------------|----------|
| Reaccion permanente (ELS) = | 903.184  |
| Reaccion maxima (ELS) =     | 1524.521 |
| Reaccion minima (ELS) =     | 758.089  |
| Reaccion minima (ELU) =     | 655.151  |

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00012  | 0.00000 | 0.00012  |
| G2                         | 0.00008  | 0.00000 | 0.00005  |
| Pii                        | 0.00000  | 0.00000 | 0.00000  |
| Pi                         | 0.00000  | 0.00000 | 0.00001  |
| Pd                         | 0.00000  | 0.00000 | 0.00000  |
| TEMP                       | -0.00003 | 0.00000 | -0.00001 |
| SC peatonal(100%) Max      | 0.00004  | 0.00000 | 0.00005  |
| SC peatonal(100%) Min      | -0.00003 | 0.00000 | -0.00004 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 1 (Max)  | 0.00007  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 1 (Min)  | -0.00005 | 0.00000 | -0.00006 |
| IPF-75 TREN B1 via 1 (Max) | 0.00005  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 1 (Min) | -0.00002 | 0.00000 | -0.00005 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00003 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00022  | 0.00000 | 0.00025  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00015 | 0.00000 | -0.00019 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00025  | 0.00000 | 0.00028  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00015 | 0.00000 | -0.00021 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00006  | 0.00000 | 0.00007  |
| IPF-75 TREN A via 2 (Min)  | -0.00005 | 0.00000 | -0.00007 |
| IPF-75 TREN B1 via 2 (Max) | 0.00005  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00005 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00001 | 0.00000 | -0.00003 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00004  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00020  | 0.00000 | 0.00022  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00016 | 0.00000 | -0.00021 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00022  | 0.00000 | 0.00025  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00018 | 0.00000 | -0.00023 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

|                              |           |
|------------------------------|-----------|
| Acciones permanentes (ELS) = | 0.000169  |
| Giro maximo (ELS) =          | 0.000725  |
| Giro minimo (ELS) =          | -0.000258 |

APOYO N = 176

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 603.18616 | 0.00000 |
| G2                         | 0.00000 | 451.68063 | 0.00000 |
| Pii                        | 0.00000 | -53.02396 | 0.00000 |
| Pi                         | 0.00000 | -81.93413 | 0.00000 |
| Pd                         | 0.00000 | -65.20572 | 0.00000 |
| TEMP                       | 0.00000 | -12.61230 | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 39.67497  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -3.50338  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 70.67922  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -0.76600  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 1.74271   | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -10.79646 | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 6.56856   | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -65.11948 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 6.12805   | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -63.86874 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 5.57362   | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -68.05347 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 5.48274   | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -33.51797 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 6.07458   | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -37.36538 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 0.51633   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -5.19337  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 104.52285 | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.90213  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 596.49615 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -17.47034 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 563.56293 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -16.32369 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 499.27475 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -14.94362 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 393.97275 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -14.41179 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 605.58179 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -14.48367 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 66.02273  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.15511  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 989.661  
 Reaccion maxima (ELS) = 1596.183  
 Reaccion minima (ELS) = 894.198  
 Reaccion minima (ELU) = 820.614

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | -0.00012 | 0.00000 | -0.00011 |
| G2                         | -0.00007 | 0.00000 | -0.00009 |
| Pii                        | 0.00011  | 0.00000 | -0.00011 |
| Pi                         | 0.00016  | 0.00000 | -0.00015 |
| Pd                         | 0.00012  | 0.00000 | -0.00011 |
| TEMP                       | 0.00005  | 0.00000 | -0.00001 |
| SC peatonal(100%) Max      | 0.00003  | 0.00000 | 0.00004  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00004 |
| SC peatonal(50%) Max       | 0.00001  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 1 (Max)  | 0.00006  | 0.00000 | 0.00006  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00005  | 0.00000 | 0.00003  |
| IPF-75 TREN B1 via 1 (Min) | -0.00003 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00003  | 0.00000 | 0.00001  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00003  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00019  | 0.00000 | 0.00017  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00017 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00021  | 0.00000 | 0.00008  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00006 | 0.00000 | -0.00029 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000  | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00005  | 0.00000 | 0.00006  |
| IPF-75 TREN A via 2 (Min)  | -0.00007 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 2 (Max) | 0.00004  | 0.00000 | 0.00002  |
| IPF-75 TREN B1 via 2 (Min) | -0.00004 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00001  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00003  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 2 (Min) | -0.00004 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00017  | 0.00000 | 0.00015  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00019 | 0.00000 | -0.00027 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00018  | 0.00000 | 0.00008  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00009 | 0.00000 | -0.00032 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000315  
 Giro maximo (ELS) = 0.000017  
 Giro minimo (ELS) = -0.000901

APOYO N = 177

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 603.07587 | 0.00000 |
| G2                         | 0.00000 | 304.02472 | 0.00000 |
| Pii                        | 0.00000 | -60.06213 | 0.00000 |
| Pi                         | 0.00000 | -92.77543 | 0.00000 |
| Pd                         | 0.00000 | -74.28433 | 0.00000 |
| TEMP                       | 0.00000 | -14.47948 | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 39.67068  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -3.50533  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.43825   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -34.17578 | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 100.57426 | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.99915  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 575.00134 | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -17.90552 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 543.26904 | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -16.72945 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 486.19958 | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -15.18366 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 383.71896 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -14.67055 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 567.95367 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -15.39681 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 61.69491  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.24006  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 1.74224   | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -14.73058 | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 6.56247   | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -86.77975 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 6.12236   | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -84.34508 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 5.57416   | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -81.25676 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 5.48278   | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -43.34119 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 6.04464   | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -59.15814 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.51336   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -9.51129  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

Reaccion permanente (ELS) = 832.816  
 Reaccion maxima (ELS) = 1416.176  
 Reaccion minima (ELS) = 711.991  
 Reaccion minima (ELU) = 626.399

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00013  | 0.00000 | 0.00010  |
| G2                         | 0.00009  | 0.00000 | 0.00004  |
| Pii                        | 0.00014  | 0.00000 | -0.00020 |
| Pi                         | 0.00022  | 0.00000 | -0.00030 |
| Pd                         | 0.00016  | 0.00000 | -0.00022 |
| TEMP                       | 0.00001  | 0.00000 | -0.00006 |
| SC peatonal(100%) Max      | 0.00005  | 0.00000 | 0.00005  |
| SC peatonal(100%) Min      | -0.00004 | 0.00000 | -0.00004 |
| SC peatonal(50%) Max       | 0.00002  | 0.00000 | 0.00002  |
| SC peatonal(50%) Min       | -0.00002 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 1 (Max)  | 0.00009  | 0.00000 | 0.00009  |
| IPF-75 TREN A via 1 (Min)  | -0.00006 | 0.00000 | -0.00008 |
| IPF-75 TREN B1 via 1 (Max) | 0.00007  | 0.00000 | 0.00005  |
| IPF-75 TREN B1 via 1 (Min) | -0.00002 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00005  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00001 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00005  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 1 (Min) | -0.00003 | 0.00000 | -0.00004 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00028  | 0.00000 | 0.00025  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00015 | 0.00000 | -0.00026 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00033  | 0.00000 | 0.00009  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00008 | 0.00000 | -0.00029 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00003  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00008  | 0.00000 | 0.00008  |
| IPF-75 TREN A via 2 (Min)  | -0.00006 | 0.00000 | -0.00009 |
| IPF-75 TREN B1 via 2 (Max) | 0.00006  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00004  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00001 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00005  |
| EC-1 TREN LM71 via 2 (Min) | -0.00003 | 0.00000 | -0.00005 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00026  | 0.00000 | 0.00023  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00017 | 0.00000 | -0.00027 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00029  | 0.00000 | 0.00009  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00008 | 0.00000 | -0.00030 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00002  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

Acciones permanentes (ELS) = -0.000080  
 Giro maximo (ELS) = 0.000422  
 Giro minimo (ELS) = -0.000734



APOYO N = 178

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 180.24260 | 0.00000 |
| G2                         | 0.00000 | 126.42539 | 0.00000 |
| Pii                        | 0.00000 | 44.03145  | 0.00000 |
| Pi                         | 0.00000 | 67.91605  | 0.00000 |
| Pd                         | 0.00000 | 54.33640  | 0.00000 |
| TEMP                       | 0.00000 | 11.30318  | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 13.38355  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -2.76515  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 16.98234  | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -0.79061  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 16.17308  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -6.02377  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 31.05589  | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -24.48515 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 30.38490  | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -22.87850 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 28.70641  | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -20.97784 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 23.65282  | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -19.98255 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 20.63816  | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -23.39614 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 1.12870   | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -2.08781  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 67.67197  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -4.20880  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 167.92801 | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -15.32300 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 160.12276 | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -14.31095 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 152.12860 | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -13.06962 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 156.26961 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -12.67975 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 179.50977 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -13.23198 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 15.72729  | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -1.08113  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

|                             |         |
|-----------------------------|---------|
| Reaccion permanente (ELS) = | 361.004 |
| Reaccion maxima (ELS) =     | 572.942 |
| Reaccion minima (ELS) =     | 320.991 |
| Reaccion minima (ELU) =     | 289.255 |

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00022  | 0.00000 | -0.00060 |
| G2                         | 0.00016  | 0.00000 | -0.00040 |
| Pii                        | -0.00114 | 0.00000 | 0.00126  |
| Pi                         | -0.00178 | 0.00000 | 0.00197  |
| Pd                         | -0.00144 | 0.00000 | 0.00159  |
| TEMP                       | -0.00007 | 0.00000 | 0.00016  |
| SC peatonal(100%) Max      | 0.00003  | 0.00000 | 0.00003  |
| SC peatonal(100%) Min      | -0.00002 | 0.00000 | -0.00006 |
| SC peatonal(50%) Max       | 0.00001  | 0.00000 | 0.00001  |
| SC peatonal(50%) Min       | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00008  | 0.00000 | 0.00005  |
| IPF-75 TREN A via 1 (Min)  | -0.00003 | 0.00000 | -0.00013 |
| IPF-75 TREN B1 via 1 (Max) | 0.00005  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 1 (Min) | -0.00002 | 0.00000 | -0.00009 |
| IPF-75 TREN B2 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00006 |
| EC-1 TREN LM71 via 1 (Max) | 0.00004  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 1 (Min) | -0.00002 | 0.00000 | -0.00007 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00020  | 0.00000 | 0.00015  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00010 | 0.00000 | -0.00036 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00017  | 0.00000 | 0.00017  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00011 | 0.00000 | -0.00033 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00001  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 2 (Max)  | 0.00007  | 0.00000 | 0.00005  |
| IPF-75 TREN A via 2 (Min)  | -0.00003 | 0.00000 | -0.00014 |
| IPF-75 TREN B1 via 2 (Max) | 0.00004  | 0.00000 | 0.00004  |
| IPF-75 TREN B1 via 2 (Min) | -0.00003 | 0.00000 | -0.00010 |
| IPF-75 TREN B2 via 2 (Max) | 0.00003  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00007 |
| EC-1 TREN LM71 via 2 (Max) | 0.00004  | 0.00000 | 0.00003  |
| EC-1 TREN LM71 via 2 (Min) | -0.00002 | 0.00000 | -0.00008 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00017  | 0.00000 | 0.00015  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00010 | 0.00000 | -0.00039 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00014  | 0.00000 | 0.00017  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00012 | 0.00000 | -0.00037 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00001  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00003 |

## COMBINACION DE GIROS DE FLEXION

|                              |           |
|------------------------------|-----------|
| Acciones permanentes (ELS) = | 0.000590  |
| Giro maximo (ELS) =          | 0.001092  |
| Giro minimo (ELS) =          | -0.000128 |

APOYO N = 179

| REACCIONES                 | Flector | Reac_vert | Torsor  |
|----------------------------|---------|-----------|---------|
| G1                         | 0.00000 | 179.54581 | 0.00000 |
| G2                         | 0.00000 | 94.95887  | 0.00000 |
| Pii                        | 0.00000 | 43.32201  | 0.00000 |
| Pi                         | 0.00000 | 66.82945  | 0.00000 |
| Pd                         | 0.00000 | 53.37939  | 0.00000 |
| TEMP                       | 0.00000 | 11.11272  | 0.00000 |
| SC peatonal(100%) Max      | 0.00000 | 13.29944  | 0.00000 |
| SC peatonal(100%) Min      | 0.00000 | -2.72542  | 0.00000 |
| SC peatonal(50%) Max       | 0.00000 | 0.35100   | 0.00000 |
| SC peatonal(50%) Min       | 0.00000 | -5.95367  | 0.00000 |
| IPF-75 TREN A via 1 (Max)  | 0.00000 | 65.85796  | 0.00000 |
| IPF-75 TREN A via 1 (Min)  | 0.00000 | -4.18605  | 0.00000 |
| IPF-75 TREN B1 via 1 (Max) | 0.00000 | 162.68185 | 0.00000 |
| IPF-75 TREN B1 via 1 (Min) | 0.00000 | -15.27744 | 0.00000 |
| IPF-75 TREN B2 via 1 (Max) | 0.00000 | 155.15872 | 0.00000 |
| IPF-75 TREN B2 via 1 (Min) | 0.00000 | -14.26653 | 0.00000 |
| EC-1 TREN LM71 via 1 (Max) | 0.00000 | 148.68355 | 0.00000 |
| EC-1 TREN LM71 via 1 (Min) | 0.00000 | -12.96263 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00000 | 152.62732 | 0.00000 |
| EC-1 TREN SW/0 via 1 (Min) | 0.00000 | -12.58086 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00000 | 169.49776 | 0.00000 |
| EC-1 TREN SW/2 via 1 (Min) | 0.00000 | -13.48707 | 0.00000 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00000 | 14.81210  | 0.00000 |
| EC-1 TREN 12.5 via 1 (Min) | 0.00000 | -1.10816  | 0.00000 |
| IPF-75 TREN A via 2 (Max)  | 0.00000 | 14.36114  | 0.00000 |
| IPF-75 TREN A via 2 (Min)  | 0.00000 | -6.02280  | 0.00000 |
| IPF-75 TREN B1 via 2 (Max) | 0.00000 | 26.16352  | 0.00000 |
| IPF-75 TREN B1 via 2 (Min) | 0.00000 | -24.90116 | 0.00000 |
| IPF-75 TREN B2 via 2 (Max) | 0.00000 | 25.77858  | 0.00000 |
| IPF-75 TREN B2 via 2 (Min) | 0.00000 | -23.28995 | 0.00000 |
| EC-1 TREN LM71 via 2 (Max) | 0.00000 | 25.55674  | 0.00000 |
| EC-1 TREN LM71 via 2 (Min) | 0.00000 | -21.24495 | 0.00000 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00000 | 19.97621  | 0.00000 |
| EC-1 TREN SW/0 via 2 (Min) | 0.00000 | -19.97059 | 0.00000 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00000 | 10.54007  | 0.00000 |
| EC-1 TREN SW/2 via 2 (Min) | 0.00000 | -24.42649 | 0.00000 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00000 | 0.40630   | 0.00000 |
| EC-1 TREN 12.5 via 2 (Min) | 0.00000 | -2.20014  | 0.00000 |

## COMBINACION DE REACCIONES VERTICALES

|                             |         |
|-----------------------------|---------|
| Reaccion permanente (ELS) = | 327.884 |
| Reaccion maxima (ELS) =     | 535.443 |
| Reaccion minima (ELS) =     | 287.448 |
| Reaccion minima (ELU) =     | 255.583 |

| DESPLAZAMIENTOS            | GX       | FZ      | GY       |
|----------------------------|----------|---------|----------|
| G1                         | 0.00059  | 0.00000 | -0.00036 |
| G2                         | 0.00038  | 0.00000 | -0.00025 |
| Pii                        | -0.00119 | 0.00000 | 0.00148  |
| Pi                         | -0.00186 | 0.00000 | 0.00230  |
| Pd                         | -0.00150 | 0.00000 | 0.00186  |
| TEMP                       | -0.00016 | 0.00000 | 0.00011  |
| SC peatonal(100%) Max      | 0.00006  | 0.00000 | 0.00002  |
| SC peatonal(100%) Min      | -0.00002 | 0.00000 | -0.00005 |
| SC peatonal(50%) Max       | 0.00003  | 0.00000 | 0.00001  |
| SC peatonal(50%) Min       | -0.00001 | 0.00000 | -0.00003 |
| IPF-75 TREN A via 1 (Max)  | 0.00014  | 0.00000 | 0.00004  |
| IPF-75 TREN A via 1 (Min)  | -0.00005 | 0.00000 | -0.00010 |
| IPF-75 TREN B1 via 1 (Max) | 0.00009  | 0.00000 | 0.00003  |
| IPF-75 TREN B1 via 1 (Min) | -0.00004 | 0.00000 | -0.00006 |
| IPF-75 TREN B2 via 1 (Max) | 0.00006  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 1 (Min) | -0.00002 | 0.00000 | -0.00004 |
| EC-1 TREN LM71 via 1 (Max) | 0.00007  | 0.00000 | 0.00002  |
| EC-1 TREN LM71 via 1 (Min) | -0.00002 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 1 (Max) | 0.00038  | 0.00000 | 0.00014  |
| EC-1 TREN SW/0 via 1 (Min) | -0.00014 | 0.00000 | -0.00025 |
| EC-1 TREN SW/2 via 1 (Max) | 0.00036  | 0.00000 | 0.00016  |
| EC-1 TREN SW/2 via 1 (Min) | -0.00016 | 0.00000 | -0.00021 |
| EC-1 TREN 12.5 via 1 (Max) | 0.00003  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 1 (Min) | -0.00001 | 0.00000 | -0.00002 |
| IPF-75 TREN A via 2 (Max)  | 0.00012  | 0.00000 | 0.00004  |
| IPF-75 TREN A via 2 (Min)  | -0.00005 | 0.00000 | -0.00011 |
| IPF-75 TREN B1 via 2 (Max) | 0.00008  | 0.00000 | 0.00003  |
| IPF-75 TREN B1 via 2 (Min) | -0.00004 | 0.00000 | -0.00007 |
| IPF-75 TREN B2 via 2 (Max) | 0.00006  | 0.00000 | 0.00002  |
| IPF-75 TREN B2 via 2 (Min) | -0.00002 | 0.00000 | -0.00005 |
| EC-1 TREN LM71 via 2 (Max) | 0.00007  | 0.00000 | 0.00002  |
| EC-1 TREN LM71 via 2 (Min) | -0.00002 | 0.00000 | -0.00006 |
| EC-1 TREN SW/0 via 2 (Max) | 0.00034  | 0.00000 | 0.00014  |
| EC-1 TREN SW/0 via 2 (Min) | -0.00015 | 0.00000 | -0.00028 |
| EC-1 TREN SW/2 via 2 (Max) | 0.00031  | 0.00000 | 0.00015  |
| EC-1 TREN SW/2 via 2 (Min) | -0.00016 | 0.00000 | -0.00024 |
| EC-1 TREN 12.5 via 2 (Max) | 0.00003  | 0.00000 | 0.00001  |
| EC-1 TREN 12.5 via 2 (Min) | -0.00001 | 0.00000 | -0.00002 |

## COMBINACION DE GIROS DE FLEXION

|                              |          |
|------------------------------|----------|
| Acciones permanentes (ELS) = | 0.001252 |
| Giro maximo (ELS) =          | 0.001673 |
| Giro minimo (ELS) =          | 0.000745 |



## APOYOS. DIMENSIONAMIENTO

Apoyo de estribo

$$R_{max} = 532'9 \text{ T (apoyo 178)}$$

$$R_{w, conc} = 68'69 \text{ T}$$

$$R = 641'6 \text{ T} \Rightarrow$$

$$\Rightarrow \text{Apoyo POT} = 700$$

Apoyo sobre pilas 1 y 7

$$R_{max} = 1596'2 \text{ T (apoyo 176)}$$

$$R_{w, conc} = 29'13 \text{ T}$$

$$R = 1625'3 \text{ T} \Rightarrow$$

$$\Rightarrow \text{Apoyo POT} = 1700$$

Apoyo sobre pilas 2 a 6

$$R_{max} = 1723'9 \text{ T (apoyo 166)}$$

$$R_{w, conc} = 37'34 \text{ T}$$

$$R = 1761'2 \text{ T} \Rightarrow$$

$$\Rightarrow \text{Apoyo POT} = 1800$$

Esfuerzos - Caso: 9 (Viento transversal conc)  
Extremos globales

1

- Caso: 9 (Viento transversal conc)

| Filtrar             | Barra         | Caso |
|---------------------|---------------|------|
| Lista completa      | 1A233 235A245 | 1A11 |
| Selección           | 418A453       | 9    |
| Número total        | 339           | 11   |
| Número seleccionado | 36            | 1    |

- Caso: 9 (Viento transversal conc)

|       | FX (T) | FY (T) | FZ (T)  | MX (Tm)  | MY (Tm)  |
|-------|--------|--------|---------|----------|----------|
| MAX   | 68.71  | 54.30  | 124.61  | 50.041   | 230.524  |
| Barra | 451    | 442    | 420     | 418      | 421      |
| Nudo  | 17601  | 8001   | 1       | 801      | 162      |
| Caso  | 9      | 9      | 9       | 9        | 9        |
| MIN   | -74.60 | -0.00  | -124.61 | -134.984 | -230.524 |
| Barra | 453    | 440    | 419     | 451      | 419      |
| Nudo  | 17201  | 6001   | 11201   | 17601    | 163      |
| Caso  | 9      | 9      | 9       | 9        | 9        |

|       | MZ (Tm)  |
|-------|----------|
| MAX   | 8.145    |
| Barra | 442      |
| Nudo  | 8001     |
| Caso  | 9        |
| MIN   | -100.446 |
| Barra | 443      |
| Nudo  | 175      |
| Caso  | 9        |

## Esfuerzos - Caso: 9 (Viento transversal conc)

Valores

1

## - Caso: 9 (Viento transversal conc)

| Filtrar             | Barra         | Caso |
|---------------------|---------------|------|
| Lista completa      | 1A233 235A245 | 1A11 |
| Selección           | 418A453       | 9    |
| Número total        | 339           | 11   |
| Número seleccionado | 36            | 1    |

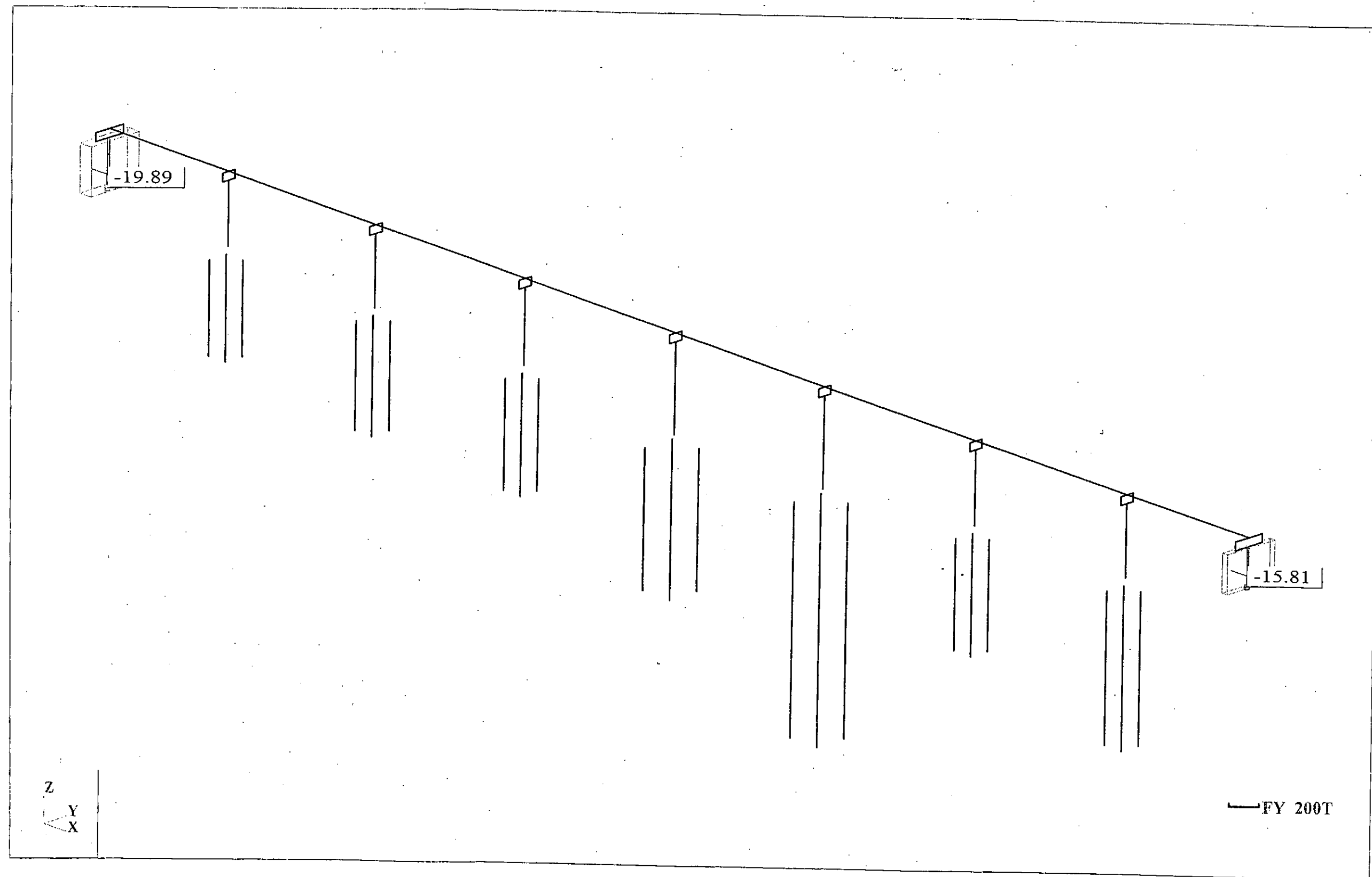
## - Caso: 9 (Viento transversal conc)

| Barra/Nudo/Caso | FX (T) | FY (T) | FZ (T)  | MX (Tm) | MY (Tm)  | MZ (Tm) |
|-----------------|--------|--------|---------|---------|----------|---------|
| 418/ 801/ 9     | 61.35  | 19.77  | -124.61 | 50.041  | 18.691   | 2.965   |
| 418/ 11201/ 9   | 61.35  | 19.77  | -124.61 | 50.041  | -0.000   | 0.000   |
| 419/ 11201/ 9   | 61.35  | 19.77  | -124.61 | 50.041  | -0.000   | 0.000   |
| 419/ 163/ 9     | 61.35  | 19.77  | -124.61 | 50.041  | -230.524 | -36.566 |
| 420/ 1/ 9       | -67.30 | 28.69  | 124.61  | 48.077  | -18.691  | 4.304   |
| 420/ 10801/ 9   | -67.30 | 28.69  | 124.61  | 48.077  | -0.000   | -0.000  |
| 421/ 10801/ 9   | -67.30 | 28.69  | 124.61  | 48.077  | 0.000    | -0.000  |
| 421/ 162/ 9     | -67.30 | 28.69  | 124.61  | 48.077  | 230.524  | -53.084 |
| 422/ 2001/ 9    | 29.06  | 19.44  | -0.00   | 29.693  | 0.000    | 2.916   |
| 422/ 12001/ 9   | 29.06  | 19.44  | -0.00   | 29.693  | -0.000   | -0.000  |
| 423/ 12001/ 9   | 29.06  | 19.44  | 0.00    | 29.693  | -0.000   | 0.000   |
| 423/ 165/ 9     | 29.06  | 19.44  | 0.00    | 29.693  | 0.000    | -35.956 |
| 424/ 17860/ 9   | -48.06 | 0.00   | 0.00    | 29.486  | 0.000    | 0.000   |
| 424/ 11601/ 9   | -48.06 | 0.00   | 0.00    | 29.486  | 0.000    | -0.000  |
| 425/ 11601/ 9   | -48.06 | -0.00  | 0.00    | 29.486  | -0.000   | -0.000  |
| 425/ 164/ 9     | -48.06 | -0.00  | 0.00    | 29.486  | 0.000    | 0.000   |
| 426/ 3201/ 9    | 31.57  | 39.05  | 0.00    | 18.172  | -0.000   | 5.858   |
| 426/ 12801/ 9   | 31.57  | 39.05  | 0.00    | 18.172  | 0.000    | 0.000   |
| 427/ 12801/ 9   | 31.57  | 39.06  | 0.00    | 18.172  | -0.000   | 0.000   |
| 427/ 167/ 9     | 31.57  | 39.06  | 0.00    | 18.172  | 0.000    | -72.253 |
| 428/ 2401/ 9    | -50.79 | -0.00  | 0.00    | 17.853  | -0.000   | 0.000   |
| 428/ 12401/ 9   | -50.79 | -0.00  | 0.00    | 17.853  | -0.000   | 0.000   |
| 429/ 12401/ 9   | -50.79 | 0.00   | 0.00    | 17.853  | 0.000    | 0.000   |
| 429/ 166/ 9     | -50.79 | 0.00   | 0.00    | 17.853  | 0.000    | 0.000   |
| 430/ 4401/ 9    | 30.43  | 51.36  | -0.00   | 8.990   | 0.000    | 7.704   |
| 430/ 13601/ 9   | 30.43  | 51.36  | -0.00   | 8.990   | -0.000   | 0.000   |
| 431/ 13601/ 9   | 30.43  | 51.36  | -0.00   | 8.990   | 0.000    | 0.000   |
| 431/ 169/ 9     | 30.43  | 51.36  | -0.00   | 8.990   | -0.000   | -95.025 |
| 432/ 3601/ 9    | -49.38 | 0.00   | 0.00    | 8.692   | -0.000   | 0.000   |
| 432/ 13201/ 9   | -49.38 | 0.00   | 0.00    | 8.692   | 0.000    | -0.000  |
| 433/ 13201/ 9   | -49.38 | -0.00  | 0.00    | 8.692   | -0.000   | -0.000  |
| 433/ 168/ 9     | -49.38 | -0.00  | 0.00    | 8.692   | 0.000    | 0.000   |
| 434/ 5601/ 9    | 37.10  | 47.91  | 0.00    | 1.663   | -0.000   | 7.186   |
| 434/ 14401/ 9   | 37.10  | 47.91  | 0.00    | 1.663   | 0.000    | -0.000  |
| 435/ 14401/ 9   | 37.10  | 47.90  | 0.00    | 1.663   | -0.000   | -0.000  |
| 435/ 171/ 9     | 37.10  | 47.90  | 0.00    | 1.663   | 0.000    | -88.618 |
| 436/ 4801/ 9    | -56.33 | -0.00  | 0.00    | 1.499   | 0.000    | -0.000  |
| 436/ 14001/ 9   | -56.33 | -0.00  | 0.00    | 1.499   | 0.000    | -0.000  |

| Barra/Nudo/Caso | FX (T) | FY (T) | FZ (T) | MX (Tm)  | MY (Tm) | MZ (Tm)  |
|-----------------|--------|--------|--------|----------|---------|----------|
| 437/ 14001/ 9   | -56.33 | -0.00  | 0.00   | 1.499    | -0.000  | -0.000   |
| 437/ 170/ 9     | -56.33 | -0.00  | 0.00   | 1.499    | 0.000   | 0.000    |
| 438/ 6801/ 9    | 37.89  | 40.51  | -0.00  | -9.196   | -0.000  | 6.076    |
| 438/ 15201/ 9   | 37.89  | 40.51  | -0.00  | -9.196   | -0.000  | 0.000    |
| 439/ 15201/ 9   | 37.89  | 40.50  | 0.00   | -9.196   | -0.000  | 0.000    |
| 439/ 173/ 9     | 37.89  | 40.50  | 0.00   | -9.196   | 0.000   | -74.920  |
| 440/ 6001/ 9    | -56.80 | -0.00  | 0.00   | -9.238   | -0.000  | -0.000   |
| 440/ 14801/ 9   | -56.80 | -0.00  | 0.00   | -9.238   | 0.000   | 0.000    |
| 441/ 14801/ 9   | -56.80 | 0.00   | -0.00  | -9.238   | 0.000   | 0.000    |
| 441/ 172/ 9     | -56.80 | 0.00   | -0.00  | -9.238   | -0.000  | -0.000   |
| 442/ 8001/ 9    | 5.22   | 54.30  | -0.00  | -23.419  | -0.000  | 8.145    |
| 442/ 16001/ 9   | 5.22   | 54.30  | -0.00  | -23.419  | -0.000  | -0.000   |
| 443/ 16001/ 9   | 5.22   | 54.29  | 0.00   | -23.419  | -0.000  | -0.000   |
| 443/ 175/ 9     | 5.22   | 54.29  | 0.00   | -23.419  | 0.000   | -100.446 |
| 444/ 7201/ 9    | -24.47 | -0.00  | 0.00   | -23.345  | -0.000  | 0.000    |
| 444/ 15601/ 9   | -24.47 | -0.00  | 0.00   | -23.345  | -0.000  | 0.000    |
| 445/ 15601/ 9   | -24.47 | 0.00   | 0.00   | -23.345  | -0.000  | 0.000    |
| 445/ 174/ 9     | -24.47 | 0.00   | 0.00   | -23.345  | 0.000   | -0.000   |
| 446/ 9201/ 9    | 19.94  | 19.95  | 0.00   | -26.140  | 0.000   | 2.992    |
| 446/ 16801/ 9   | 19.94  | 19.95  | 0.00   | -26.140  | 0.000   | -0.000   |
| 447/ 16801/ 9   | 19.94  | 19.95  | 0.00   | -26.140  | -0.000  | 0.000    |
| 447/ 177/ 9     | 19.94  | 19.95  | 0.00   | -26.140  | 0.000   | -36.903  |
| 448/ 8401/ 9    | -38.91 | 0.00   | 0.00   | -26.065  | -0.000  | 0.000    |
| 448/ 16401/ 9   | -38.91 | 0.00   | 0.00   | -26.065  | 0.000   | -0.000   |
| 449/ 16401/ 9   | -38.91 | -0.00  | 0.00   | -26.065  | -0.000  | -0.000   |
| 449/ 176/ 9     | -38.91 | -0.00  | 0.00   | -26.065  | 0.000   | 0.000    |
| 450/ 10401/ 9   | 68.71  | 38.14  | -0.00  | -134.984 | 0.000   | 5.721    |
| 450/ 17601/ 9   | 68.71  | 38.14  | -0.00  | -134.984 | 0.000   | -0.000   |
| 451/ 17601/ 9   | 68.71  | 38.14  | -0.00  | -134.984 | 0.000   | 0.000    |
| 451/ 179/ 9     | 68.71  | 38.14  | -0.00  | -134.984 | -0.000  | -70.565  |
| 452/ 9601/ 9    | -74.60 | -0.00  | 0.00   | -134.284 | 0.000   | 0.000    |
| 452/ 17201/ 9   | -74.60 | -0.00  | 0.00   | -134.284 | 0.000   | 0.000    |
| 453/ 17201/ 9   | -74.60 | -0.00  | 0.00   | -134.284 | -0.000  | -0.000   |
| 453/ 178/ 9     | -74.60 | -0.00  | 0.00   | -134.284 | 0.000   | 0.000    |

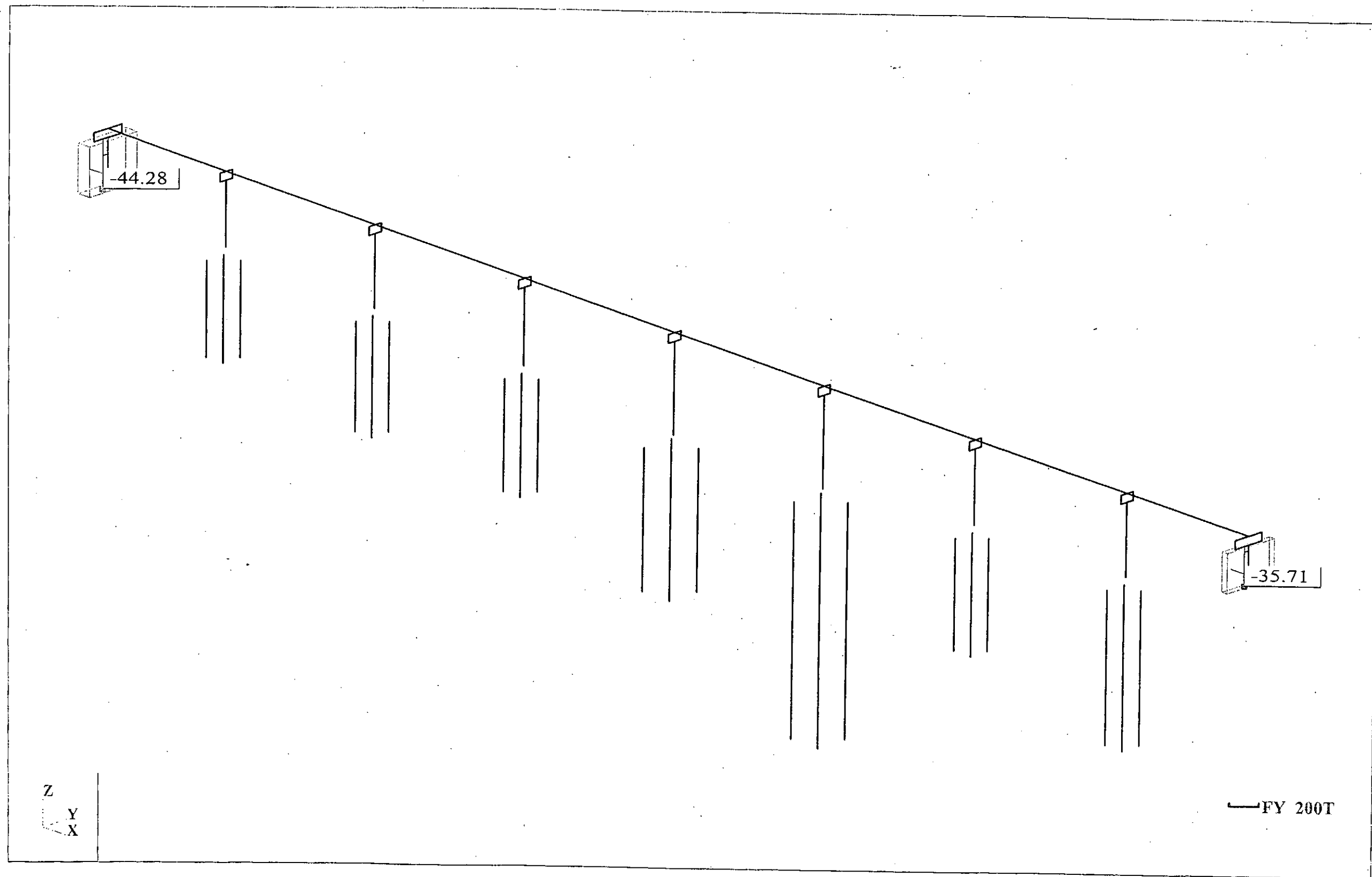
## 8.2 REACCIONES HORIZONTALES

## Fuerza Centrífuga - Reacciones en estribos

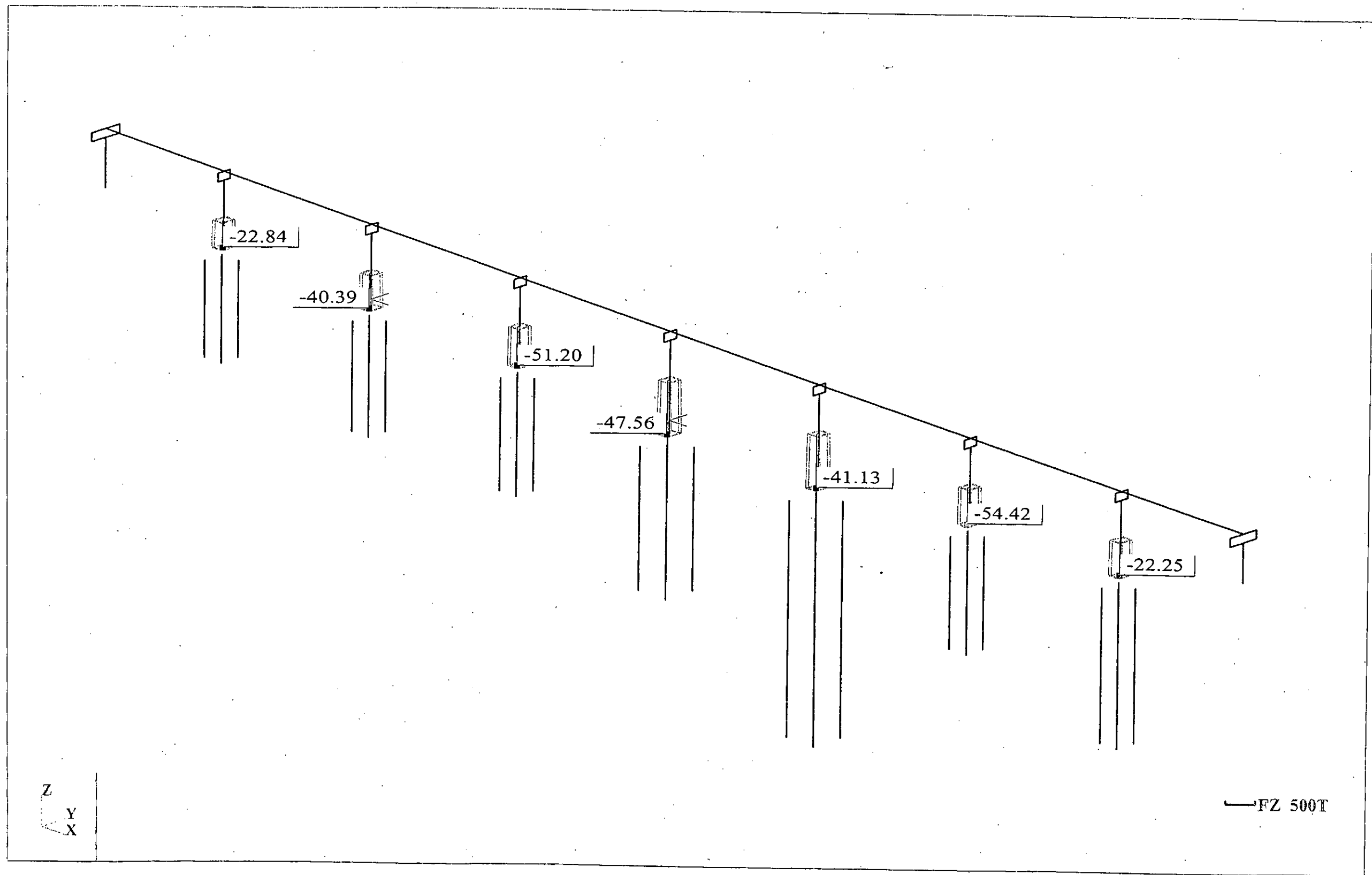




## Viento transversal conc. - Reacciones en estribos



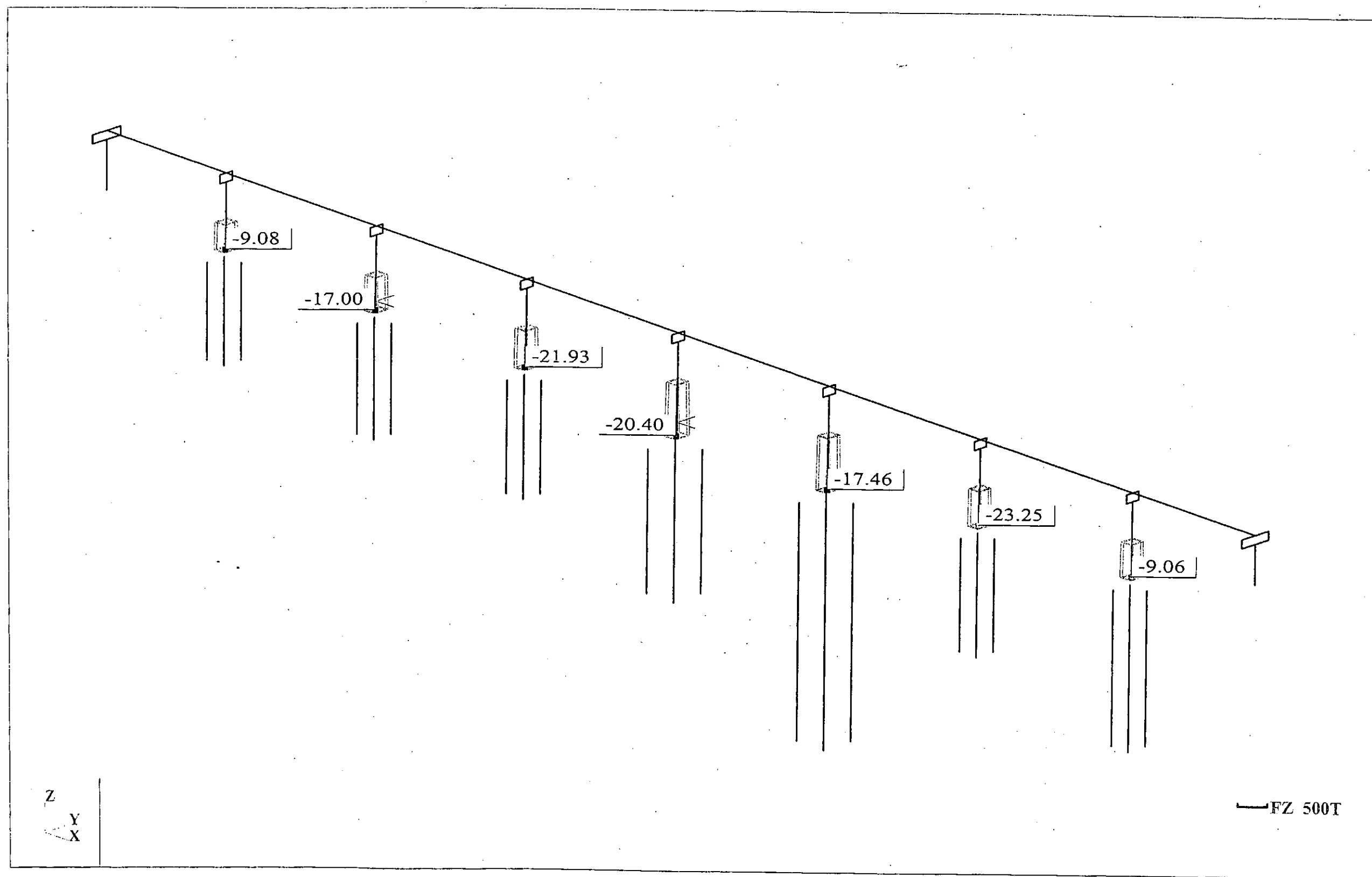
# Viento transversal conc. - Reacciones en pilas







## Fuerza Centrífuga - Reacciones en pilas



### **8.3 VERIFICACIÓN DE LOS APARATOS DE APOYO Y MOVIMIENTOS EN JUNTAS**



# CALCULO DE MOVIMIENTOS DIFERIDOS EN TABLEROS CONTRUIDOS POR FASES VANO A VANO

Numero de vanos = 8

Luz del vano 1 = 36.00 m Voladizo posterior = 11.25 m  
 Luz del vano 2 = 45.00 m Voladizo posterior = 11.25 m  
 Luz del vano 3 = 45.00 m Voladizo posterior = 11.25 m  
 Luz del vano 4 = 45.00 m Voladizo posterior = 11.25 m  
 Luz del vano 5 = 45.00 m Voladizo posterior = 11.25 m  
 Luz del vano 6 = 45.00 m Voladizo posterior = 11.25 m  
 Luz del vano 7 = 45.00 m Voladizo posterior = 9.00 m  
 Luz del vano 8 = 36.00 m Voladizo posterior = 0.00 m

Duracion media de una fase = 14.00 dias

Edad final fase 1= 5.00 dias  
 Edad final fase 2= 19.00 dias  
 Edad final fase 3= 33.00 dias  
 Edad final fase 4= 47.00 dias  
 Edad final fase 5= 61.00 dias  
 Edad final fase 6= 75.00 dias  
 Edad final fase 7= 89.00 dias  
 Edad final fase 8= 103.00 dias

Edad inicio retraccion = 0  
 Edad puesta carga = 5

## EVOLUCION PARAMETROS REOLOGICOS DEL HORMIGON

| Fase | Edad   | Eps_retrac | Phit,to |
|------|--------|------------|---------|
| 1    | 5.     | -0.000007  | 0.0000  |
| 2    | 19.    | -0.000014  | 0.5618  |
| 3    | 33.    | -0.000019  | 0.6892  |
| 4    | 47.    | -0.000022  | 0.7756  |
| 5    | 61.    | -0.000025  | 0.8425  |
| 6    | 75.    | -0.000028  | 0.8978  |
| 7    | 89.    | -0.000030  | 0.9450  |
| 8    | 103.   | -0.000033  | 0.9864  |
| 9    | 10000. | -0.000240  | 2.0492  |

## MOVIMIENTOS POR RETRACCION A 10000 DIAS

Tiempo final =10000. dias

Apoyo = 1

Edad Fase 1 =10000. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -8.66 mm

Apoyo = 2

Edad Fase 1 = 14. dias Def\_retra=-0.0002284

Edad Fase 2 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -18.91 mm

Apoyo = 3

Edad Fase 1 = 28. dias Def\_retra=-0.0002234

Edad Fase 2 = 14. dias Def\_retra=-0.0002284

Edad Fase 3 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -28.95 mm

Apoyo = 4

Edad Fase 1 = 42. dias Def\_retra=-0.0002195

Edad Fase 2 = 28. dias Def\_retra=-0.0002234

Edad Fase 3 = 14. dias Def\_retra=-0.0002284

Edad Fase 4 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -38.82 mm

Apoyo = 5

Edad Fase 1 = 56. dias Def\_retra=-0.0002163

Edad Fase 2 = 42. dias Def\_retra=-0.0002195

Edad Fase 3 = 28. dias Def\_retra=-0.0002234

Edad Fase 4 = 14. dias Def\_retra=-0.0002284

Edad Fase 5 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -48.55 mm

Apoyo = 6

Edad Fase 1 = 70. dias Def\_retra=-0.0002135

Edad Fase 2 = 56. dias Def\_retra=-0.0002163

Edad Fase 3 = 42. dias Def\_retra=-0.0002195

Edad Fase 4 = 28. dias Def\_retra=-0.0002234

Edad Fase 5 = 14. dias Def\_retra=-0.0002284

Edad Fase 6 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -58.15 mm

Apoyo = 7

Edad Fase 1 = 84. dias Def\_retra=-0.0002109

Edad Fase 2 = 70. dias Def\_retra=-0.0002135

Edad Fase 3 = 56. dias Def\_retra=-0.0002163

Edad Fase 4 = 42. dias Def\_retra=-0.0002195

Edad Fase 5 = 28. dias Def\_retra=-0.0002234

Edad Fase 6 = 14. dias Def\_retra=-0.0002284

Edad Fase 7 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -67.63 mm

Apoyo = 8

Edad Fase 1 = 98. dias Def\_retra=-0.0002086

Edad Fase 2 = 84. dias Def\_retra=-0.0002109

Edad Fase 3 = 70. dias Def\_retra=-0.0002135

Edad Fase 4 = 56. dias Def\_retra=-0.0002163

Edad Fase 5 = 42. dias Def\_retra=-0.0002195

Edad Fase 6 = 28. dias Def\_retra=-0.0002234

Edad Fase 7 = 14. dias Def\_retra=-0.0002284

Edad Fase 8 = 0. dias Def\_retra=-0.0002405

Movimiento final por retraccion en apoyo = -74.88 mm

#### MOVIMIENTOS DE ACORTAMIENTO ELASTICO

Movimiento por deform. elastica en apoyo 1 = 6.4 mm

Movimiento por deform. elastica en J.C. 1 = 8.9 mm

Movimiento por deform. elastica en apoyo 2 = 8.1 mm

Movimiento por deform. elastica en J.C. 2 = 10.6 mm

Movimiento por deform. elastica en apoyo 3 = 8.1 mm

Movimiento por deform. elastica en J.C. 3 = 10.6 mm

Movimiento por deform. elastica en apoyo 4 = 8.1 mm

Movimiento por deform. elastica en J.C. 4 = 10.6 mm

Movimiento por deform. elastica en apoyo 5 = 8.1 mm

Movimiento por deform. elastica en J.C. 5 = 10.6 mm

Movimiento por deform. elastica en apoyo 6 = 8.1 mm

Movimiento por deform. elastica en J.C. 6 = 10.6 mm

Movimiento por deform. elastica en apoyo 7 = 8.1 mm

Movimiento por deform. elastica en J.C. 7 = 10.1 mm

Movimiento por deform. elastica en apoyo 8 = 6.5 mm

#### MOVIMIENTOS POR FLUENCIA A 10000 DIAS

Tiempo final =10000. dias

Apoyo = 1

Edad Fase 1 = 0. dias Inc. Mov\_fluencia= 13.20 mm

Movimiento final por fluencia en apoyo = 13.20 mm

Apoyo = 2

Edad Fase 1 = 19. dias Inc. Mov\_fluencia= 13.27 mm

Edad Fase 2 = 0. dias Inc. Mov\_fluencia= 29.83 mm

Movimiento final por fluencia en apoyo = 29.83 mm

Apoyo = 3

Edad Fase 1 = 33. dias Inc. Mov\_fluencia= 12.13 mm

Edad Fase 2 = 19. dias Inc. Mov\_fluencia= 27.84 mm

Edad Fase 3 = 0. dias Inc. Mov\_fluencia= 44.41 mm

Movimiento final por fluencia en apoyo = 44.41 mm

Apoyo = 4

Edad Fase 1 = 47. dias Inc. Mov\_fluencia= 11.36 mm

Edad Fase 2 = 33. dias Inc. Mov\_fluencia= 25.72 mm

Edad Fase 3 = 19. dias Inc. Mov\_fluencia= 41.43 mm

Edad Fase 4 = 0. dias Inc. Mov\_fluencia= 58.00 mm

Movimiento final por fluencia en apoyo = 58.00 mm

Apoyo = 5

Edad Fase 1 = 61. dias Inc. Mov\_fluencia= 10.76 mm

Edad Fase 2 = 47. dias Inc. Mov\_fluencia= 24.21 mm

Edad Fase 3 = 33. dias Inc. Mov\_fluencia= 38.58 mm

Edad Fase 4 = 19. dias Inc. Mov\_fluencia= 54.29 mm

Edad Fase 5 = 0. dias Inc. Mov\_fluencia= 70.86 mm

Movimiento final por fluencia en apoyo = 70.86 mm

Apoyo = 6

Edad Fase 1 = 75. dias Inc. Mov\_fluencia= 10.27 mm

Edad Fase 2 = 61. dias Inc. Mov\_fluencia= 23.02 mm

Edad Fase 3 = 47. dias Inc. Mov\_fluencia= 36.47 mm

Edad Fase 4 = 33. dias Inc. Mov\_fluencia= 50.83 mm

Edad Fase 5 = 19. dias Inc. Mov\_fluencia= 66.54 mm

Edad Fase 6 = 0. dias Inc. Mov\_fluencia= 83.11 mm

Movimiento final por fluencia en apoyo = 83.11 mm

Apoyo = 7

Edad Fase 1 = 89. dias Inc. Mov\_fluencia= 9.85 mm

Edad Fase 2 = 75. dias Inc. Mov\_fluencia= 22.01 mm

Edad Fase 3 = 61. dias Inc. Mov\_fluencia= 34.76 mm

Edad Fase 4 = 47. dias Inc. Mov\_fluencia= 48.21 mm

Edad Fase 5 = 33. dias Inc. Mov\_fluencia= 62.57 mm

Edad Fase 6 = 19. dias Inc. Mov\_fluencia= 78.28 mm

Edad Fase 7 = 0. dias Inc. Mov\_fluencia= 94.85 mm

Movimiento final por fluencia en apoyo = 94.85 mm

Apoyo = 8

Edad Fase 1 = 103. dias Inc. Mov\_fluencia= 9.48 mm

Edad Fase 2 = 89. dias Inc. Mov\_fluencia= 21.14 mm

Edad Fase 3 = 75. dias Inc. Mov\_fluencia= 33.30 mm

Edad Fase 4 = 61. dias Inc. Mov\_fluencia= 46.05 mm

Edad Fase 5 = 47. dias Inc. Mov\_fluencia= 59.50 mm

Edad Fase 6 = 33. dias Inc. Mov\_fluencia= 73.87 mm

Edad Fase 7 = 19. dias Inc. Mov\_fluencia= 88.84 mm

Edad Fase 8 = 0. dias Inc. Mov\_fluencia= 102.09 mm

Movimiento final por fluencia en apoyo =102.09 mm

RESUMEN MOVIMIENTOS FINALES EN APOYOS (mm)

| APOYO | ACORT.ELAST. | RETRACCION | FLUENCIA | TOTAL |
|-------|--------------|------------|----------|-------|
| 1     | 6.4          | 8.7        | 13.2     | 28.3  |
| 2     | 8.1          | 18.9       | 29.8     | 56.8  |
| 3     | 8.1          | 28.9       | 44.4     | 81.4  |
| 4     | 8.1          | 38.8       | 58.0     | 104.9 |
| 5     | 8.1          | 48.5       | 70.9     | 127.5 |
| 6     | 8.1          | 58.1       | 83.1     | 149.3 |
| 7     | 8.1          | 67.6       | 94.9     | 170.6 |
| 8     | 6.5          | 74.9       | 102.1    | 183.4 |

CÁLCULO DE LOS DESPLAZAMIENTOS EN LOS APOYOS DE PILAS Y ESTRIBOS

PROYECTO: L.A.V. MADRID-BARCELONA-FRONTA FRANCESA. TRAMO: LLEIDA-MARTORELL. SUBTRAMO XI-I  
REFERENCIA: VIADUCTO DEL RÍO ANOIA

Desplazamientos característicos de cada una de las acciones

| PILA/ESTRIBO | BARRA                                 | NUDO | Retrac+Flue | Temp + | Temp - | Otras + | Otras - |
|--------------|---------------------------------------|------|-------------|--------|--------|---------|---------|
| Estribo 2    | 1                                     | 1    | -23.8       | 7.6    | -7.6   | 1.0     | -1.0    |
| Pila 7       | 21                                    | 21   | -22.2       | 6.8    | -6.8   | 1.0     | -1.0    |
| Pila 6       | 41                                    | 41   | -19.4       | 5.8    | -5.8   | 1.0     | -1.0    |
| Pila 5       | 61                                    | 61   | -16.6       | 4.8    | -4.8   | 1.0     | -1.0    |
| Pila 4       | 81                                    | 81   | -13.6       | 3.8    | -3.8   | 1.0     | -1.0    |
| Pila 3       | 101                                   | 101  | -10.6       | 2.8    | -2.8   | 1.0     | -1.0    |
| Pila 2       | 121                                   | 121  | -7.4        | 1.8    | -1.8   | 1.0     | -1.0    |
| Pila 1       | 141                                   | 141  | -3.7        | 0.8    | -0.8   | 1.0     | -1.0    |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |      |             |        |        |         |         |

Hipótesis de instalación de los apoyos en diciembre

| PILA/ESTRIBO | BARRA                                 | NUDO | Desplazamientos Iniciales |              | Desplazamientos finales |              |
|--------------|---------------------------------------|------|---------------------------|--------------|-------------------------|--------------|
|              |                                       |      | Acortamiento              | Alargamiento | Acortamiento            | Alargamiento |
| Estribo 2    | 1                                     | 1    | -1.0                      | 16.2         | -24.8                   | -7.6         |
| Pila 7       | 21                                    | 21   | -1.0                      | 14.6         | -23.2                   | -7.6         |
| Pila 6       | 41                                    | 41   | -1.0                      | 12.6         | -20.4                   | -6.8         |
| Pila 5       | 61                                    | 61   | -1.0                      | 10.6         | -17.6                   | -6.0         |
| Pila 4       | 81                                    | 81   | -1.0                      | 8.6          | -14.6                   | -5.0         |
| Pila 3       | 101                                   | 101  | -1.0                      | 6.6          | -11.6                   | -4.0         |
| Pila 2       | 121                                   | 121  | -1.0                      | 4.6          | -8.4                    | -2.8         |
| Pila 1       | 141                                   | 141  | -1.0                      | 2.6          | -4.7                    | -1.1         |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |      |                           |              |                         |              |

Hipótesis de instalación de los apoyos en marzo

| PILA/ESTRIBO | BARRA                                 | NUDO | Desplazamientos Iniciales |              | Desplazamientos finales |              |
|--------------|---------------------------------------|------|---------------------------|--------------|-------------------------|--------------|
|              |                                       |      | Acortamiento              | Alargamiento | Acortamiento            | Alargamiento |
| Estribo 2    | 1                                     | 1    | -8.6                      | 8.6          | -32.4                   | -15.2        |
| Pila 7       | 21                                    | 21   | -7.8                      | 7.8          | -30.0                   | -14.4        |
| Pila 6       | 41                                    | 41   | -6.8                      | 6.8          | -26.2                   | -12.6        |
| Pila 5       | 61                                    | 61   | -5.8                      | 5.8          | -22.4                   | -10.8        |
| Pila 4       | 81                                    | 81   | -4.8                      | 4.8          | -18.4                   | -8.8         |
| Pila 3       | 101                                   | 101  | -3.8                      | 3.8          | -14.4                   | -6.8         |
| Pila 2       | 121                                   | 121  | -2.8                      | 2.8          | -10.2                   | -4.6         |
| Pila 1       | 141                                   | 141  | -1.8                      | 1.8          | -5.5                    | -1.9         |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |      |                           |              |                         |              |

Resumen de desplazamientos máximos acumulados

| PILA/ESTRIBO | Acort. Máx.                           | Alarg. Máx. |
|--------------|---------------------------------------|-------------|
| Estribo 2    | -40.0                                 | 16.2        |
| Pila 7       | -36.8                                 | 14.6        |
| Pila 6       | -32.0                                 | 12.6        |
| Pila 5       | -27.2                                 | 10.6        |
| Pila 4       | -22.2                                 | 8.6         |
| Pila 3       | -17.2                                 | 6.6         |
| Pila 2       | -12.0                                 | 4.6         |
| Pila 1       | -6.3                                  | 2.6         |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |             |

Hipótesis de instalación de los apoyos en junio

| PILA/ESTRIBO | BARRA                                 | NUDO | Desplazamientos Iniciales |              | Desplazamientos finales |              |
|--------------|---------------------------------------|------|---------------------------|--------------|-------------------------|--------------|
|              |                                       |      | Acortamiento              | Alargamiento | Acortamiento            | Alargamiento |
| Estribo 2    | 1                                     | 1    | -16.2                     | 1.0          | -40.0                   | -22.8        |
| Pila 7       | 21                                    | 21   | -14.6                     | 1.0          | -36.8                   | -21.2        |
| Pila 6       | 41                                    | 41   | -12.6                     | 1.0          | -32.0                   | -18.4        |
| Pila 5       | 61                                    | 61   | -10.6                     | 1.0          | -27.2                   | -15.6        |
| Pila 4       | 81                                    | 81   | -8.6                      | 1.0          | -22.2                   | -12.6        |
| Pila 3       | 101                                   | 101  | -6.6                      | 1.0          | -17.2                   | -9.6         |
| Pila 2       | 121                                   | 121  | -4.6                      | 1.0          | -12.0                   | -6.4         |
| Pila 1       | 141                                   | 141  | -2.6                      | 1.0          | -6.3                    | -2.7         |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |      |                           |              |                         |              |

Hipótesis de instalación de los apoyos en septiembre

| PILA/ESTRIBO | BARRA                                 | NUDO | Desplazamientos Iniciales |              | Desplazamientos finales |              |
|--------------|---------------------------------------|------|---------------------------|--------------|-------------------------|--------------|
|              |                                       |      | Acortamiento              | Alargamiento | Acortamiento            | Alargamiento |
| Estribo 2    | 1                                     | 1    | -8.6                      | 8.6          | -32.4                   | -15.2        |
| Pila 7       | 21                                    | 21   | -7.8                      | 7.8          | -30.0                   | -14.4        |
| Pila 6       | 41                                    | 41   | -6.8                      | 6.8          | -26.2                   | -12.6        |
| Pila 5       | 61                                    | 61   | -5.8                      | 5.8          | -22.4                   | -10.8        |
| Pila 4       | 81                                    | 81   | -4.8                      | 4.8          | -18.4                   | -8.8         |
| Pila 3       | 101                                   | 101  | -3.8                      | 3.8          | -14.4                   | -6.8         |
| Pila 2       | 121                                   | 121  | -2.8                      | 2.8          | -10.2                   | -4.6         |
| Pila 1       | 141                                   | 141  | -1.8                      | 1.8          | -5.5                    | -1.9         |
| Estribo 1    | Punto fijo. No sufre desplazamientos. |      |                           |              |                         |              |

**CONTROL TENSIONAL EN HIPÓTESIS DE ASIENTOS DIFERENCIALES**

# CÁLCULO DEL INCREMENTO TENSIONAL POR EFECTO DEL ASIENTO DIFERENCIAL

Asiento en E-1

- La sección 9 sufre un incremento de momento flector

$$\left. \begin{array}{l} M_{pp} = 2066'4 \text{ mT} \\ M_{aE-1} = 2588'9 \text{ mT} \end{array} \right\} \Rightarrow \Delta M = 522'5 \text{ mT}$$

$$\text{Caract. sección} = \begin{cases} A = 9'6742 \text{ m}^2 \\ I = 11'3278 \text{ m}^4 \\ V_{sup} = 1'1524 \text{ m} \\ V_{inf} = 1'85260 \text{ m} \end{cases}$$

$$\Delta \sigma_s = \frac{\Delta M \cdot V_{sup}}{I} = 53'2 \text{ T/m}^2 \text{ (comp.)}$$

$$\Delta \sigma_i = \frac{\Delta M \cdot V_{inf}}{I} = -85'5 \text{ T/m}^2 \text{ (trac.)}$$

- La sección 21 sufre una reducción del momento flector permanente igual a:

$$\Delta M = 1304'7 \text{ mT}$$

$$\text{Caract. sección} = \begin{cases} A = 10'9754 \text{ m}^2 \\ I = 13'5715 \text{ m}^4 \\ V_{sup} = 1'318 \text{ m} \\ V_{inf} = 1'687 \text{ m} \end{cases}$$

$$\Delta \sigma_s = 126'7 \text{ T/m}^2 \text{ (comp.)}$$

$$\Delta \sigma_i = -162'2 \text{ T/m}^2 \text{ (trac.)}$$

- La sección 30:

$$\Delta M = 553'98 \text{ mT}$$

$$I = 11'3278 \text{ m}^4$$

$$V_{sup} = 1'1524 \text{ m}$$

$$V_{inf} = 1'85260 \text{ m}$$

$$\Delta \sigma_s = 56'4 \text{ T/m}^2$$

$$\Delta \sigma_i = -90'6 \text{ T/m}^2$$





- Sección 41

$$\Delta M = -363'8 \text{ mT}$$

$$I = 13'5715 \text{ m}^4$$

$$Y_{\text{sup}} = 1'318 \text{ m}$$

$$Y_{\text{inf}} = 1'687 \text{ m}$$

$$\Delta \sigma_s = -35'3 \text{ T/m}^2 \text{ (trac.)}$$

$$\Delta \sigma_i = 45'2 \text{ T/m}^2 \text{ (comp.)}$$



Asiento en E-2

- Sección 152

$$\Delta M = 980'26 \text{ mT}$$

$$I = 11'3278 \text{ m}^4$$

$$Y_{\text{sup}} = 1'1524 \text{ m}$$

$$Y_{\text{inf}} = 1'85260 \text{ m}$$

$$\Delta \sigma_s = 99'7 \text{ T/m}^2$$

$$\Delta \sigma_i = -160'3 \text{ T/m}^2$$

- Sección 141

$$\Delta M = 2183'4 \text{ mT}$$

$$I = 13'5715 \text{ m}^4$$

$$Y_{\text{sup}} = 1'318 \text{ m}$$

$$Y_{\text{inf}} = 1'687 \text{ m}$$

$$\Delta \sigma_s = 212'0 \text{ T/m}^2$$

$$\Delta \sigma_i = -271'4 \text{ T/m}^2$$

- Sección 132

$$\Delta M = 927'3 \text{ mT}$$

$$I = 11'3278 \text{ m}^4$$

$$V_{sup} = 1'1524 \text{ m}$$

$$V_{inf} = 1'85266 \text{ m}$$

$$\Delta \sigma_s = 94'3 \text{ T/m}^2$$

$$\Delta \sigma_i = -151'2 \text{ T/m}^2$$

- Sección 121

$$\Delta M = -608'7 \text{ mT}$$

$$I = 13'5715 \text{ m}^4$$

$$V_{sup} = 1'318 \text{ m}$$

$$V_{inf} = 1'687 \text{ m}$$

$$\Delta \sigma_s = -59'1 \text{ T/m}^2$$

$$\Delta \sigma_i = 75'7 \text{ T/m}^2$$

## COMPROBACIÓN DE LAS SECCIONES CRÍTICAS

Según el anexo geotécnico el asiento se producirá de forma lenta. Por lo tanto, sólo se comprueban las tensiones para hipótesis de combinación de cargas a largo plazo.

Si se asume un incremento del asiento proporcional a  $\psi$  ( $\equiv$  coef. de fluencia) la variación final en el estado tensional de la sección será:

$$\Delta \sigma_{final} = \frac{1 - e^{-\psi}}{\psi} \cdot \Delta \sigma_{inst}$$

$$\Delta \sigma_{final} \approx 0'42 \Delta \sigma_{inst}$$

Para mayor seguridad no se tendrá en cuenta esta reducción.





a. Hipótesis de construcción.

- Se considera que el asiento diferencial no ha aparecido.

b. Hipótesis de carga permanente

$$\sigma_{t, \max} \leq 0 \text{ kg/cm}^2$$

Sección 9. Combinación 9.

$$\left. \begin{array}{l} \sigma_s = -340'1 \text{ T/m}^2 \\ \sigma_i = -722'5 \text{ T/m}^2 \end{array} \right\} \rightarrow \text{Valores en hipótesis sin asiento}$$

$$\left. \begin{array}{l} \Delta \sigma_s = -53'2 \text{ T/m}^2 \\ \Delta \sigma_i = 85'5 \text{ T/m}^2 \end{array} \right\} \rightarrow \text{Incrementos de tensión por asiento}$$

$$\sigma_s' = -340'1 - 53'2 = -393'3 \text{ T/m}^2 < \sigma_{t, \max}$$

$$\sigma_i' = -722'5 + 85'5 = -637 \text{ T/m}^2 < \sigma_{t, \max}$$



Sección 21. Combinación 9.

$$\left. \begin{array}{l} \sigma_s = -570'3 \text{ T/m}^2 \\ \sigma_i = -409'7 \text{ T/m}^2 \\ \Delta \sigma_s = +126'7 \text{ T/m}^2 \\ \Delta \sigma_i = 162'2 \text{ T/m}^2 \end{array} \right\} \Rightarrow$$

$$\Rightarrow \sigma_s' = -697 \text{ T/m}^2 < \sigma_{t, \max}$$

$$\sigma_i' = -247'5 \text{ T/m}^2 < \sigma_{t, \max}$$

Sección 30. Combinación 9.

$$\left. \begin{array}{l} \sigma_s = -456'7 \text{ T/m}^2 \\ \sigma_i = -661'2 \text{ T/m}^2 \\ \Delta \sigma_s = -56'4 \text{ T/m}^2 \\ \Delta \sigma_i = 90'6 \text{ T/m}^2 \end{array} \right\} \Rightarrow$$

$$\Rightarrow \left\{ \begin{array}{l} \sigma_s' = -513'1 \text{ T/m}^2 < \sigma_{t, \max} \\ \sigma_i' = -570'6 \text{ T/m}^2 < \sigma_{t, \max} \end{array} \right.$$



Sección 41. Combinación 9.

$$\sigma_s' = -615'4 + 35'3 = -580'1 \text{ T/m}^2 < \sigma_t$$

$$\sigma_i' = -465'2 - 45'2 = -510'4 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 152. Combinación 9.

$$\sigma_s' = -354 - 99'7 = -453'7 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -884'8 + 160'3 = -724'5 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 141. Comb. 9

$$\sigma_s' = -701'1 - 212'0 = -913'1 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -338'1 + 271'9 = -66'7 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 132. Comb. 9

$$\sigma_s' = -461'7 - 94'3 = -556 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -673'9 + 151'7 = -522'2 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 121. Comb. 9

$$\sigma_s' = -608'7 + 59'1 = -549'6 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -473'9 - 75'7 = -549'6 \text{ T/m}^2 < \sigma_{tmax}$$



< Hipótesis de combinación frecuente

$$\sigma_{tmax} \leq f_{ctk} = 28'5 \text{ kp/cm}^2 = 285 \text{ T/m}^2$$

Sección 9. Combinación 13.

$$\sigma_s' = -593'0 - 53'2 = -646'2 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -311'3 + 85'5 = -225'8 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 21. Combinación 13.

$$\sigma_s' = -630'9 - 126'7 = -757'6 \text{ T/m}^2$$

$$\sigma_i' = -332'0 + 162'2 = -169'8 \text{ T/m}^2$$

Sección 30. Combinación 13.

$$\sigma_s' = -728'6 - 56'4 = -785 \text{ T/m}^2$$

$$\sigma_i' = -223'8 + 90'6 = -133'2 \text{ T/m}^2$$

Sección 41. Combinación 15.

$$\sigma_s' = -258'7 + 35'3 = -223'4 \text{ T/m}^2$$

$$\sigma_i' = -921'8 - 45'2 = -967 \text{ T/m}^2$$



Sección 152. Combinación 13

$$\sigma_s' = -602'4 - 99'7 = -702'1 \text{ T/m}^2$$

$$\sigma_i' = -485'3 + 160'3 = -325 \text{ T/m}^2$$

Sección 141. Combinación 13

$$\sigma_s' = -773'4 - 212 = -985'4 \text{ T/m}^2$$

$$\sigma_i' = -245'6 + 271'4 = 25'8 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 132. Combinación 13

$$\sigma_s' = -735'3 - 94'3 = -829'6 \text{ T/m}^2$$

$$\sigma_i' = -233'8 + 151'7 = -82'1 \text{ T/m}^2$$

Sección 121. Combinación 15

$$\sigma_s' = -252'5 + 59'1 = -193'4 \text{ T/m}^2$$

$$\sigma_i' = -929'8 - 75'7 = -1005'5 \text{ T/m}^2$$



d. Hipótesis de combinación característica

$$\sigma_{tmax} \leq \sigma_{atu} = 407 \text{ T/m}^2$$

Sección 9. Combinación 12

$$\sigma_s' = -786'1 - 53'2 = -839'3 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -0'8 + 85'5 = 84'7 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 21. Combinación 12

$$\sigma_s' = -696'5 - 126'7 = -823'2 \text{ T/m}^2$$

$$\sigma_i' = -248'1 + 162'2 = -85'9 \text{ T/m}^2$$

Sección 30. Combinación 12

$$\sigma_s' = -948'4 - 56'4 = -1004'8 \text{ T/m}^2$$

$$\sigma_i' = 129'9 + 90'6 = 220'5 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 41. Combinación 14

$$\sigma_s' = 7'6 + 35'3 = 42'9 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma_i' = -1262'6 - 45'2 = -1307'8 \text{ T/m}^2$$



Sección 152. Combinación 12

$$\sigma'_s = -795'8 - 99'7 = -895'5 \text{ T/m}^2$$

$$\sigma'_i = -174'0 + 160'3 = -13'7 \text{ T/m}^2$$

Sección 141. Combinación 12

$$\sigma'_s = -846'6 - 212 = -1058'6 \text{ T/m}^2$$

$$\sigma'_i = -151'8 + 271'4 = 119'6 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 132. Combinación 12

$$\sigma'_s = -956'3 - 94'3 = -1050'6 \text{ T/m}^2$$

$$\sigma'_i = 121'7 + 151'7 = 273'4 \text{ T/m}^2 < \sigma_{tmax}$$

Sección 121. Combinación 14

$$\sigma'_s = 13'5 + 59'1 = 72'6 \text{ T/m}^2 < \sigma_{tmax}$$

$$\sigma'_i = -1276'2 - 75'7 = -1345'9 \text{ T/m}^2$$

**10 CÁLCULO DEL ESTRIBO 1**

## 10.1 GEOMETRÍA



### 10.3 CÁLCULO DE ESFUERZOS Y DIMENSIONAMIENTO

El cálculo y dimensionamiento del estribos se detalla en las páginas siguientes. Las hipótesis de cálculo se exponen a continuación:

1. El cálculo se realiza en la hipótesis clásica como muro con acciones en coronación debidas a las reacciones horizontales y verticales transmitidas por el tablero. Los empujes del terreno se han calculado para un coeficiente de empuje  $K=0,3$  y una densidad del terreno de  $2,0 \text{ T/m}^3$ . No se han considerado eventuales empujes hidrostáticos al colocar un adecuado drenaje en el trasdós del estribo.
2. En el cálculo de la seguridad del estribo frente al vuelco, deslizamiento y tensiones máximas se han verificado las siguientes condiciones (ver resultados en listados de cálculo).

Coeficiente de Seguridad al vuelco,  $CS_v \geq 1,80$

Coeficiente de Seguridad al deslizamiento  $CS_d \geq 1,50$

Tensión máxima del terreno en puntera  $\sigma_{\max} \leq 1,33 \sigma_{\text{admisible}}$

Con  $\sigma_{\text{admisible}} = 4,5 \text{ Kp/cm}^2$  y coeficientes de rozamiento terreno-zapata  $\mu = 0,55$ . La Dirección facultativa deberá verificar si el terreno que aparece en la excavación cumple dicho criterio de dimensionamiento. En caso contrario, se deberá recalcular el Estribo.

3. El dimensionamiento de las armaduras de flexión y cortante del muro y zapata se realiza con los criterios de la Normativa vigente para estructuras de hormigón (EHE). Los coeficientes de seguridad de las acciones corresponden con un **nivel de control intenso**  $\gamma_{fg}=1,35$  y  $\gamma_{fq}=1,50$ .
4. Las armaduras horizontales de flexión transversal se colocan de acuerdo con los valores mínimos exigidos por la Normativa EHE.

10.2 ACCIONES EN CORONACIÓN

Estados de carga

|              | Fz (kN) | MomentoX (mkN) | ___Apoyo: 1 |
|--------------|---------|----------------|-------------|
| Peso propio: | 1958.28 | 0.00           |             |
| CP2:         | 1497.61 | 0.00           |             |
| Pretensado:  | 624.24  | 0.00           |             |
| SC 100%:     | 134.66  | 0.00           |             |
| SC 50%:      | 325.14  | 0.00           |             |
| V60 CEN:     | 3116.04 | 0.00           |             |
| V60 EXC:     | 3116.04 | 0.00           |             |
| Gradiente:   | 113.94  | 0.00           |             |
| Deformac:    | 0.00    | 0.00           |             |

|              | Fz (kN)  | MomentoX (mkN) | ___Apoyo: 2 |
|--------------|----------|----------------|-------------|
| Peso propio: | 1942.36  | 0.00           |             |
| CP2:         | 719.72   | 0.00           |             |
| Pretensado:  | 699.37   | 0.00           |             |
| SC 100%:     | 132.57   | 0.00           |             |
| SC 50%:      | -219.49  | 0.00           |             |
| V60 CEN:     | 3101.40  | 0.00           |             |
| V60 EXC:     | -1087.82 | 0.00           |             |
| Gradiente:   | 109.47   | 0.00           |             |
| Deformac:    | 0.00     | 0.00           |             |

| Acciones horiz. | Fx (kN)  | Fy (kN) | (Totales) |
|-----------------|----------|---------|-----------|
| Relógicas:      | 0.00     | 0.00    |           |
| Temperatura:    | 0.00     | 0.00    |           |
| Frenado:        | 14028.30 | 0.00    |           |
| Centrífuga:     | 0.00     | 198.90  |           |
| Viento_long:    | 0.00     | 0.00    |           |
| Sismo long:     | 0.00     | 0.00    |           |
| V_trav_fr:      | 0.00     | 0.00    |           |
| V_trav_dor:     | 0.00     | 0.00    |           |
| V_trav_conc:    | 0.00     | 442.80  |           |
| V_long_conc:    | 0.00     | 0.00    |           |
| Sismo tran:     | 0.00     | 0.00    |           |

SC terraplén: 30.00 kN/m2



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 1 - FUJO

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*  
\*\*\* Programa de calculo para estribos generales \*\*\*  
\*\*\*  
\*\*\* PEDELTA \*\*\*  
\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

Nombre del proyecto: L.A.V. Lleida-Martorell  
Referencia del proyecto: Viaducto de Anoia - Estribo 1

OBSERVACIONES A REALIZAR

1. Canto zapata = H/12 a H/8 : No se cumple
2. Ancho cimentación = 0.4 a 0.9 H: Correcto
3. Ancho fuste = H/12 a H/8 : Correcto
4. Puntera < 2(hzapata) => Cim.rígida
5. Ancho murete = max(0.30,hmur/8): Correcto

DATOS DE ENTRADA

Tipología del estribo

Tipo 1: Est cimentación superficial

Características de los materiales

Hormigón de alzados: 30.00 MPa  
Hormigón de cimentación: 25.00 MPa  
Resistencia acero armado: 500.00 MPa  
Coeficiente de fluencia: 2.00  
Módulo de deformación: 28576.79 MPa

Coeficientes de mayoración de acciones

C<sub>g</sub>: 1.35 C<sub>q</sub>: 1.50

Coeficientes de combinación de acciones

psi0: 0.80 psi1: 0.60 psi2: 0.20

Características del terreno

Altura tierras: 0.00 m  
Ángulo roz.interno: 30.00°  
Rozamiento tierras-tierras: 0.20  
Rozamiento cimentac-tierras: 0.55  
Peso específico del relleno: 20.00 kN/m3  
Tensión admisible (MPa): 0.45 MPa  
Carga última (MPa): 1.80 MPa  
Talud: 2/3

Características de los apoyos

Número de apoyos: 2  
Excentricidades:  
Exc: 1 1.700 m  
Exc: 2 -1.700 m  
Separación apoyos: 3.40 m  
Excentricidad longitudinal: 1.50 m  
Dim. lgtd apoyo (bapox): 0.70 m  
Dim. transv apoyo (bapoy): 0.70 m  
Altura apoyo: 0.43 m

Características del cajeadado

Longitud voladizo: 0.00 m  
Canto voladizo: 0.00 m  
Peralte voladizo: 0.00 m  
Canto cargadero: 0.00 m  
Ancho cargadero: 0.00 m  
Longitud voladizo:

Estados de carga

|              | Fz (kN) | MomentoX (mkN) | Apoyo: 1 |
|--------------|---------|----------------|----------|
| Peso propio: | 1958.28 | 0.00           |          |
| CP2:         | 1497.61 | 0.00           |          |
| Pretensado:  | 624.24  | 0.00           |          |
| SC 100%:     | 134.66  | 0.00           |          |
| SC 50%:      | 325.14  | 0.00           |          |
| V60 CEN:     | 3116.04 | 0.00           |          |
| V60 EXC:     | 3116.04 | 0.00           |          |
| Gradiente:   | 113.94  | 0.00           |          |
| Deformac:    | 0.00    | 0.00           |          |

|              | Fz (kN)  | MomentoX (mkN) | Apoyo: 2 |
|--------------|----------|----------------|----------|
| Peso propio: | 1942.36  | 0.00           |          |
| CP2:         | 719.72   | 0.00           |          |
| Pretensado:  | 699.37   | 0.00           |          |
| SC 100%:     | 132.57   | 0.00           |          |
| SC 50%:      | -219.49  | 0.00           |          |
| V60 CEN:     | 3101.40  | 0.00           |          |
| V60 EXC:     | -1087.82 | 0.00           |          |
| Gradiente:   | 109.47   | 0.00           |          |
| Deformac:    | 0.00     | 0.00           |          |

| Acciones horiz. | Fx (kN)  | Fy (kN) | (Totales) |
|-----------------|----------|---------|-----------|
| Relógicas:      | 0.00     | 0.00    |           |
| Temperatura:    | 0.00     | 0.00    |           |
| Frenado:        | 14028.30 | 0.00    |           |
| Centrífuga:     | 0.00     | 198.90  |           |
| Viento_long:    | 0.00     | 0.00    |           |
| Sismo long:     | 0.00     | 0.00    |           |
| V_trav_fr:      | 0.00     | 0.00    |           |
| V_trav_dor:     | 0.00     | 0.00    |           |
| V_trav_conc:    | 0.00     | 442.80  |           |
| V_long_conc:    | 0.00     | 0.00    |           |
| Sismo tran:     | 0.00     | 0.00    |           |

SC terraplén: 30.00 kN/m2

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 1 - FIJO

GEOMETRÍA DEL ESTRIBO Y ALETAS

|                             |         |
|-----------------------------|---------|
| Muro frontal                |         |
| Largo zapata:               | 18.00 m |
| Canto zapata (HZ):          | 3.00 m  |
| Ángulo cimentación:         | 0.00 m  |
| Espesor horm. nivelación:   | 0.10 m  |
| Altura muro derecha (HD):   | 14.80 m |
| Altura muro izquierda (HI): | 14.80 m |
| Altura murete guarda (HMT): | 3.15 m  |
| Altura_1 cargadero (HM1):   | 1.00 m  |
| Altura_2 cargadero (HM2):   | 1.00 m  |
| Peralte:                    | 0.00 m  |
| Ancho zona apoyo (BM1):     | 5.88 m  |
| Ancho murete guarda (BMT):  | 0.60 m  |
| Ancho_1 cargadero (BM2):    | 0.00 m  |
| Ancho fuste (BF):           | 2.50 m  |
| Excentr. apoyos (EXC):      | 1.50 m  |
| Zarpa (ZP):                 | 6.00 m  |
| Talón (TL):                 | 10.00 m |
| Aleta derecha               |         |
| Longitud aleta:             | 9.50 m  |
| Longitud de muro:           | 9.50 m  |
| Altura muro aleta:          | 0.00 m  |
| Ángulo de aleta derecha:    | 0.00 m  |
| Resguardo aleta:            | 17.30 m |
| Ancho aleta_Extremo libre:  | 1.00 m  |
| Ancho aleta_Extremo muro:   | 1.00 m  |
| Aleta izquierda             |         |
| Longitud aleta:             | 9.50 m  |
| Longitud de muro:           | 9.50 m  |
| Altura muro aleta:          | 0.00 m  |
| Ángulo de aleta izquierda:  | 0.00 m  |
| Resguardo aleta:            | 17.30 m |
| Ancho aleta_Extremo libre:  | 1.00 m  |
| Ancho aleta_Extremo muro:   | 1.00 m  |

GRADO DE EMPOTRAMIENTO

G\_E Aleta-Muro: 1.000

DESGLOSE DEL PESO PROPIO DEL ESTRIBO

| Parte del estribo  | Volumen (m3) | ug (m) |
|--------------------|--------------|--------|
| Aleta derecha      |              |        |
| Aletas, voladizo_d | 0.00         | 15.50  |
| Aletas, voladizo_d | 0.00         | 15.50  |
| Aletas, apoyadas_d | 170.53       | 10.75  |
| Contrafuertes_d    | 0.00         | 15.50  |
| Contraf. chaflán_d | 0.00         | 15.50  |
| Aleta izquierda    |              |        |
| Aletas, voladizo_i | 0.00         | 15.50  |
| Aletas, voladizo_i | 0.00         | 15.50  |
| Aletas, apoyadas_i | 170.53       | 10.75  |
| Contrafuertes_i    | 0.00         | 15.50  |
| Contraf. chaflán_i | 0.00         | 15.50  |
| Fuste del estribo  |              |        |
| Muro frontal       | 384.00       | 7.25   |
| Muro frontal       | 30.00        | 7.25   |
| Muro frontal       | 23.88        | 9.83   |
| Muro frontal       | 77.76        | 9.24   |
| Murete de guarda   | 22.68        | 12.18  |
| Murete de guarda   | 0.00         | 11.88  |
| Murete de guarda   | 0.00         | 11.88  |
| Cajeado            |              |        |
| Macizos cajeado    | 0.00         | 11.88  |
| Macizos cajeado    | 0.00         | 8.94   |
| Macizos cajeado    | 0.00         | 8.94   |
| Zapata             | 999.00       | 9.25   |

RESUMEN DE ACCIONES

Peso propio estribo: 46959.25 kN  
Momento Myb: -428448.56 mkN

Peso tierras estr. : 38638.32 kN  
Momento Myt: -535303.56 mkN

Empuje tierras : 23415.12 kN  
Momento Mye: 173756.66 mkN

Roz vert tierras : 4683.02 kN  
Momento Myv: -86635.95 mkN

Sobrecarga estr. : 2167.20 kN  
Momento Myq: -33569.93 mkN

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VIADUCTO DE ANOLA  
ESTRIBO 1 - FIJO

Planteamiento como ELU

1. Comprobación de la estabilidad global del estribo

Acciones características (ELS)

|       | ACCIÓN                    | Fx       | Fz       | Mya        |
|-------|---------------------------|----------|----------|------------|
| (I)   | Peso propio del estribo:  | 0.00     | 46959.25 | -428448.56 |
| (IIa) | Acc. tablero (Fz,max):    | 0.00     | 14192.66 | -106444.92 |
| (IIb) | Acc. tablero (Fz,min):    | 0.00     | 7573.94  | -56804.56  |
| (III) | Acc. tablero (Fx,max):    | 14028.30 | 0.00     | 255735.89  |
| (IV)  | Empuje de tierras:        | 23415.12 | 0.00     | 173756.66  |
| (V)   | Peso de tierras:          | 0.00     | 38638.32 | -535303.56 |
| (VI)  | Rozamiento vert. tierras: | 0.00     | 4683.02  | -86635.95  |

Acciones mayoradas (ELU)

|       | ACCIÓN                    | Fx       | Fz        | Mya        |
|-------|---------------------------|----------|-----------|------------|
| (I)   | Peso propio del estribo:  | 0.00     | 42263.32  | -385603.69 |
| (IIb) | Acc. tablero (Fz,min):    | 0.00     | 9715.23   | -72864.23  |
| (III) | Acc. tablero (Fx,max):    | 18938.21 | 0.00      | 345243.47  |
| (IV)  | Empuje de tierras:        | 35122.68 | 0.00      | 260634.98  |
| (V)   | Peso de tierras:          | 0.00     | 57957.48  | -802955.38 |
| (VI)  | Rozamiento vert. tierras: | 0.00     | 7024.54   | -129953.92 |
|       | TOTAL.....                | 54060.88 | 116960.56 | -785498.75 |

RESULTADOS:

Excentricidad de la resultante respecto al borde frontal de la zapata:

ead: 6.72 m

eau: 5.41 m

eau < ead: Queda comprobada la estabilidad frente al vuelco

2. Comprobación de la seguridad global frente al deslizamiento

tg\_ad: 0.49

ud: 0.55 Ángulo de roz. suelo-cimentación

tg\_ad < ud : Queda comprobada la seguridad global frente al deslizamiento

3. Comprobación en vacío

3a. Estabilidad al vuelco:

ead: 9.86 m

eau: 4.97 m

eau < ead: Queda comprobada la estabilidad frente al vuelco en vacío

3b. Estabilidad al deslizamiento:

tg\_ad: 0.35

ud: 0.55 Ángulo de roz. suelo-cimentación

tg\_ad < ud : Queda comprobada la seguridad global frente al deslizamiento

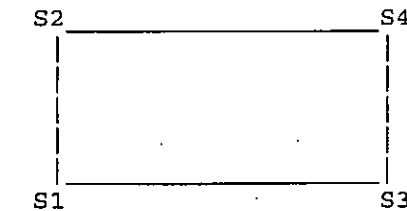
Comprobación de la máxima compresión unitaria sobre el terreno cim. (ELS)

ea\_cp: 6.49 m > (Ancho zapata)/3 => Ley de tensiones trapecial

Tensión máxima: 0.5465 MPa  
Tensión media: 0.3137 MPa  
Tensión mínima: 0.0809 MPa  
Tensión admisible: 0.4500 MPa

Tensión máxima < 1.30 · Tensión admisible => Correcto

Tensiones en las esquinas de la cimentación:



S1: 0.5551 MPa  
S2: 0.0895 MPa  
S3: 0.5380 MPa  
S4: 0.0724 MPa

Planteamiento clásico-determinista

1b. Comprobación de la estabilidad al vuelco

Momento estabilizador: -1156833.00 mkN

Momento desestabilizador: 429492.56 mkN

Coef. al vuelco (Csv): 2.69

2b. Comprobación de la estabilidad al deslizamiento

Fuerza estabilizadora: 57460.29 kN

Fuerza desestabilizadora: 37443.42 kN

Coef. al desliz. (Csd): 1.53

3b. Comprobación en vacío (construcción)

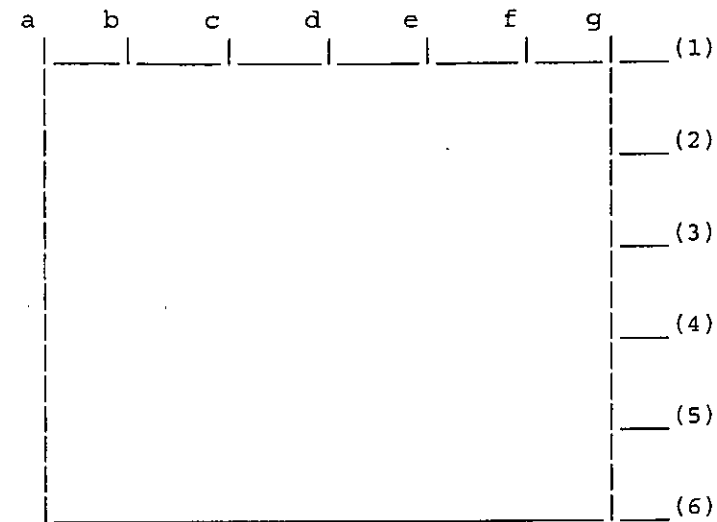
Coef. al vuelco (Csv): 6.05 Correcto

Coef. deslizamiento (Csd): 2.12 Correcto

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VIADUCTO DE ANOIA  
ESTRIBO 1 - FIJO

ENVOLVENTES DE MOMENTOS EN ELS

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. HZTAL



Geometría de la placa:  
Ancho de la placa: 14.00 m  
Altura de la placa: 18.25 m

| Placa empotrada | Mz <sub>a</sub> | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg     | mkN/ml |
|-----------------|-----------------|-------|-------|-------|-------|-------|---------|--------|
| 1               | -968.7          | 267.2 | 452.6 | 511.0 | 452.6 | 267.2 | -968.7  |        |
| 2               | -780.8          | 248.9 | 431.6 | 494.5 | 431.6 | 248.9 | -780.8  |        |
| 3               | -2779.9         | 315.0 | 515.9 | 577.1 | 515.9 | 315.0 | -2779.9 |        |
| 4               | -1251.6         | 363.5 | 541.9 | 599.2 | 541.9 | 363.5 | -1251.6 |        |
| 5               | -839.3          | 240.5 | 329.2 | 353.3 | 329.2 | 240.5 | -839.3  |        |

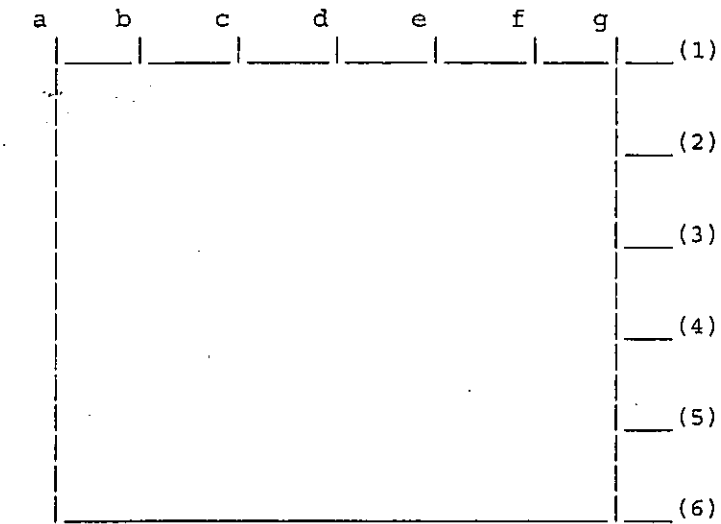
| Placa apoyada | Mz <sub>a</sub> | Mzb    | Mzc    | Mzd    | Mze    | Mzf    | Mzg | mkN/ml |
|---------------|-----------------|--------|--------|--------|--------|--------|-----|--------|
| 1             | 0.0             | 1147.9 | 1311.1 | 1360.4 | 1311.1 | 1147.9 | 0.0 |        |
| 2             | 0.0             | 1058.9 | 1212.2 | 1263.7 | 1212.2 | 1058.9 | 0.0 |        |
| 3             | 0.0             | 1032.8 | 1167.7 | 1214.6 | 1167.7 | 1032.8 | 0.0 |        |
| 4             | 0.0             | 879.7  | 974.7  | 999.1  | 974.7  | 879.7  | 0.0 |        |
| 5             | 0.0             | 413.4  | 432.3  | 433.3  | 432.3  | 413.4  | 0.0 |        |

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. VERTICAL

| My <sub>d</sub> (mkN/ml): | PLACA EMPOTRADA | PLACA APOYADA |
|---------------------------|-----------------|---------------|
| 1                         | 0.0             | 0.0           |
| 2                         | 26.8            | 229.3         |
| 3                         | 215.6           | 554.6         |
| 4                         | 418.7           | 722.7         |
| 5                         | 325.5           | 215.4         |
| 6                         | -1420.6         | -2608.1       |

ENVOLVENTES DE MOMENTOS EN ELU

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. HZTAL



Geometría de la placa:  
Ancho de la placa: 14.00 m  
Altura de la placa: 18.25 m

| Placa empotrada | Mz <sub>a</sub> | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg     | mkN/ml |
|-----------------|-----------------|-------|-------|-------|-------|-------|---------|--------|
| 1               | -1338.8         | 369.2 | 625.3 | 705.9 | 625.3 | 369.2 | -1338.8 |        |
| 2               | -1058.5         | 344.2 | 596.1 | 682.9 | 596.1 | 344.2 | -1058.5 |        |
| 3               | -4026.7         | 433.1 | 709.3 | 793.6 | 709.3 | 433.1 | -4026.7 |        |
| 4               | -1714.2         | 497.7 | 742.3 | 820.8 | 742.3 | 497.7 | -1714.2 |        |
| 5               | -1146.5         | 328.4 | 449.9 | 482.9 | 449.9 | 328.4 | -1146.5 |        |

| Placa apoyada | Mz <sub>a</sub> | Mzb    | Mzc    | Mzd    | Mze    | Mzf    | Mzg | mkN/ml |
|---------------|-----------------|--------|--------|--------|--------|--------|-----|--------|
| 1             | 0.0             | 1577.8 | 1802.0 | 1869.8 | 1802.0 | 1577.8 | 0.0 |        |
| 2             | 0.0             | 1455.0 | 1665.4 | 1736.0 | 1665.4 | 1455.0 | 0.0 |        |
| 3             | 0.0             | 1416.2 | 1601.2 | 1665.4 | 1601.2 | 1416.2 | 0.0 |        |
| 4             | 0.0             | 1203.4 | 1333.4 | 1367.1 | 1333.4 | 1203.4 | 0.0 |        |
| 5             | 0.0             | 564.2  | 590.2  | 591.6  | 590.2  | 564.2  | 0.0 |        |

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. VERTICAL

| My <sub>d</sub> (mkN/ml): | PLACA EMPOTRADA | PLACA APOYADA |
|---------------------------|-----------------|---------------|
| 1                         | 0.0             | 0.0           |
| 2                         | 39.6            | 319.1         |
| 3                         | 296.3           | 761.9         |
| 4                         | 571.7           | 987.5         |
| 5                         | 442.7           | 290.0         |
| 6                         | -1940.6         | -3570.9       |

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ESTRIBO 1 - FJO

DIMENSIONAMIENTO DE LA ARMADURA DEL FUSTE

| ESFUERZOS: | PLACA EMPOTRADA | PLACA APOYADA   | PLACA G_E       |
|------------|-----------------|-----------------|-----------------|
| Mz_ext:    | -4026.70 mkN/ml | 0.00 mkN/ml     | 0.00 mkN/ml     |
| Mz_cl:     | 820.83 mkN/ml   | 1869.80 mkN/ml  | 1869.80 mkN/ml  |
| My_ext:    | -1293.76 mkN/ml | -2380.63 mkN/ml | -2380.63 mkN/ml |

1. Dimensionamiento de la armadura horizontal

- a. Unión con aletas
- b. Zona centro de fuste

| Placa empotrada        |            |            |
|------------------------|------------|------------|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo (a):  | 38.58      | 0.00       |
| Armadura cálculo (b):  | 0.00       | 7.74       |
| Armadura geom. mínima: | 26.67      | 53.33      |

| Placa apoyada          |            |            |
|------------------------|------------|------------|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo (a):  | 0.00       | 0.00       |
| Armadura cálculo (b):  | 0.00       | 17.72      |
| Armadura geom. mínima: | 26.67      | 53.33      |
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo (a):  | 46.00      | 46.00      |
| Armadura cálculo (b):  |            |            |

| Placa con grado de empotramiento: 1.00 |            |            |
|----------------------------------------|------------|------------|
| Resultados de armado                   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo (a):                  | 0.00       | 0.00       |
| Armadura cálculo (b):                  | 0.00       | 17.72      |
| Armadura geom. mínima:                 | 26.67      | 53.33      |
| Resultados de armado                   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo (a):                  | 46.00      | 46.00      |
| Armadura cálculo (b):                  |            |            |

2. Dimensionamiento de la armadura vertical

| Placa empotrada        |            |            |
|------------------------|------------|------------|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo:      | 12.22      | 3.67       |
| Armadura geom. mínima: | 22.50      | 7.50       |
| Armadura mec. mínima:  | 46.00      | 13.80      |

| Placa apoyada          |            |            |
|------------------------|------------|------------|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo:      | 22.62      | 6.78       |
| Armadura geom. mínima: | 22.50      | 7.50       |
| Armadura mec. mínima:  | 46.00      | 13.80      |

| Placa con grado de empotramiento: |            |            |
|-----------------------------------|------------|------------|
| Resultados de armado              | As1_cm2/ml | As2_cm2/ml |
| Armadura cálculo:                 | 22.62      | 6.78       |
| Armadura geom. mínima:            | 22.50      | 7.50       |
| Armadura mec. mínima:             | 46.00      | 13.80      |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 1 - FUJO

ANÁLISIS DEL MURO FRONTAL DEL ESTRIBO

ANÁLISIS CON HIPÓTESIS DE DEFORMACIÓN PLANA\_ELS

Momento Mz(-): 2150.6 mkN/ml (Hip:Viga biempotrada)  
Momento Mz(+): 3225.8 mkN/ml (Hip:Viga biapoyada)  
Momento My: 24531.6 mkN/ml (Hip:Ménsula)

ANÁLISIS CON HIPÓTESIS DE DEFORMACIÓN PLANA\_ELU

Momento Mz(-): 2927.8 mkN/ml (Hip:Viga biempotrada)  
Momento Mz(+): 4391.6 mkN/ml (Hip:Viga biapoyada)  
Momento My: 33490.2 mkN/ml (Hip:Ménsula)

1. Dimensionamiento de la armadura horizontal

| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
|------------------------|------------|------------|
| Armadura cálculo (-):  | 27.89      | 0.00       |
| Armadura cálculo (+):  | 0.00       | 42.16      |
| Armadura geom. mínima: | 26.67      | 53.33      |

2. Dimensionamiento de la armadura vertical

| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
|------------------------|------------|------------|
| Armadura cálculo:      | 650.24     | 171.27     |
| Armadura geom. mínima: | 22.50      | 7.50       |
| Armadura mec. mínima:  | 46.00      | 13.80      |

CUANTÍAS ARMADO A LO LARGO DE LA ALTURA DEL FUSTE

| z(i)  | Fz(kN)  | My(mkN/ml) | As1_cm2/ml | As2_cm2/ml |
|-------|---------|------------|------------|------------|
| 0.00  | 7.50    | 214.19     | 46.00      | 13.80      |
| 0.50  | 15.00   | 269.28     | 46.00      | 13.80      |
| 1.00  | 22.50   | 324.37     | 46.00      | 13.80      |
| 1.50  | 30.00   | 379.45     | 46.00      | 13.80      |
| 2.00  | 37.50   | 434.54     | 46.00      | 13.80      |
| 2.50  | 45.00   | 489.63     | 46.00      | 13.80      |
| 3.00  | 1117.71 | 544.71     | 46.00      | 13.80      |
| 3.50  | 1198.71 | 599.80     | 46.00      | 13.80      |
| 4.00  | 1273.62 | 644.81     | 46.00      | 13.80      |
| 4.50  | 1324.77 | 685.49     | 46.00      | 13.80      |
| 5.00  | 1357.14 | 726.18     | 46.00      | 13.80      |
| 5.50  | 1388.39 | 766.86     | 46.00      | 13.80      |
| 6.00  | 1419.64 | 807.55     | 46.00      | 13.80      |
| 6.50  | 1450.89 | 848.23     | 46.00      | 13.80      |
| 7.00  | 1482.14 | 888.92     | 46.00      | 13.80      |
| 7.50  | 1513.39 | 891.74     | 46.00      | 13.80      |
| 8.00  | 1544.64 | 837.77     | 46.00      | 13.80      |
| 8.50  | 1575.89 | 783.80     | 46.00      | 13.80      |
| 9.00  | 1607.14 | 729.83     | 46.00      | 13.80      |
| 9.50  | 1638.39 | 675.86     | 46.00      | 13.80      |
| 10.00 | 1669.64 | 621.89     | 46.00      | 13.80      |
| 10.50 | 1700.89 | 567.92     | 46.00      | 13.80      |
| 11.00 | 1732.14 | 480.70     | 46.00      | 13.80      |
| 11.50 | 1763.39 | 94.27      | 46.00      | 13.80      |
| 12.00 | 1794.64 | -292.15    | 46.00      | 13.80      |
| 12.50 | 1825.89 | -678.58    | 46.00      | 13.80      |
| 13.00 | 1857.14 | -1065.01   | 46.00      | 13.80      |
| 13.50 | 1888.39 | -1451.44   | 46.00      | 13.80      |
| 14.00 | 1919.64 | -1837.87   | 46.00      | 13.80      |
| 14.50 | 1950.89 | -2224.29   | 46.00      | 13.80      |
| 15.00 | 1982.14 | -2743.10   | 46.00      | 13.80      |
| 15.50 | 2013.39 | -3295.00   | 46.00      | 13.80      |
| 16.00 | 2044.64 | -3570.94   | 46.00      | 13.80      |
| 16.50 | 2075.89 | -3570.94   | 46.00      | 13.80      |
| 17.00 | 2107.14 | -3570.94   | 46.00      | 13.80      |
| 17.50 | 2138.39 | -3570.94   | 46.00      | 13.80      |
| 18.00 | 2154.01 | -3570.94   | 46.00      | 13.80      |
| 18.25 | 2154.01 | -3570.94   | 46.00      | 13.80      |



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 1 - FIJO

COMPROBACIÓN DE LA SECCIÓN A CORTANTE

1.Esfuerzo cortante de agotamiento por compresión oblicua en el alma  
Vu1 > Vrd: Correcto

2.Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.29  
ro: 0.0019  
fck: 30.00  
Vu2: 1544.46 kN  
Vrd: 1059.74 kN  
Vu2 > Vrd: Correcto

ARMADURA DEL MURETE DE GUARDA

Análisis a flexión:  
Momento murete (mkN): 135.42

|                      | As1_cm2 | As2_cm2 |
|----------------------|---------|---------|
| Armadura de cálculo: | 5.74    | 0.00    |
| Armadura geométrica: | 5.40    | 1.80    |
| Armadura mecánica:   | 11.04   | 0.00    |

Comprobación de la sección a cortante:

1.Esfuerzo cortante de agotamiento por compresión oblicua en el alma  
Vu1: 3300.00 kN  
Vrd: 101.09 kN  
Vu1 > Vrd : Correcto

2.Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.60  
ro: 0.0018  
fck: 30.00 MPa  
Vu2: 186.98 kN  
Vrd: 101.09 kN  
Vu2 > Vrd : Correcto

DIMENSIONAMIENTO DE LA CORONACION

A. Nudos de compresión en coronación

1.Carga puntual

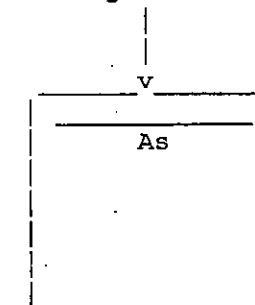
bx: 0.70 m  
by: 0.70 m  
fcd: 20.00 MPa  
Nu: 32340.00 kN

Nd: 10616.43 kN

Nd < Nu: Correcto

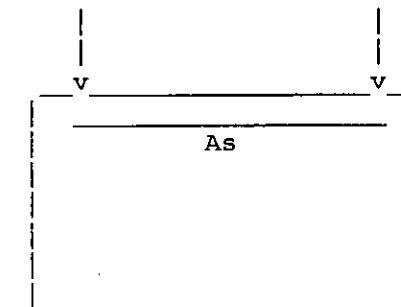
Configuración de los modelos de bielas y tirantes

1.Sentido longitudinal



Modelo de bielas y tirantes

2.Sentido transversal



Modelo de bielas y tirantes del análisis global

B. Armadura en coronación

|                    |             |            |
|--------------------|-------------|------------|
| Armadura global y: | 23418.6 mm2 | 234.19 cm2 |
| Direccion x:       | 5845.4 mm2  | 58.45 cm2  |
| Direccion y:       | 5845.4 mm2  | 58.45 cm2  |

L.A.Y. LLERIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 1 - FIJO

ARMADO DE LA PUNTERA DE LA CIMENTACIÓN

|                            | as1(cm2/ml) | as2(cm2/ml) |
|----------------------------|-------------|-------------|
| Armado de cálculo:         | 77.81       | 0.00        |
| Cuantía mínima geométrica: | 27.00       | 27.00       |
| Cuantía mínima mecánica:   | 46.00       | 0.00        |
| Armado sentido transv.:    | 27.00       | 27.00       |

ARMADO DEL TALÓN DE LA CIMENTACIÓN

|                            | as1(cm2/ml) | as2(cm2/ml) |
|----------------------------|-------------|-------------|
| Armado de cálculo:         | 0.00        | 37.72       |
| Cuantía mínima geométrica: | 27.00       | 27.00       |
| Cuantía mínima mecánica:   | 0.00        | 46.00       |
| Armado sentido transv.:    | 27.00       | 27.00       |

CUANTÍAS ARMADO A LO LARGO DEL TALÓN

| x(i)  | My(mkN)  | As1_cm2/ml | As2_cm2/ml |
|-------|----------|------------|------------|
| 0.00  | 1199.15  | 27.00      | 46.00      |
| 0.50  | 1149.07  | 27.00      | 46.00      |
| 1.00  | 1098.98  | 27.00      | 46.00      |
| 1.50  | 1048.89  | 27.00      | 46.00      |
| 2.00  | 998.80   | 27.00      | 46.00      |
| 2.50  | 823.23   | 27.00      | 46.00      |
| 3.00  | 625.51   | 27.00      | 46.00      |
| 3.50  | 427.80   | 27.00      | 46.00      |
| 4.00  | 230.09   | 27.00      | 46.00      |
| 4.50  | -205.09  | 27.00      | 46.00      |
| 5.00  | -742.03  | 27.00      | 46.00      |
| 5.50  | -1278.97 | 27.00      | 46.00      |
| 6.00  | -1815.92 | 27.00      | 46.00      |
| 6.50  | -2604.22 | 27.00      | 46.00      |
| 7.00  | -3598.18 | 28.48      | 46.00      |
| 7.50  | -4742.68 | 37.72      | 46.00      |
| 8.00  | -4742.68 | 37.72      | 46.00      |
| 8.50  | -4742.68 | 37.72      | 46.00      |
| 9.00  | -4742.68 | 37.72      | 46.00      |
| 9.50  | -4742.68 | 37.72      | 46.00      |
| 10.00 | -4742.68 | 37.72      | 46.00      |
| 10.37 | -4742.68 | 37.72      | 46.00      |

COMPROBACIÓN DE LA SECCIÓN A CORTANTE (TALÓN)

1.Esfuerzo cortante de agotamiento por compresión oblicua en el alma  
Vu1 > Vrd: Correcto

2.Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.26  
ro: 0.0016  
fck: 25.00 MPa  
Vu2: 746.20 kN  
Vrd: 720.94 kN  
Vu2 > Vrd: Correcto



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
ESTRIBO I - FDO

CLASIFICACIÓN DEL ARMADO

|                                  | phi | Sep_cm/ml | As_cm2/ml |
|----------------------------------|-----|-----------|-----------|
| Longitudinal superior zapata, 1: | 25. | 10.0      | 46.00     |
| Longitudinal inferior zapata, 2: | 32. | 10.0      | 77.81     |
| Transversal superior zapata, 3:  | 20. | 10.0      | 27.00     |
| Transversal inferior zapata, 4:  | 20. | 10.0      | 27.00     |
| Laterales trasdós, 5:            | 25. | 10.0      | 40.84     |
| Laterales intradós, 6:           | 25. | 10.0      | 40.84     |
| Espera muro_intradós, 7:         | 20. | 20.0      | 13.80     |
| Vertical muro_intradós, 8:       | 20. | 20.0      | 13.80     |
| Espera muro_trasdós, 9:          | 25. | 10.0      | 46.00     |
| Vertical muro_trasdós, 10:       | 25. | 10.0      | 46.00     |
| Horizontal trasdós, 11:          | 20. | 10.0      | 26.67     |
| Horizontal intradós, 12:         | 32. | 10.0      | 53.33     |
| Posición 13,hztal cargadero, 13: | 20. | 10.0      | 26.67     |
| Posición 14,hztal reposo, 14:    | 55. | 10.0      | 234.19    |
| Posición 15,hztal murete, 15:    | 12. | 20.0      | 5.65      |
| Trasdós cargadero, 16:           | 20. | 20.0      | 13.40     |
| Posición 17,vert. reposo, 17:    | 20. | 20.0      | 13.80     |
| Vertical murete de guarda, 18:   | 12. | 20.0      | 5.65      |

SOLAPOS Y ANCLAJES

|                       | Lgt_cm   |
|-----------------------|----------|
| a.Espera intradós:    |          |
| Longt.anclaje:        | 52.0 cm  |
| Longt.solapo:         | 52.0 cm  |
| Longt.espera:         | 380.0 cm |
| b.Vertical intradós:  |          |
| Longt.anclaje:        | 52.0 cm  |
| Longt.solapo:         | 52.0 cm  |
| c.Espera trasdós:     |          |
| Longt.anclaje:        | 81.2 cm  |
| Longt.solapo:         | 146.2 cm |
| Longt.espera:         | 470.0 cm |
| d.Vertical trasdós:   |          |
| Longt.anclaje:        | 81.2 cm  |
| Longt.solapo:         | 146.2 cm |
| e.Vertical cargadero: |          |
| Longt.anclaje:        | 52.0 cm  |
| f.Vertical murete:    |          |
| Longt.anclaje:        | 30.0 cm  |

VERIFICACIÓN DE LA FISURACIÓN EN EL FUSTE DEL MURO

|             |          |
|-------------|----------|
| Acciones    |          |
| Nk (kN):    | 1975.05  |
| Mk (mkN):   | -1738.77 |
| Mfis (mkN): | -3688.02 |

Mk < Mfis: No hay fisuración

VERIFICACIÓN DE LA FISURACIÓN EN EL TALÓN DEL MURO

|             |           |
|-------------|-----------|
| Acciones    |           |
| Nk (kN):    | 0.00      |
| Mk (mkN):   | -19996.20 |
| Mfis (mkN): | -4201.09  |

Mk > Mfis: Hay fisuración

|         | Apertura de fisura (wk_mm) |        |        |     |
|---------|----------------------------|--------|--------|-----|
| phi\sep | 10.                        | 12.5   | 15.    | 20. |
| 12.     |                            |        |        |     |
| 16.     |                            |        |        |     |
| 20.     |                            |        |        |     |
| 25.     | 0.6851                     |        |        |     |
| 32.     | 0.4265                     | 0.6030 | 0.8076 |     |

## 11 CÁLCULO DEL ESTRIBO 2

---

## 11.1 GEOMETRÍA

## 11.2 ACCIONES EN CORONACIÓN

### Estados de carga

|              | Fz (kN) | MomentoX (mkN) | ___Apoyo: 1 |
|--------------|---------|----------------|-------------|
| Peso propio: | 2038.39 | 0.00           |             |
| CP2:         | 1497.43 | 0.00           |             |
| Pretensado:  | 636.15  | 0.00           |             |
| SC 100%:     | 134.61  | 0.00           |             |
| SC 50%:      | 325.19  | 0.00           |             |
| V60 CEN:     | 2995.23 | 0.00           |             |
| V60 EXC:     | 2995.23 | 0.00           |             |
| Gradiente:   | 114.05  | 0.00           |             |
| Deformac:    | 0.00    | 0.00           |             |

|              | Fz (kN)  | MomentoX (mkN) | ___Apoyo: 2 |
|--------------|----------|----------------|-------------|
| Peso propio: | 2021.48  | 0.00           |             |
| CP2:         | 720.23   | 0.00           |             |
| Pretensado:  | 712.86   | 0.00           |             |
| SC 100%:     | 132.73   | 0.00           |             |
| SC 50%:      | -219.56  | 0.00           |             |
| V60 CEN:     | 2986.09  | 0.00           |             |
| V60 EXC:     | -1091.55 | 0.00           |             |
| Gradiente:   | 109.21   | 0.00           |             |
| Deformac:    | 0.00     | 0.00           |             |

| Acciones horiz. | Fx (kN) | Fy (kN) | (Totales) |
|-----------------|---------|---------|-----------|
| Relógicas:      | 0.00    | 0.00    |           |
| Temperatura:    | 0.00    | 0.00    |           |
| Frenado:        | 367.80  | 0.00    |           |
| Centrífuga:     | 0.00    | 198.90  |           |
| Viento_long:    | 0.00    | 0.00    |           |
| Sismo_long:     | 0.00    | 0.00    |           |
| V_trav_fr:      | 0.00    | 0.00    |           |
| V_trav_dor:     | 0.00    | 0.00    |           |
| V_trav_conc:    | 0.00    | 442.80  |           |
| V_long_conc:    | 0.00    | 0.00    |           |
| Sismo tran:     | 0.00    | 0.00    |           |

SC terraplén: 30.00 kN/m2

### 11.3 CÁLCULO DE ESFUERZOS Y DIMENSIONAMIENTO

El cálculo y dimensionamiento del estribos se detalla en las páginas siguientes. Las hipótesis de cálculo se exponen a continuación:

1. El cálculo se realiza en la hipótesis clásica como muro con acciones en coronación debidas a las reacciones horizontales y verticales transmitidas por el tablero. Los empujes del terreno se han calculado para un coeficiente de empuje  $K=0,3$  y una densidad del terreno de  $2,0 \text{ T/m}^3$ . No se han considerado eventuales empujes hidrostáticos al colocar un adecuado drenaje en el trasdós del estribo.

2. En el cálculo de la seguridad del estribo frente al vuelco, deslizamiento y tensiones máximas se han verificado las siguientes condiciones (ver resultados en listados de cálculo).

|                                           |                                                     |
|-------------------------------------------|-----------------------------------------------------|
| Coeficiente de Seguridad al vuelco,       | $CS_v \geq 1,80$                                    |
| Coeficiente de Seguridad al deslizamiento | $CS_d \geq 1,50$                                    |
| Tensión máxima del terreno en puntera     | $\sigma_{\max} \leq 1,33 \sigma_{\text{admisible}}$ |

Con  $\sigma_{\text{admisible}} = 3,6 \text{ Kp/cm}^2$  y coeficientes de rozamiento terreno-zapata  $\mu = 0,55$ . La Dirección facultativa deberá verificar si el terreno que aparece en la excavación cumple dicho criterio de dimensionamiento. En caso contrario, se deberá recalcular el Estribo.

3. El dimensionamiento de las armaduras de flexión y cortante del muro y zapata se realiza con los criterios de la Normativa vigente para estructuras de hormigón (EHE). Los coeficientes de seguridad de las acciones corresponden con un **nivel de control intenso**  $\gamma_{fg}=1,35$  y  $\gamma_{rq}=1,50$ .
4. Las armaduras horizontales de flexión transversal se colocan de acuerdo con los valores mínimos exigidos por la Normativa EHE.

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 2 - MÓVIL

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\* Programa de calculo para estribos generales \*\*\*  
\*\*\* PEDELTA \*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

Nombre del proyecto: Viaducto del Anoia - ST SADURNÍ D'ANOIA  
Referencia del proyecto: Cálculo del Estribo 2

OBSERVACIONES A REALIZAR

- 1.Canto zapata =  $H/12$  a  $H/8$  : Correcto
- 2.Ancho cimentación =  $0.4$  a  $0.9 H$ : Correcto
- 3.Ancho fuste =  $H/12$  a  $H/8$  : Correcto
- 4.Puntera  $< 2(h_{zapata}) \Rightarrow$  Cim.rígida
- 5.Ancho murete =  $\max(0.30, h_{mur}/8)$ : Correcto

DATOS DE ENTRADA

Tipología del estribo

Tipo 1: Est cimentación superficial

Características de los materiales

Hormigón de alzados: 30.00 MPa  
Hormigón de cimentación: 25.00 MPa  
Resistencia acero armado: 500.00 MPa  
Coeficiente de fluencia: 2.00  
Módulo de deformación: 28576.79 MPa

Coeficientes de mayoración de acciones

C<sub>g</sub>: 1.35 C<sub>q</sub>: 1.50

Coeficientes de combinación de acciones

psi0: 0.80 psi1: 0.60 psi2: 0.20

Características del terreno

Altura tierras: 0.00 m  
Ángulo roz.interno: 30.00°  
Rozamiento tierras-tierras: 0.20  
Rozamiento cimentac-tierras: 0.55  
Peso específico del relleno: 20.00 kN/m<sup>3</sup>  
Tensión admisible (MPa): 0.36 MPa  
Carga última (MPa): 1.00 MPa  
Talud: 2/3

Características de los apoyos

Número de apoyos: 2  
Excentricidades:  
Exc: 1 1.700 m  
Exc: 2 -1.700 m  
Separación apoyos: 3.40 m  
Excentricidad longitudinal: 0.75 m  
Dim. lgt'd apoyo (bapox): 0.80 m  
Dim. transv apoyo (bapoy): 0.80 m  
Altura apoyo: 0.30 m

Características del cajeadado

Longitud voladizo: 0.00 m  
Canto voladizo: 0.00 m  
Peralte voladizo: 0.00 m  
Canto cargadero: 0.00 m  
Ancho cargadero: 0.00 m  
Longitud voladizo:

Estados de carga

|              | Fz (kN) | MomentoX (mkN) | Apoyo: 1 |
|--------------|---------|----------------|----------|
| Peso propio: | 2038.39 | 0.00           |          |
| CP2:         | 1497.43 | 0.00           |          |
| Pretensado:  | 636.15  | 0.00           |          |
| SC 100%:     | 134.61  | 0.00           |          |
| SC 50%:      | 325.19  | 0.00           |          |
| V60 CEN:     | 2995.23 | 0.00           |          |
| V60 EXC:     | 2995.23 | 0.00           |          |
| Gradiente:   | 114.05  | 0.00           |          |
| Deformac:    | 0.00    | 0.00           |          |

|              | Fz (kN)  | MomentoX (mkN) | Apoyo: 2 |
|--------------|----------|----------------|----------|
| Peso propio: | 2021.48  | 0.00           |          |
| CP2:         | 720.23   | 0.00           |          |
| Pretensado:  | 712.86   | 0.00           |          |
| SC 100%:     | 132.73   | 0.00           |          |
| SC 50%:      | -219.56  | 0.00           |          |
| V60 CEN:     | 2986.09  | 0.00           |          |
| V60 EXC:     | -1091.55 | 0.00           |          |
| Gradiente:   | 109.21   | 0.00           |          |
| Deformac:    | 0.00     | 0.00           |          |

| Acciones horiz. | Fx (kN) | Fy (kN) | (Totales) |
|-----------------|---------|---------|-----------|
| Relógicas:      | 0.00    | 0.00    |           |
| Temperatura:    | 0.00    | 0.00    |           |
| Frenado:        | 367.80  | 0.00    |           |
| Centrífuga:     | 0.00    | 198.90  |           |
| Viento_long:    | 0.00    | 0.00    |           |
| Sismo_long:     | 0.00    | 0.00    |           |
| V_trav_fr:      | 0.00    | 0.00    |           |
| V_trav_dor:     | 0.00    | 0.00    |           |
| V_trav_conc:    | 0.00    | 442.80  |           |
| V_long_conc:    | 0.00    | 0.00    |           |
| Sismo tran:     | 0.00    | 0.00    |           |

SC terraplén: 30.00 kN/m<sup>2</sup>



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
ESTRIBO 2 - MÓVIL

GEOMETRÍA DEL ESTRIBO Y ALETAS

|                             |         |
|-----------------------------|---------|
| Muro frontal                |         |
| Largo zapata:               | 14.40 m |
| Canto zapata (HZ):          | 1.50 m  |
| Ángulo cimentación:         | 0.00 m  |
| Espesor horm. nivelación:   | 0.10 m  |
| Altura muro derecha (HD):   | 7.55 m  |
| Altura muro izquierda (HI): | 7.55 m  |
| Altura murete guarda (HMT): | 3.35 m  |
| Altura_1 cargadero (HM1):   | 0.75 m  |
| Altura_2 cargadero (HM2):   | 0.75 m  |
| Peralte:                    | 0.00 m  |
| Ancho zona apoyo (BM1):     | 1.93 m  |
| Ancho murete guarda (BMT):  | 0.50 m  |
| Ancho_1 cargadero (BM2):    | 0.00 m  |
| Ancho fuste (BF):           | 1.50 m  |
| Excentr. apoyos (EXC):      | 0.75 m  |
| Zarpa (ZP):                 | 2.50 m  |
| Talón (TL):                 | 5.50 m  |
| Aleta derecha               |         |
| Longitud aleta:             | 5.50 m  |
| Longitud de muro:           | 5.50 m  |
| Altura muro aleta:          | 0.00 m  |
| Ángulo de aleta derecha:    | 0.00 m  |
| Resguardo aleta:            | 11.65 m |
| Ancho aleta_Extremo libre:  | 1.00 m  |
| Ancho aleta_Extremo muro:   | 1.00 m  |
| Aleta izquierda             |         |
| Longitud aleta:             | 5.50 m  |
| Longitud de muro:           | 5.50 m  |
| Altura muro aleta:          | 0.00 m  |
| Ángulo de aleta izquierda:  | 0.00 m  |
| Resguardo aleta:            | 11.65 m |
| Ancho aleta_Extremo libre:  | 1.00 m  |
| Ancho aleta_Extremo muro:   | 1.00 m  |

GRADO DE EMPOTRAMIENTO

G\_E Aleta-Muro: 1.000

DESGLOSE DEL PESO PROPIO DEL ESTRIBO

| Parte del estribo  | Volumen(m3) | ug(m) |
|--------------------|-------------|-------|
| Aleta derecha      |             |       |
| Aletas, voladizo_d | 0.00        | 8.00  |
| Aletas, voladizo_d | 0.00        | 8.00  |
| Aletas, apoyadas_d | 59.95       | 5.25  |
| Contrafuertes_d    | 0.00        | 8.00  |
| Contraf. chaflán_d | 0.00        | 8.00  |
| Aleta izquierda    |             |       |
| Aletas, voladizo_i | 0.00        | 8.00  |
| Aletas, voladizo_i | 0.00        | 8.00  |
| Aletas, apoyadas_i | 59.95       | 5.25  |
| Contrafuertes_i    | 0.00        | 8.00  |
| Contraf. chaflán_i | 0.00        | 8.00  |
| Fuste del estribo  |             |       |
| Muro frontal       | 108.90      | 3.25  |
| Muro frontal       | 13.50       | 3.25  |
| Muro frontal       | 4.18        | 4.31  |
| Muro frontal       | 21.87       | 3.71  |
| Murete de guarda   | 20.10       | 4.68  |
| Murete de guarda   | 0.00        | 4.43  |
| Murete de guarda   | 0.00        | 4.43  |
| Cajeado            |             |       |
| Macizos cajeado    | 0.00        | 4.43  |
| Macizos cajeado    | 0.00        | 3.46  |
| Macizos cajeado    | 0.00        | 3.46  |
| Zapata             | 205.20      | 4.75  |

RESUMEN DE ACCIONES

|                      |               |
|----------------------|---------------|
| Peso propio estribo: | 12341.37 kN   |
| Momento Myb:         | -54883.18 mkN |
| Peso tierras estr. : | 13389.18 kN   |
| Momento Myt:         | -92672.25 mkN |
| Empuje tierras :     | 8911.47 kN    |
| Momento Mye:         | 40421.79 mkN  |
| Roz vert tierras :   | 1782.29 kN    |
| Momento Myv:         | -16931.79 mkN |
| Sobrecarga estr. :   | 1645.20 kN    |
| Momento Myq:         | -11870.12 mkN |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
ESTRIBO 2 - MÓVIL

Planteamiento como ELU

1. Comprobación de la estabilidad global del estribo

Acciones características (ELS)

|       | ACCIÓN                    | Fx      | Fz       | Mya       |
|-------|---------------------------|---------|----------|-----------|
| (I)   | Peso propio del estribo:  | 0.00    | 12341.37 | -54883.18 |
| (IIa) | Acc. tablero (Fz,max):    | 0.00    | 14144.06 | -45968.19 |
| (IIb) | Acc. tablero (Fz,min):    | 0.00    | 7761.44  | -25224.68 |
| (III) | Acc. tablero (Fx,max):    | 367.80  | 0.00     | 3438.93   |
| (IV)  | Empuje de tierras:        | 8911.47 | 0.00     | 40421.79  |
| (V)   | Peso de tierras:          | 0.00    | 13389.18 | -92672.25 |
| (VI)  | Rozamiento vert. tierras: | 0.00    | 1782.29  | -16931.79 |

Acciones mayoradas (ELU)

|       | ACCIÓN                    | Fx       | Fz       | Mya        |
|-------|---------------------------|----------|----------|------------|
| (I)   | Peso propio del estribo:  | 0.00     | 11107.24 | -49394.86  |
| (IIb) | Acc. tablero (Fz,min):    | 0.00     | 9958.58  | -32365.37  |
| (III) | Acc. tablero (Fx,max):    | 496.53   | 0.00     | 4642.56    |
| (IV)  | Empuje de tierras:        | 13367.20 | 0.00     | 60632.69   |
| (V)   | Peso de tierras:          | 0.00     | 20083.77 | -139008.38 |
| (VI)  | Rozamiento vert. tierras: | 0.00     | 2673.44  | -25397.68  |
|       | TOTAL.....                | 13863.73 | 43823.02 | -180891.05 |

RESULTADOS:

Excentricidad de la resultante respecto al borde frontal de la zapata:

ead: 4.13 m

eau: 3.04 m

eau < ead: Queda comprobada la estabilidad frente al vuelco

2. Comprobación de la seguridad global frente al deslizamiento

tg\_ad: 0.34

ud: 0.55 Ángulo de roz. suelo-cimentación

tg\_ad < ud : Queda comprobada la seguridad global frente al deslizamiento

3. Comprobación en vacío

3a. Estabilidad al vuelco:

ead: 4.52 m

eau: 2.35 m

eau < ead: Queda comprobada la estabilidad frente al vuelco en vacío

3b. Estabilidad al deslizamiento:

tg\_ad: 0.43

ud: 0.55 Ángulo de roz. suelo-cimentación

tg\_ad < ud : Queda comprobada la seguridad global frente al deslizamiento

Comprobación de la máxima compresión unitaria sobre el terreno cim. (ELS)

ea\_cp: 3.50 m > (Ancho zapata)/3 => Ley de tensiones trapecial

Tensión máxima: 0.4489 MPa

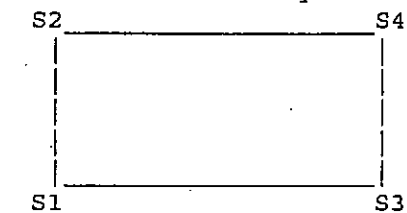
Tensión media: 0.3045 MPa

Tensión mínima: 0.1601 MPa

Tensión admisible: 0.3600 MPa

Tensión máxima < 1.30 · Tensión admisible => Correcto

Tensiones en las esquinas de la cimentación:



S1: 0.4672 MPa

S2: 0.1784 MPa

S3: 0.4306 MPa

S4: 0.1418 MPa

Planteamiento clásico-determinista

1b. Comprobación de la estabilidad al vuelco

Momento estabilizador: -210455.41 mkN

Momento desestabilizador: 43860.72 mkN

Coef. al vuelco (Csv): 4.80

2b. Comprobación de la estabilidad al deslizamiento

Fuerza estabilizadora: 22911.30 kN

Fuerza desestabilizadora: 9279.27 kN

Coef. al desliz. (Csd): 2.47

3b. Comprobación en vacío (construcción)

Coef. al vuelco (Csv): 4.07

Correcto

Coef. deslizamiento (Csd): 1.70

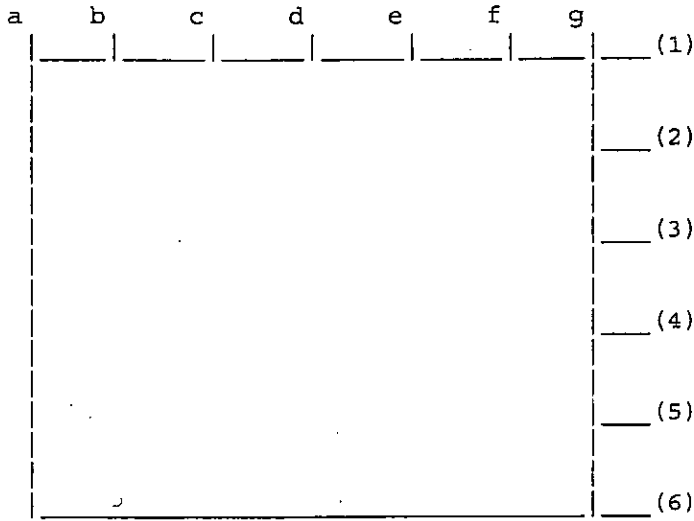
Correcto



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ENVOLVENTES DE MOMENTOS EN ELS

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. HZTAL



Geometría de la placa:  
Ancho de la placa: 14.00 m  
Altura de la placa: 11.05 m

Placa empotrada

| Mz_: | Mza    | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg    | _mkN/ml |
|------|--------|-------|-------|-------|-------|-------|--------|---------|
| 1    | -412.0 | 116.0 | 193.6 | 219.4 | 193.6 | 116.0 | -412.0 |         |
| 2    | -444.6 | 120.9 | 193.4 | 216.5 | 193.4 | 120.9 | -444.6 |         |
| 3    | -452.8 | 129.8 | 192.2 | 212.2 | 192.2 | 129.8 | -452.8 |         |
| 4    | -392.9 | 114.2 | 158.0 | 170.6 | 158.0 | 114.2 | -392.9 |         |
| 5    | -199.6 | 47.7  | 59.0  | 61.8  | 59.0  | 47.7  | -199.6 |         |

Placa apoyada

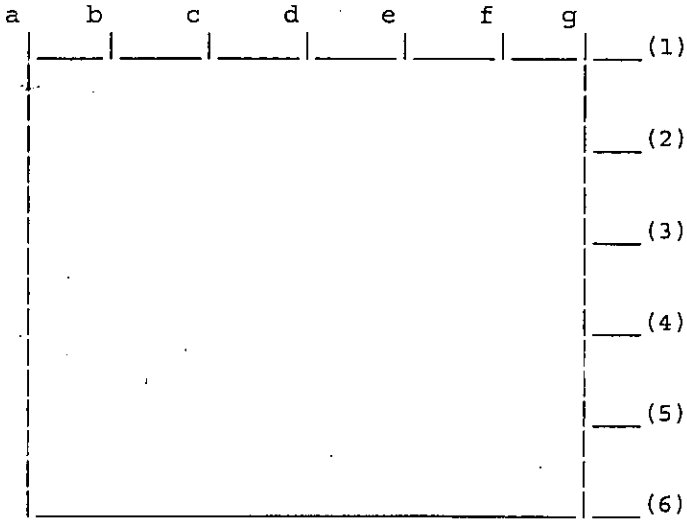
| Mz_: | Mza | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg  | _mkN/ml |
|------|-----|-------|-------|-------|-------|-------|------|---------|
| 1    | 0.0 | 369.6 | 417.3 | 433.3 | 417.3 | 369.6 | 0.0  |         |
| 2    | 0.0 | 339.6 | 380.0 | 392.8 | 380.0 | 339.6 | -0.0 |         |
| 3    | 0.0 | 298.6 | 328.1 | 337.0 | 328.1 | 298.6 | 0.0  |         |
| 4    | 0.0 | 212.7 | 225.1 | 228.3 | 225.1 | 212.7 | 0.0  |         |
| 5    | 0.0 | 57.4  | 51.6  | 49.2  | 51.6  | 57.4  | 0.0  |         |

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. VERTICAL

| My_d(mkN/ml): | PLACA EMPOTRADA | PLACA APOYADA |
|---------------|-----------------|---------------|
| 1             | 0.0             | 0.0           |
| 2             | 86.1            | 156.0         |
| 3             | 177.3           | 250.9         |
| 4             | 191.3           | 183.1         |
| 5             | 27.5            | -216.6        |
| 6             | -791.3          | -1275.2       |

ENVOLVENTES DE MOMENTOS EN ELU

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. HZTAL



Geometría de la placa:  
Ancho de la placa: 14.00 m  
Altura de la placa: 11.05 m

Placa empotrada

| Mz_: | Mza    | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg    | _mkN/ml |
|------|--------|-------|-------|-------|-------|-------|--------|---------|
| 1    | -580.4 | 163.1 | 271.7 | 307.7 | 271.7 | 163.1 | -580.4 |         |
| 2    | -622.0 | 169.1 | 270.3 | 302.6 | 270.3 | 169.1 | -622.0 |         |
| 3    | -629.4 | 180.3 | 267.2 | 295.1 | 267.2 | 180.3 | -629.4 |         |
| 4    | -543.3 | 157.8 | 218.6 | 236.2 | 218.6 | 157.8 | -543.3 |         |
| 5    | -274.8 | 65.5  | 81.2  | 85.2  | 81.2  | 65.5  | -274.8 |         |

Placa apoyada

| Mz_: | Mza | Mzb   | Mzc   | Mzd   | Mze   | Mzf   | Mzg | _mkN/ml |
|------|-----|-------|-------|-------|-------|-------|-----|---------|
| 1    | 0.0 | 517.5 | 584.0 | 606.4 | 584.0 | 517.5 | 0.0 |         |
| 2    | 0.0 | 474.5 | 530.8 | 548.7 | 530.8 | 474.5 | 0.0 |         |
| 3    | 0.0 | 415.6 | 456.8 | 469.2 | 456.8 | 415.6 | 0.0 |         |
| 4    | 0.0 | 294.9 | 312.2 | 316.7 | 312.2 | 294.9 | 0.0 |         |
| 5    | 0.0 | 79.0  | 71.0  | 67.6  | 71.0  | 79.0  | 0.0 |         |

CÁLCULO DE DISTRIBUCIÓN DE ESFUERZOS EN DIREC. VERTICAL

| My_d(mkN/ml): | PLACA EMPOTRADA | PLACA APOYADA |
|---------------|-----------------|---------------|
| 1             | 0.0             | 0.0           |
| 2             | 120.2           | 217.4         |
| 3             | 244.6           | 346.5         |
| 4             | 262.0           | 249.5         |
| 5             | 33.4            | -305.2        |
| 6             | -1092.9         | -1767.0       |

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DIMENSIONAMIENTO DE LA ARMADURA DEL FUSTE

| ESFUERZOS: | PLACA EMPOTRADA | PLACA APOYADA   | PLACA G_E       |
|------------|-----------------|-----------------|-----------------|
| Mz_ext:    | -629.43 mkN/ml  | 0.00 mkN/ml     | 0.00 mkN/ml     |
| Mz_cl:     | 307.75 mkN/ml   | 606.37 mkN/ml   | 606.37 mkN/ml   |
| My_ext:    | -728.59 mkN/ml  | -1177.99 mkN/ml | -1177.99 mkN/ml |

1. Dimensionamiento de la armadura horizontal

- a. Unión con aletas
- b. Zona centro de fuste

| Placa empotrada        |            |            |  |
|------------------------|------------|------------|--|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo (a):  | 10.07      | 0.00       |  |
| Armadura cálculo (b):  | 0.00       | 4.90       |  |
| Armadura geom. mínima: | 16.00      | 32.00      |  |

| Placa apoyada          |            |            |  |
|------------------------|------------|------------|--|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo (a):  | 0.00       | 0.00       |  |
| Armadura cálculo (b):  | 0.00       | 9.70       |  |
| Armadura geom. mínima: | 16.00      | 32.00      |  |
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |  |

|                       |       |       |
|-----------------------|-------|-------|
| Armadura cálculo (a): | 27.60 | 27.60 |
| Armadura cálculo (b): |       |       |

| Placa con grado de empotramiento: 1.00 |            |            |  |
|----------------------------------------|------------|------------|--|
| Resultados de armado                   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo (a):                  | 0.00       | 0.00       |  |
| Armadura cálculo (b):                  | 0.00       | 9.70       |  |
| Armadura geom. mínima:                 | 16.00      | 32.00      |  |
| Resultados de armado                   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo (a):                  | 27.60      | 27.60      |  |
| Armadura cálculo (b):                  |            |            |  |

2. Dimensionamiento de la armadura vertical

| Placa empotrada        |            |            |  |
|------------------------|------------|------------|--|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo:      | 11.68      | 3.50       |  |
| Armadura geom. mínima: | 13.50      | 4.50       |  |
| Armadura mec. mínima:  | 27.60      | 8.28       |  |

| Placa apoyada          |            |            |  |
|------------------------|------------|------------|--|
| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo:      | 19.00      | 5.70       |  |
| Armadura geom. mínima: | 13.50      | 4.50       |  |
| Armadura mec. mínima:  | 27.60      | 8.28       |  |

| Placa con grado de empotramiento: |            |            |  |
|-----------------------------------|------------|------------|--|
| Resultados de armado              | As1_cm2/ml | As2_cm2/ml |  |
| Armadura cálculo:                 | 19.00      | 5.70       |  |
| Armadura geom. mínima:            | 13.50      | 4.50       |  |
| Armadura mec. mínima:             | 27.60      | 8.28       |  |

ANÁLISIS DEL MURO FRONTAL DEL ESTRIBO

ANÁLISIS CON HIPÓTESIS DE DEFORMACIÓN PLANA\_ELS

Momento Mz(-): 1366.6 mkN/ml (Hip:Viga biempotrada)  
 Momento Mz(+): 2049.8 mkN/ml (Hip:Viga biapoyada)  
 Momento My: 2470.7 mkN/ml (Hip:Ménsula)

ANÁLISIS CON HIPÓTESIS DE DEFORMACIÓN PLANA\_ELU

Momento Mz(-): 1869.3 mkN/ml (Hip:Viga biempotrada)  
 Momento Mz(+): 2804.0 mkN/ml (Hip:Viga biapoyada)  
 Momento My: 3427.0 mkN/ml (Hip:Ménsula)

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1. Dimensionamiento de la armadura horizontal

| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
|------------------------|------------|------------|
| Armadura cálculo (-):  | 30.47      | 0.00       |
| Armadura cálculo (+):  | 0.00       | 46.37      |
| Armadura geom. mínima: | 16.00      | 32.00      |

2. Dimensionamiento de la armadura vertical

| Resultados de armado   | As1_cm2/ml | As2_cm2/ml |
|------------------------|------------|------------|
| Armadura cálculo:      | 40.64      | 12.19      |
| Armadura geom. mínima: | 13.50      | 4.50       |
| Armadura mec. mínima:  | 27.60      | 8.28       |

CUANTÍAS ARMADO A LO LARGO DE LA ALTURA DEL FUSTE

| z(i)  | Fz (kN) | My (mkN/ml) | As1_cm2/ml | As2_cm2/ml |
|-------|---------|-------------|------------|------------|
| 0.00  | 6.25    | 142.67      | 27.60      | 8.28       |
| 0.50  | 12.50   | 178.74      | 27.60      | 8.28       |
| 1.00  | 18.75   | 214.81      | 27.60      | 8.28       |
| 1.50  | 25.00   | 250.88      | 27.60      | 8.28       |
| 2.00  | 31.25   | 286.96      | 27.60      | 8.28       |
| 2.50  | 37.50   | 299.58      | 27.60      | 8.28       |
| 3.00  | 1061.28 | 295.23      | 27.60      | 8.28       |
| 3.50  | 1091.65 | 290.88      | 27.60      | 8.28       |
| 4.00  | 1119.55 | 286.52      | 27.60      | 8.28       |
| 4.50  | 1140.20 | 268.48      | 27.60      | 8.28       |
| 5.00  | 1158.95 | 178.59      | 27.60      | 8.28       |
| 5.50  | 1177.70 | 88.70       | 27.60      | 8.28       |
| 6.00  | 1196.45 | -1.19       | 27.60      | 8.28       |
| 6.50  | 1215.20 | -91.08      | 27.60      | 8.28       |
| 7.00  | 1233.95 | -306.96     | 27.60      | 8.28       |
| 7.50  | 1252.70 | -567.10     | 27.60      | 8.28       |
| 8.00  | 1271.45 | -827.25     | 27.60      | 8.28       |
| 8.50  | 1290.20 | -1087.39    | 27.60      | 8.28       |
| 9.00  | 1308.95 | -1377.58    | 27.60      | 8.28       |
| 9.50  | 1327.70 | -1731.58    | 27.60      | 8.28       |
| 10.00 | 1346.45 | -1766.98    | 27.60      | 8.28       |
| 10.50 | 1365.20 | -1766.98    | 27.60      | 8.28       |
| 11.00 | 1367.07 | -1766.98    | 27.60      | 8.28       |
| 11.05 | 1367.07 | -1766.98    | 27.60      | 8.28       |

COMPROBACIÓN DE LA SECCIÓN A CORTANTE

1. Esfuerzo cortante de agotamiento por compresión oblicua en el alma  
Vu1 > Vrd: Correcto

2. Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.37  
ro: 0.0019  
fck: 30.00  
Vu2: 801.37 kN  
Vrd: 473.77 kN  
Vu2 > Vrd: Correcto

ARMADURA DEL MURETE DE GUARDA

Análisis a flexión:

Momento murete (mkN): 154.94

|                      | As1_cm2 | As2_cm2 |
|----------------------|---------|---------|
| Armadura de cálculo: | 8.11    | 0.00    |
| Armadura geométrica: | 4.50    | 1.50    |
| Armadura mecánica:   | 9.20    | 0.00    |

Comprobación de la sección a cortante:

1. Esfuerzo cortante de agotamiento por compresión oblicua en el alma

Vu1: 2700.00 kN

Vrd: 110.03 kN

Vu1 > Vrd : Correcto

2. Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.67

ro: 0.0018

fck: 30.00 MPa

Vu2: 159.06 kN

Vrd: 110.03 kN

Vu2 > Vrd : Correcto

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DIMENSIONAMIENTO DE LA CORONACIÓN

A. Nudos de compresión en coronación

1. Carga puntual

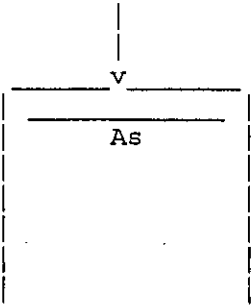
bx: 0.80 m  
by: 0.80 m  
fcd: 20.00 MPa  
Nu: 30880.00 kN

Nd: 10556.40 kN

Nd < Nu: Correcto

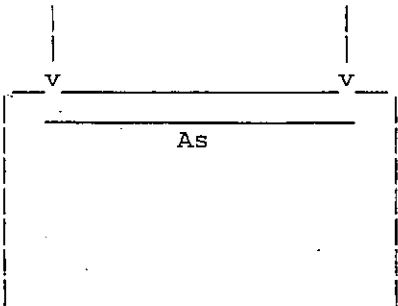
Configuración de los modelos de bielas y tirantes

1. Sentido longitudinal



Modelo de bielas y tirantes

2. Sentido transversal



Modelo de bielas y tirantes del análisis global

B. Armadura en coronación

Armadura global y: 23286.2 mm2 232.86 cm2  
Dirección x: 3862.9 mm2 38.63 cm2  
Dirección y: 3862.9 mm2 38.63 cm2

ARMADO DE LA PUNTERA DE LA CIMENTACIÓN

|                            | as1 (cm2/ml) | as2 (cm2/ml) |
|----------------------------|--------------|--------------|
| Armado de cálculo:         | 28.64        | 0.00         |
| Cuantía mínima geométrica: | 13.50        | 13.50        |
| Cuantía mínima mecánica:   | 23.00        | 0.00         |
| Armado sentido transv.:    | 13.50        | 13.50        |

ARMADO DEL TALÓN DE LA CIMENTACIÓN

|                            | as1 (cm2/ml) | as2 (cm2/ml) |
|----------------------------|--------------|--------------|
| Armado de cálculo:         | 0.00         | 19.45        |
| Cuantía mínima geométrica: | 13.50        | 13.50        |
| Cuantía mínima mecánica:   | 0.00         | 23.00        |
| Armado sentido transv.:    | 13.50        | 13.50        |

CUANTÍAS ARMADO A LO LARGO DEL TALÓN

| x(i) | My (mKN) | As1_cm2/ml | As2_cm2/ml |
|------|----------|------------|------------|
| 0.00 | 108.65   | 13.50      | 23.00      |
| 0.50 | 41.45    | 13.50      | 23.00      |
| 1.00 | -25.75   | 13.50      | 23.00      |
| 1.50 | -136.24  | 13.50      | 23.00      |
| 2.00 | -264.42  | 13.50      | 23.00      |
| 2.50 | -416.75  | 13.50      | 23.00      |
| 3.00 | -602.45  | 13.50      | 23.00      |
| 3.50 | -796.97  | 13.50      | 23.00      |
| 4.00 | -1050.55 | 16.97      | 23.00      |
| 4.50 | -1200.76 | 19.45      | 23.00      |
| 5.00 | -1200.76 | 19.45      | 23.00      |
| 5.50 | -1200.76 | 19.45      | 23.00      |
| 5.72 | -1200.76 | 19.45      | 23.00      |

COMPROBACIÓN DE LA SECCIÓN A CORTANTE (TALÓN)

1. Esfuerzo cortante de agotamiento por compresión oblicua en el alma  
Vu1 > Vrd: Correcto

2. Esfuerzo cortante de agotamiento por tracción en el alma

Eps: 1.37  
ro: 0.0016  
fck: 25.00 MPa  
Vu2: 401.36 kN  
Vrd: 186.46 kN  
Vu2 > Vrd: Correcto

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ESTRIBO 2 - MÓVIL

CLASIFICACIÓN DEL ARMADO

|                                  | phi | Sep_cm/ml | As_cm2/ml |
|----------------------------------|-----|-----------|-----------|
| Longitudinal superior zapata, 1: | 20. | 12.5      | 23.00     |
| Longitudinal inferior zapata, 2: | 20. | 10.0      | 28.64     |
| Transversal superior zapata, 3:  | 20. | 20.0      | 13.50     |
| Transversal inferior zapata, 4:  | 20. | 20.0      | 13.50     |
| Laterales trasdós, 5:            | 20. | 15.0      | 18.85     |
| Laterales intradós, 6:           | 20. | 15.0      | 18.85     |
| Espera muro_intradós, 7:         | 16. | 20.0      | 8.28      |
|                                  |     |           |           |
| Vertical muro_intradós, 8:       | 16. | 20.0      | 8.28      |
| Espera muro_trasdós, 9:          | 20. | 10.0      | 27.60     |
| Vertical muro_trasdós, 10:       | 20. | 10.0      | 27.60     |
| Horizontal trasdós, 11:          | 20. | 15.0      | 16.00     |
| Horizontal intradós, 12:         | 25. | 10.0      | 32.00     |
| Posición 13,hztal cargadero, 13: | 20. | 15.0      | 16.00     |
| Posición 14,hztal reposo, 14:    | 54. | 10.0      | 232.86    |
| Posición 15,hztal murete, 15:    | 12. | 20.0      | 5.65      |
| Trasdós cargadero, 16:           | 20. | 20.0      | 13.40     |
| Posición 17,vert. reposo, 17:    | 16. | 20.0      | 8.28      |
| Vertical murete de guarda, 18:   | 12. | 20.0      | 5.65      |

SOLAPOS Y ANCLAJES

|                       | Lgt_cm   |
|-----------------------|----------|
| a.Espera intradós:    |          |
| Longt.anclaje:        | 40.0 cm  |
| Longt.solapo:         | 40.0 cm  |
| Longt.espera:         | 220.0 cm |
| b.Vertical intradós:  |          |
| Longt.anclaje:        | 40.0 cm  |
| Longt.solapo:         | 40.0 cm  |
| c.Espera trasdós:     |          |
| Longt.anclaje:        | 52.0 cm  |
| Longt.solapo:         | 93.6 cm  |
| Longt.espera:         | 270.0 cm |
| d.Vertical trasdós:   |          |
| Longt.anclaje:        | 52.0 cm  |
| Longt.solapo:         | 93.6 cm  |
| e.Vertical cargadero: |          |
| Longt.anclaje:        | 52.0 cm  |
| f.Vertical murete:    |          |
| Longt.anclaje:        | 30.0 cm  |

VERIFICACIÓN DE LA FISURACIÓN EN EL FUSTE DEL MURO

Acciones  
 Nk (kN): 1311.28  
 Mk (mkN): -850.10  
 Mfis (mkN): -1321.30  
 Mk < Mfis: No hay fisuración

VERIFICACIÓN DE LA FISURACIÓN EN EL TALÓN DEL MURO

Acciones  
 Nk (kN): 0.00  
 Mk (mkN): -866.54  
 Mfis (mkN): -1014.97  
 Mk < Mfis: No hay fisuración

## 12 CÁLCULO DE LAS PILAS



## 12.1 GEOMETRÍA

# PILA 3

## ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 11974.40    | 0.00           |
| Carga Permanente               | = 7517.93     | 2931.65        |
| Pretensado                     | = -14.60      | 0.00           |
| Sobrecarga unif. total         | = 852.28      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.05      | 1366.39        |
| Vehiculo/s Centrado            | = 12536.36    | 0.00           |
| Vehiculo/s Excentrico          | = 6478.79     | 11314.24       |
| Gradiente térmico              | = -17.47      | 11314.24       |
| Deformación                    | = 0.00        | 0.00           |

## ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1007.75  | 0.00       |
| Centrifuga          | = 0.00     | 219.30     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 512.00     |
| Sismo transversal   | = 0.00     | 0.00       |

# PILA 4

## ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 11991.22    | 0.00           |
| Carga Permanente               | = 7524.16     | 2934.04        |
| Pretensado                     | = 184.35      | 0.00           |
| Sobrecarga unif. total         | = 855.75      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.32      | 1366.72        |
| Vehiculo/s Centrado            | = 12556.36    | 0.00           |
| Vehiculo/s Excentrico          | = 6500.41     | 11313.41       |
| Gradiente térmico              | = 9.05        | 11313.41       |
| Deformación                    | = 0.00        | 0.00           |

## ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.95  | 0.00       |
| Centrifuga          | = 0.00     | 204.00     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 475.60     |
| Sismo transversal   | = 0.00     | 0.00       |



PILA 5

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 12654.54    | 0.00           |
| Carga Permanente               | = 7524.45     | 3280.19        |
| Pretensado                     | = 183.73      | 0.00           |
| Sobrecarga unif. total         | = 855.94      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.02      | 1487.90        |
| Vehiculo/s Centrado            | = 13454.49    | 0.00           |
| Vehiculo/s Excentrico          | = 6836.21     | 11912.11       |
| Gradiente térmico              | = 9.08        | 11912.11       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.95  | 0.00       |
| Centrifuga          | = 0.00     | 174.60     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 411.30     |
| Sismo transversal   | = 0.00     | 0.00       |

PILA 6

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 12632.88    | 0.00           |
| Carga Permanente               | = 7536.96     | 3263.12        |
| Pretensado                     | = 323.20      | 0.00           |
| Sobrecarga unif. total         | = 838.24      | 0.00           |
| Sobrecarga unif. medio tablero | = 367.82      | 1485.34        |
| Vehiculo/s Centrado            | = 13415.57    | 0.00           |
| Vehiculo/s Excentrico          | = 6740.49     | 11894.65       |
| Gradiente térmico              | = 58.81       | 11894.65       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.49  | 0.00       |
| Centrifuga          | = 0.00     | 232.50     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 544.20     |
| Sismo transversal   | = 0.00     | 0.00       |

# PILA 7

## ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 13227.70    | 0.00           |
| Carga Permanente               | = 7549.79     | 2903.01        |
| Pretensado                     | = -1399.43    | 0.00           |
| Sobrecarga unif. total         | = 792.92      | 0.00           |
| Sobrecarga unif. medio tablero | = 364.58      | 1350.88        |
| Vehiculo/s Centrado            | = 12692.27    | 0.00           |
| Vehiculo/s Excentrico          | = 6376.64     | 11257.98       |
| Gradiente térmico              | = -269.19     | 11257.98       |
| Deformación                    | = 0.00        | 0.00           |

## ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1038.87  | 0.00       |
| Centrifuga          | = 0.00     | 90.60      |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 222.50     |
| Sismo transversal   | = 0.00     | 0.00       |

### 12.3 CÁLCULO DE ESFUERZOS Y DIMENSIONAMIENTO

El cálculo y dimensionamiento de las pilas se detalla en las páginas siguientes. Las hipótesis de cálculo se exponen a continuación:

1. El cálculo se ha realizado según especificaciones de la EHE a partir de las reacciones en coronación presentadas en el apartado 12.2.
2. Se ha comprobado que la carga máxima en los pilotes no supera la carga admisible obtenida del informe geotécnico.
3. El dimensionamiento de las armaduras de flexión y cortante del fuste y encepado se realiza con los criterios de la Normativa vigente para estructuras de hormigón (EHE). Los coeficientes de seguridad de las acciones corresponden con un nivel de control intenso  $\gamma_{fg}=1,35$  y  $\gamma_{fq}=1,50$ .

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 1

```
*****
*****
***
***      Programa de calculo para pilas      ***
***      (Puentes in situ)                  ***
***
***      PEDELTA                             ***
***
*****
*****
```

GEOMETRIA DE PILA

Altura = 15.250 m  
Coef. Pandeo = 1.700

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 3.96 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 4.7680 m2  
Inercia x = 8.9619 m4      Radio de giro x= 1.371 m  
Inercia y = 3.5516 m4      Radio de giro y= 0.863 m

Esbeltez x = 18.91  
Esbeltez y = 30.04

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 3.0000 m  
Ancho transv. = 9.0000 m  
Ancho longtd. = 9.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 11916.34    | 0.00           |
| Carga Permanente               | = 7548.87     | 2591.41        |
| Pretensado                     | = -1756.09    | 0.00           |
| Sobrecarga unif. total         | = 792.71      | 0.00           |
| Sobrecarga unif. medio tablero | = 364.66      | 1241.66        |
| Vehiculo/s Centrado            | = 11635.68    | 0.00           |
| Vehiculo/s Excentrico          | = 6024.24     | 10631.83       |
| Gradiente térmico              | = -269.16     | 10631.83       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1004.69  | 0.00       |
| Centrifuga          | = 0.00     | 90.80      |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 228.40     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 1

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| FY | 113  | 0.0        | 401.0      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| FZ | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| MX | 7    | 1004.7     | 282.7      | 23922.4    | 14464.9     | 0.0         | 16215.6    | 7706.8     |
| MY | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| R1 | 7    | 1004.7     | 282.7      | 23922.4    | 14464.9     | 0.0         | 16215.6    | 7706.8     |
| R2 | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 373.5      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| FY | 17   | 1004.7     | 100.0      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| FZ | 209  | 0.0        | 100.0      | 17264.4    | 2591.4      | 0.0         | 9394.4     | 7870.0     |
| MX | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| MY | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| R1 | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |
| R2 | 1    | 1004.7     | 282.7      | 29961.9    | 2591.4      | 0.0         | 15743.1    | 14218.8    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| Fuste             |      | 1          |            |            |             |             |  |
|-------------------|------|------------|------------|------------|-------------|-------------|--|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |  |
| Esfuerzos maximos |      |            |            |            |             |             |  |
| FX                | 25   | 1038.5     | 100.0      | 31779.7    | 4116.4      | 15596.6     |  |
| FY                | 113  | 0.0        | 426.7      | 31779.7    | 8915.7      | 0.0         |  |
| FZ                | 1    | 1004.7     | 303.2      | 31779.7    | 7069.6      | 15321.5     |  |
| MX                | 119  | 0.0        | 426.7      | 25740.2    | 20789.2     | 0.0         |  |
| MY                | 25   | 1038.5     | 100.0      | 31779.7    | 4116.4      | 15596.6     |  |
| Esfuerzos minimos |      |            |            |            |             |             |  |
| FX                | 41   | 0.0        | 394.0      | 31779.7    | 8454.3      | 0.0         |  |
| FY                | 17   | 1004.7     | 100.0      | 31779.7    | 4116.4      | 15321.5     |  |
| FZ                | 209  | 0.0        | 141.0      | 19082.2    | 4449.9      | 0.0         |  |
| MX                | 17   | 1004.7     | 100.0      | 31779.7    | 4116.4      | 15321.5     |  |
| MY                | 41   | 0.0        | 394.0      | 31779.7    | 8454.3      | 0.0         |  |

3. Combinaciones frecuentes

| Fuste             |      | 1          |            |            |             |             |
|-------------------|------|------------|------------|------------|-------------|-------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
| Esfuerzos maximos |      |            |            |            |             |             |
| FX                | 257  | 611.3      | 100.0      | 26808.3    | 4116.4      | 9261.7      |
| FY                | 346  | 0.0        | 270.6      | 26754.5    | 6608.3      | 0.0         |
| FZ                | 233  | 602.8      | 150.8      | 26808.3    | 4854.7      | 9192.9      |
| MX                | 351  | 0.0        | 270.6      | 23184.7    | 13732.3     | 0.0         |
| MY                | 257  | 611.3      | 100.0      | 26808.3    | 4116.4      | 9261.7      |
| Esfuerzos minimos |      |            |            |            |             |             |
| FX                | 273  | 0.0        | 205.3      | 26808.3    | 5685.5      | 0.0         |
| FY                | 249  | 602.8      | 100.0      | 26808.3    | 4116.4      | 9192.9      |
| FZ                | 441  | 0.0        | 110.3      | 19216.7    | 4199.8      | 0.0         |
| MX                | 249  | 602.8      | 100.0      | 26808.3    | 4116.4      | 9192.9      |
| MY                | 273  | 0.0        | 205.3      | 26808.3    | 5685.5      | 0.0         |

4. Combinaciones casi-permanentes

| Fuste             |      | 1          |            |            |             |             |
|-------------------|------|------------|------------|------------|-------------|-------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
| Esfuerzos maximos |      |            |            |            |             |             |
| FX                | 483  | 209.4      | 100.0      | 21837.0    | 4116.4      | 3133.1      |
| FY                | 499  | 0.0        | 169.0      | 21837.0    | 5131.7      | 0.0         |
| FZ                | 459  | 200.9      | 150.8      | 21837.0    | 4854.7      | 3064.3      |
| MX                | 505  | 0.0        | 169.0      | 20629.1    | 7506.3      | 0.0         |
| MY                | 483  | 209.4      | 100.0      | 21837.0    | 4116.4      | 3133.1      |
| Esfuerzos minimos |      |            |            |            |             |             |
| FX                | 499  | 0.0        | 169.0      | 21837.0    | 5131.7      | 0.0         |
| FY                | 475  | 200.9      | 100.0      | 21837.0    | 4116.4      | 3064.3      |
| FZ                | 667  | 0.0        | 110.3      | 19297.5    | 4199.8      | 0.0         |
| MX                | 475  | 200.9      | 100.0      | 21837.0    | 4116.4      | 3064.3      |
| MY                | 499  | 0.0        | 169.0      | 21837.0    | 5131.7      | 0.0         |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 1

ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica

Hip: 8 fct: -2.90 MPa tensión: -4.00 MPa

Nk:25578.7 kN Mxk:18943.1 mkN Myk:15321.5 mkN

ELU INESTABILIDAD

Altura: 15.25 m  
Betapandeo: 1.70  
Lgtud pandeo: 25.93 m  
Radio giro rx: 1.37 m  
Radio giro ry: 0.86 m  
Esbeltez aux: 18.91  
Esbeltez auy: 30.04

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)  
35 < Esbeltez < 100 => Met. aproximado (MA)  
100 < Esbeltez < 200 => Met. general EHE (MG)  
Esbeltez > 200 => No se contempla

No hace falta verificar el ELU Inestabilidad

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1507.0     | 409.1      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| FY | 113  | 0.0        | 586.6      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| FZ | 1    | 1507.0     | 409.1      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| MX | 7    | 1507.0     | 409.1      | 34105.3    | 21308.6     | 0.0         | 23319.9    | 10785.4    |
| MY | 1    | 1507.0     | 409.1      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| R1 | 7    | 1507.0     | 409.1      | 34105.3    | 21308.6     | 0.0         | 23319.9    | 10785.4    |
| R2 | 1    | 1507.0     | 409.1      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 545.3      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| FY | 227  | 0.0        | 100.0      | 17709.1    | 2591.4      | 0.0         | 9616.7     | 8092.4     |
| FZ | 229  | 0.0        | 100.0      | 17655.3    | 2591.4      | 0.0         | 9589.8     | 8065.5     |
| MX | 227  | 0.0        | 100.0      | 17709.1    | 2591.4      | 0.0         | 9616.7     | 8092.4     |
| MY | 1    | 1507.0     | 409.1      | 43164.5    | 3498.4      | 0.0         | 22611.2    | 20553.3    |
| R1 | 229  | 0.0        | 100.0      | 17655.3    | 2591.4      | 0.0         | 9589.8     | 8065.5     |
| R2 | 229  | 0.0        | 100.0      | 17655.3    | 2591.4      | 0.0         | 9589.8     | 8065.5     |

Combinaciones características

|                   |      |        |       |         |         |         |         |         |          |          |
|-------------------|------|--------|-------|---------|---------|---------|---------|---------|----------|----------|
| --- Fuste --- 1   |      |        |       |         |         |         |         |         |          |          |
|                   | HIP. | FX     | FY    | FZ      | MX (MA) | MY (MA) | MX (MG) | MY (MG) | MX (lin) | MY (lin) |
|                   |      | (kN)   | (kN)  | (kN)    | (mkN)   | (mkN)   | (mkN)   | (mkN)   | (mkN)    | (mkN)    |
| Esfuerzos maximos |      |        |       |         |         |         |         |         |          |          |
| FX                | 25   | 1557.8 | 135.0 | 45618.6 | 9582.2  | 32097.2 | 8275.8  | 29287.0 | 5557.2   | 23394.9  |
| FY                | 113  | 0.0    | 625.0 | 45618.6 | 17363.2 | 5176.2  | 15665.9 | 4356.0  | 12756.1  | 0.0      |
| FZ                | 1    | 1507.0 | 439.9 | 45618.6 | 14405.6 | 31664.4 | 12824.4 | 28849.7 | 9987.0   | 22982.3  |
| MX                | 119  | 0.0    | 625.0 | 36559.3 | 34949.8 | 4148.3  | 33500.4 | 4015.3  | 30566.3  | 0.0      |
| MY                | 25   | 1557.8 | 135.0 | 45618.6 | 9582.2  | 32097.2 | 8275.8  | 29287.0 | 5557.2   | 23394.9  |
| Esfuerzos minimos |      |        |       |         |         |         |         |         |          |          |
| FX                | 41   | 0.0    | 576.1 | 45618.6 | 16627.3 | 5176.2  | 14955.9 | 4356.0  | 12064.0  | 0.0      |
| FY                | 17   | 1507.0 | 135.0 | 45618.6 | 9582.2  | 31664.4 | 8275.8  | 28849.7 | 5557.2   | 22982.3  |
| FZ                | 209  | 0.0    | 196.6 | 26572.2 | 8648.8  | 3015.1  | 8057.9  | 2802.6  | 6057.3   | 0.0      |
| MX                | 17   | 1507.0 | 135.0 | 45618.6 | 9582.2  | 31664.4 | 8275.8  | 28849.7 | 5557.2   | 22982.3  |
| MY                | 41   | 0.0    | 576.1 | 45618.6 | 16627.3 | 5176.2  | 14955.9 | 4356.0  | 12064.0  | 0.0      |



LA V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 1

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1

Armadura de cálculo - Pandeo dir. ancho

(1): Axil máx  $\Leftrightarrow$  My

(2): My máx  $\Leftrightarrow$  Axil

HIP. AS1

1 No es necesaria armadura de cálculo

2 No es necesaria armadura de cálculo

Armadura mínima mecánica

HIP. AS1

3 7.3

Armadura mínima geométrica

HIP. AS1

4 12.4

Elección del armado de la sección

$\phi$ (est): 12.44 mm

$\phi$ : 16.00 mm

16. 0. 400. 3652. 300.

--- Fuste --- 1

Armadura de cálculo - Pandeo dir. canto

(1): Axil máx  $\Leftrightarrow$  Mx

(2): Mx máx  $\Leftrightarrow$  Axil

HIP. AS1

1 No es necesaria armadura de cálculo

2 No es necesaria armadura de cálculo

Armadura mínima mecánica

HIP. AS1

3 7.3

Armadura mínima geométrica

HIP. AS1

4 12.4

Elección del armado de la sección

$\phi$ (est): 12.44 mm

$\phi$ : 16.00 mm

| Diámetro | n° barras | Solapo(mm) | Lgtud espera | Patilla |
|----------|-----------|------------|--------------|---------|
| 16.      | 157.      | 400.       | 3652.        | 300.    |

ARMADURA TRANSVERSAL (cm2/m)

--- Fuste ---

1. Hipótesis de  $F_{x\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 1557.82 kN

$F_y$ : 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 3.96 m

d: 2.35 m

Vul: 55836.00 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 9.57

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

$A_{st}$ : 24.62 cm2/m

2. Hipótesis de  $F_{y\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 0.00 kN

$F_y$ : 625.03 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 3.96 m

d: 2.35 m

Vul: 55836.00 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 9.57

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

$A_{st}$ : 16.82 cm2/m

3. Elección de armado:

$A_{st}$ : 24.6 cm2/m

L.A.V. LLUIDA-MARTORELL  
VIADUCTO DE ANOIA  
FILA I

```

*****
*****
***
*** Dimensionamiento del encepado de la pila ***
***
*** PEDELTA ***
***
*****
*****

```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 1

Fx\_s: 1004.69 kN  
Fy\_s: 303.24 kN  
Fz\_s: 39355.50 kN  
Mx\_s: 7979.33 mkN  
My\_s: 24349.00 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 12532.90 kN  
Ph\_min: 7144.85 kN

Hipótesis de pilote menos cargado: 8

Fx\_s: 1004.69 kN  
Fy\_s: 303.24 kN  
Fz\_s: 33154.52 kN  
Mx\_s: 19852.83 mkN  
My\_s: 23310.02 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 11885.53 kN  
Ph\_min: 4691.73 kN

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.000  | 3.000  |
| 2      | -3.000 | 3.000  |
| 3      | 3.000  | -3.000 |
| 4      | -3.000 | -3.000 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i) |
|--------|----------|--------|-------|
| 1      | 12532.90 | 251.17 | 75.81 |
| 2      | 8474.74  | 251.17 | 75.81 |
| 3      | 11203.01 | 251.17 | 75.81 |
| 4      | 7144.85  | 251.17 | 75.81 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 12532.90 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i)   | _kN/m3 |
|---------|-------|---------|--------|
| 1       | 20.00 | 2000.00 |        |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz.: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)  | My(i)   |
|--------|----------|--------|--------|--------|---------|
| 1      | 16815.24 | 376.76 | 109.97 | 705.46 | 2417.02 |
| 2      | 12505.90 | 376.76 | 109.97 | 705.46 | 2417.02 |
| 3      | 15417.04 | 376.76 | 109.97 | 705.46 | 2417.02 |
| 4      | 11107.70 | 376.76 | 109.97 | 705.46 | 2417.02 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_biela | Tens_b | Tens_adm | _MPa |
|--------|----------|----------|---------|--------|----------|------|
| 1      | 16815.24 | 0.69     | 1.01    | 16.65  | 11.67    |      |
| 2      | 12505.90 | 0.69     | 1.01    | 12.38  | 11.67    |      |
| 3      | 15417.04 | 0.69     | 1.01    | 15.26  | 11.67    |      |
| 4      | 11107.70 | 0.69     | 1.01    | 11.00  | 11.67    |      |

Tens\_bielas < 0.70·fcd => Correcto



L.A.V. LLEJDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA I

Armado del pilote: Nmax - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2517.864 mkN  
Nd: 16815.242 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 11.10 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Armado del pilote: Nmin - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2517.864 mkN  
Nd: 11107.703 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 9.02 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Posicion de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE AÑOIA  
PILA 1

Armadura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:

Vrd: 392.48 kN  
Vu1: 12065.62 kN  
Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma

Vrd: 392.48 kN  
Vu2: 2807.12 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm2/m

Propuesta de armado:

Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm2

Armado del encepado

|                               |            |                 |         |
|-------------------------------|------------|-----------------|---------|
| Arm.principal de bandas lgtd: | 402.36 cm2 | distribuida en: | 2.10 m  |
| Arm.principal de bandas trvs: | 336.98 cm2 | distribuida en: | 2.10 m  |
| Arm.transv. vertical lgtd:    | 189.94 cm2 | distribuida en: | 4.00 m  |
| Arm.transv. vertical trvs:    | 94.97 cm2  | distribuida en: | 4.00 m  |
| Arm. superior/lateral lgtd:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. superior/lateral trvs:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas lgtd:       | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas trvs:       | 27.00 cm2  | distribuida en: | 1.00 ml |

CLASIFICACIÓN DEL ARMADO

|                                  | phi | n° barras | As_cm2 |
|----------------------------------|-----|-----------|--------|
| Lgtd.bandas inferior encepado 1: | 20. | 129       | 405.27 |
|                                  | 25. | 82        | 402.52 |
|                                  | 32. | 50        | 402.12 |

|                                | phi | Sep_cm/ml | As_cm2/ml |
|--------------------------------|-----|-----------|-----------|
| Lgtd.entre bandas inferior 1a: | 20. | 10.0      | 31.42     |
| Lgtd.superior encepado 2:      | 20. | 10.0      | 31.42     |

|                                  | phi | n° barras | As_cm2 |
|----------------------------------|-----|-----------|--------|
| Trvs.bandas inferior encepado 3: | 20. | 108       | 339.29 |
|                                  | 25. | 69        | 338.70 |
|                                  | 32. | 42        | 337.78 |

|                                | phi | Sep_cm/ml | As_cm2/ml |
|--------------------------------|-----|-----------|-----------|
| Trvs.entre bandas inferior 3a: | 20. | 10.0      | 31.42     |
| Trvs.superior encepado 4:      | 20. | 10.0      | 31.42     |
| Laterales 5,6:                 | 20. | 10.0      | 31.42     |

|                         | phi | Sep_cm/ml | n°cercos |
|-------------------------|-----|-----------|----------|
| Cercos lgtdinales 7:    | 20. | 12.5      | 32       |
| Cercos transversales 8: | 20. | 12.5      | 32       |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 7144.85  
Mk (mkN): -1683.14  
Mfis (mkN): -4621.45

Mk < Mfis: No hay fisuración

DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
ESTRUCTURA: Viaducto Anoia  
ELEMENTO: Pila 1

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 2           | 10                         | 125.7                    |
| 2                    | 5           | 20                         | 628.3                    |
| 3                    | 15          | 93                         | 8765.0                   |
| CARGA POR PUNTA, kPa |             | 1120                       | 3518.6                   |

Diámetro del pilote=2

Longitud de empotramiento=7.5

Longitud del pilote=22

Carga máxima en pilote=13038

Tensión de trabajo del pilote=4.2

m

diámetros

m

kN

MPa

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 2

```
*****
*****
***                                     ****
***      Programa de calculo para pilas      ****
***      (Puentes in situ)                   ****
***                                     ****
***      PEDELTA                             ****
***                                     ****
*****
*****
```

GEOMETRIA DE PILA

Altura = 16.950 m  
Coef. Pandeo = 1.700

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.05 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 4.8400 m2  
Inercia x = 9.5030 m4    Radio de giro x= 1.401 m  
Inercia y = 3.6245 m4    Radio de giro y= 0.865 m

Esbeltez x = 20.56  
Esbeltez y = 33.30

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 3.0000 m  
Ancho transv. = 9.0000 m  
Ancho longtd. = 9.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 12030.45    | 0.00           |
| Carga Permanente               | = 7537.22     | 2921.16        |
| Pretensado                     | = 364.70      | 0.00           |
| Sobrecarga unif. total         | = 838.12      | 0.00           |
| Sobrecarga unif. medio tablero | = 368.03      | 1364.10        |
| Vehiculo/s Centrado            | = 12449.41    | 0.00           |
| Vehiculo/s Excentrico          | = 6391.42     | 11318.81       |
| Gradiente térmico              | = 58.65       | 11318.81       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1012.04  | 0.00       |
| Centrifuga          | = 0.00     | 170.00     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 403.90     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
PILA 2

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| FY | 113  | 0.0        | 639.9      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| FZ | 2    | 1012.0     | 423.1      | 33291.6    | 2921.2      | 0.0         | 17504.9    | 15786.6    |
| MX | 7    | 1012.0     | 423.1      | 26728.3    | 15604.1     | 0.0         | 17953.6    | 8774.7     |
| MY | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| R1 | 8    | 1012.0     | 423.1      | 26763.5    | 15604.1     | 0.0         | 17971.2    | 8792.3     |
| R2 | 2    | 1012.0     | 423.1      | 33291.6    | 2921.2      | 0.0         | 17504.9    | 15786.6    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 593.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| FY | 17   | 1012.0     | 100.0      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| FZ | 216  | 0.0        | 100.0      | 19968.8    | 2921.2      | 0.0         | 10843.6    | 9125.3     |
| MX | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| MY | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| R1 | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |
| R2 | 1    | 1012.0     | 423.1      | 33256.4    | 2921.2      | 0.0         | 17487.3    | 15769.0    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| Fuste             |      | 1      |       |         |         |         |
|-------------------|------|--------|-------|---------|---------|---------|
| HIP.              | FX   | FY     | FZ    | MX      | MY      |         |
|                   | (kN) | (kN)   | (kN)  | (mkN)   | (mkN)   |         |
| Esfuerzos maximos |      |        |       |         |         |         |
| FX                | 25   | 1050.8 | 100.0 | 35307.3 | 4616.2  | 17501.9 |
| FY                | 113  | 0.0    | 668.6 | 35307.3 | 14025.1 | 0.0     |
| FZ                | 2    | 1012.0 | 446.1 | 35342.5 | 10299.2 | 17154.1 |
| MX                | 119  | 0.0    | 668.6 | 28779.2 | 26708.0 | 0.0     |
| MY                | 25   | 1050.8 | 100.0 | 35307.3 | 4616.2  | 17501.9 |
| Esfuerzos minimos |      |        |       |         |         |         |
| FX                | 41   | 0.0    | 616.1 | 35307.3 | 13180.7 | 0.0     |
| FY                | 17   | 1012.0 | 100.0 | 35307.3 | 4616.2  | 17154.1 |
| FZ                | 216  | 0.0    | 157.4 | 22019.8 | 5131.5  | 0.0     |
| MX                | 17   | 1012.0 | 100.0 | 35307.3 | 4616.2  | 17154.1 |
| MY                | 41   | 0.0    | 616.1 | 35307.3 | 13180.7 | 0.0     |

3. Combinaciones frecuentes

|                   |       |       |       |         |         |         |
|-------------------|-------|-------|-------|---------|---------|---------|
| ---               | Fuste | ---   | 1     |         |         |         |
|                   | HIP.  | FX    | FY    | FZ      | MX      | MY      |
|                   |       | (kN)  | (kN)  | (kN)    | (mkN)   | (mkN)   |
| Esfuerzos maximos |       |       |       |         |         |         |
| FX                | 257   | 616.9 | 100.0 | 29992.3 | 4616.2  | 10379.4 |
| FY                | 346   | 0.0   | 393.6 | 30004.0 | 9454.7  | 0.0     |
| FZ                | 362   | 29.1  | 134.0 | 30027.5 | 5192.5  | 260.9   |
| MX                | 351   | 0.0   | 393.6 | 26075.5 | 17064.5 | 0.0     |
| MY                | 257   | 616.9 | 100.0 | 29992.3 | 4616.2  | 10379.4 |
| Esfuerzos minimos |       |       |       |         |         |         |
| FX                | 273   | 0.0   | 288.5 | 29992.3 | 7765.8  | 0.0     |
| FY                | 249   | 607.2 | 100.0 | 29992.3 | 4616.2  | 10292.4 |
| FZ                | 448   | 0.0   | 134.5 | 22019.8 | 4925.4  | 0.0     |
| MX                | 249   | 607.2 | 100.0 | 29992.3 | 4616.2  | 10292.4 |
| MY                | 273   | 0.0   | 288.5 | 29992.3 | 7765.8  | 0.0     |

4. Combinaciones casi-permanentes

|                   |       |       |       |         |        |        |
|-------------------|-------|-------|-------|---------|--------|--------|
| ---               | Fuste | ---   | 1     |         |        |        |
|                   | HIP.  | FX    | FY    | FZ      | MX     | MY     |
|                   |       | (kN)  | (kN)  | (kN)    | (mkN)  | (mkN)  |
| Esfuerzos maximos |       |       |       |         |        |        |
| FX                | 483   | 212.1 | 100.0 | 24677.3 | 4616.2 | 3517.8 |
| FY                | 499   | 0.0   | 220.5 | 24677.3 | 6613.2 | 0.0    |
| FZ                | 588   | 9.7   | 134.0 | 24712.5 | 5192.5 | 87.0   |
| MX                | 505   | 0.0   | 220.5 | 23371.7 | 9149.8 | 0.0    |
| MY                | 483   | 212.1 | 100.0 | 24677.3 | 4616.2 | 3517.8 |
| Esfuerzos minimos |       |       |       |         |        |        |
| FX                | 499   | 0.0   | 220.5 | 24677.3 | 6613.2 | 0.0    |
| FY                | 475   | 202.4 | 100.0 | 24677.3 | 4616.2 | 3430.8 |
| FZ                | 674   | 0.0   | 111.5 | 22019.8 | 4719.2 | 0.0    |
| MX                | 475   | 202.4 | 100.0 | 24677.3 | 4616.2 | 3430.8 |
| MY                | 499   | 0.0   | 220.5 | 24677.3 | 6613.2 | 0.0    |

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VIADUCTO DE ANOLA  
PILA 2

ELS FISURACIÓN

2. Fisuración por tracción en la pila  
En el fuste se producen tracciones: Combinación característica  
Hip: 7 fct: -2.90 MPa tensión: -4.63 MPa  
Nk:28779.2 kN Mxk:22982.1 mkN Myk:17154.1 mkN

ELU INESTABILIDAD

Altura: 16.95 m  
Betapandeo: 1.70  
Lgtud pandeo: 28.82 m  
Radio giro rx: 1.40 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 20.56  
Esbeltez auy: 33.30

Anotación:  
Esbeltez < 35 => Pandeo OK (Mlin)  
35 < Esbeltez < 100 => Met. aproximado (MA)  
100 < Esbeltez < 200 => Met. general EHE (MG)  
Esbeltez > 200 => No se contempla

No hace falta verificar el ELU Inestabilidad

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1518.1     | 619.7      | 46712.4    | 3943.6      | 0.0         | 24516.0    | 22196.3    |
| FY | 113  | 0.0        | 944.9      | 46712.4    | 3943.6      | 0.0         | 24516.0    | 22196.3    |
| FZ | 2    | 1518.1     | 619.7      | 46765.1    | 3943.6      | 0.0         | 24542.4    | 22222.7    |
| MX | 7    | 1518.1     | 619.7      | 36920.2    | 22967.9     | 0.0         | 25215.4    | 11704.8    |
| MY | 1    | 1518.1     | 619.7      | 46712.4    | 3943.6      | 0.0         | 24516.0    | 22196.3    |
| R1 | 8    | 1518.1     | 619.7      | 36973.0    | 22967.9     | 0.0         | 25241.8    | 11731.2    |
| R2 | 2    | 1518.1     | 619.7      | 46765.1    | 3943.6      | 0.0         | 24542.4    | 22222.7    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 874.7      | 46712.4    | 3943.6      | 0.0         | 24516.0    | 22196.3    |
| FY | 227  | 0.0        | 100.0      | 19932.4    | 2921.2      | -0.0        | 10825.3    | 9107.0     |
| FZ | 227  | 0.0        | 100.0      | 19932.4    | 2921.2      | 0.0         | 10825.3    | 9107.0     |
| MX | 227  | 0.0        | 100.0      | 19932.4    | 2921.2      | 0.0         | 10825.3    | 9107.0     |
| MY | 1    | 1518.1     | 619.7      | 46712.4    | 3943.6      | 0.0         | 24516.0    | 22196.3    |
| R1 | 227  | 0.0        | 100.0      | 19932.4    | 2921.2      | 0.0         | 10825.3    | 9107.0     |
| R2 | 227  | 0.0        | 100.0      | 19932.4    | 2921.2      | 0.0         | 10825.3    | 9107.0     |

Combinaciones características

|                   |       |        |       |         |         |         |         |         |          |          |
|-------------------|-------|--------|-------|---------|---------|---------|---------|---------|----------|----------|
| ---               | Fuste | ---    | 1     |         |         |         |         |         |          |          |
|                   | HIP.  | FX     | FY    | FZ      | MX (MA) | MY (MA) | MX (MG) | MY (MG) | MX (lin) | MY (lin) |
|                   |       | (kN)   | (kN)  | (kN)    | (mkN)   | (mkN)   | (mkN)   | (mkN)   | (mkN)    | (mkN)    |
| Esfuerzos maximos |       |        |       |         |         |         |         |         |          |          |
| FX                | 25    | 1576.2 | 135.0 | 49481.1 | 11517.3 | 37933.3 | 9668.8  | 34183.2 | 6231.8   | 26252.9  |
| FY                | 113   | 0.0    | 987.9 | 49481.1 | 26769.6 | 6917.5  | 24258.2 | 5618.4  | 20345.3  | 0.0      |
| FZ                | 2     | 1518.1 | 654.1 | 49533.9 | 20845.5 | 37392.4 | 18487.4 | 33625.2 | 14756.3  | 25731.1  |
| MX                | 120   | 0.0    | 987.9 | 39741.8 | 45236.4 | 5555.9  | 43292.0 | 5181.0  | 39369.6  | 0.0      |
| MY                | 25    | 1576.2 | 135.0 | 49481.1 | 11517.3 | 37933.3 | 9668.8  | 34183.2 | 6231.8   | 26252.9  |
| Esfuerzos minimos |       |        |       |         |         |         |         |         |          |          |
| FX                | 41    | 0.0    | 909.1 | 49481.1 | 25434.3 | 6917.5  | 22950.3 | 5618.4  | 19078.6  | 0.0      |
| FY                | 17    | 1518.1 | 135.0 | 49481.1 | 11517.3 | 37381.6 | 9668.8  | 33619.7 | 6231.8   | 25731.1  |
| FZ                | 216   | 0.0    | 221.1 | 29549.8 | 10498.1 | 4131.1  | 9775.4  | 3716.0  | 7004.8   | 0.0      |
| MX                | 17    | 1518.1 | 135.0 | 49481.1 | 11517.3 | 37381.6 | 9668.8  | 33619.7 | 6231.8   | 25731.1  |
| MY                | 41    | 0.0    | 909.1 | 49481.1 | 25434.3 | 6917.5  | 22950.3 | 5618.4  | 19078.6  | 0.0      |



E.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 2

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. ancho  
(1): Axil máx  $\Leftrightarrow$  My  
(2): My máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 No es necesaria armadura de cálculo  
2 No es necesaria armadura de cálculo  
Armadura mínima mecánica  
HIP. AS1  
3 7.6  
Armadura mínima geométrica  
HIP. AS1  
4 12.5

Elección del armado de la sección

$\phi$ (est): 12.49 mm

$\phi$ i: 16.00 mm

16. 0. 400. 3652. 300.

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. canto  
(1): Axil máx  $\Leftrightarrow$  Mx  
(2): Mx máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 2.8  
2 No es necesaria armadura de cálculo  
Armadura mínima mecánica  
HIP. AS1  
3 7.6  
Armadura mínima geométrica  
HIP. AS1  
4 12.5

Elección del armado de la sección

$\phi$ (est): 12.49 mm

$\phi$ i: 16.00 mm

| Diámetro | n° barras | Solapo(mm) | Lgtud espera | Patilla |
|----------|-----------|------------|--------------|---------|
| 16.      | 158.      | 400.       | 3652.        | 300.    |

ARMADURA TRANSVERSAL (cm<sup>2</sup>/m)

--- Fuste ---

1. Hipótesis de  $F_{x\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 1576.20 kN

$F_y$ : 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.05 m

d: 2.35 m

Vul: 57105.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.22

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

Ast: 25.19 cm<sup>2</sup>/m

2. Hipótesis de  $F_{y\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 0.00 kN

$F_y$ : 987.92 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.05 m

d: 2.35 m

Vul: 57105.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.22

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

Ast: 16.94 cm<sup>2</sup>/m

3. Elección de armado:

Ast: 25.2 cm<sup>2</sup>/m

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VIADUCTO DE ANOIA  
PILA 2

```
*****
*****
***
***   Dimensionamiento del encepado de la pila   ***
***
***               PEDELTA               ***
***
*****
*****
```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 2

Fx\_s: 1012.04 kN  
Fy\_s: 446.09 kN  
Fz\_s: 42916.51 kN  
Mx\_s: 11637.45 mkN  
My\_s: 28437.17 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 14068.68 kN  
Ph\_min: 7389.58 kN

Hipótesis de pilote menos cargado: 7

Fx\_s: 1012.04 kN  
Fy\_s: 446.09 kN  
Fz\_s: 36353.24 kN  
Mx\_s: 24320.36 mkN  
My\_s: 27081.92 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 13371.83 kN  
Ph\_min: 4804.79 kN

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.000  | 3.000  |
| 2      | -3.000 | 3.000  |
| 3      | 3.000  | -3.000 |
| 4      | -3.000 | -3.000 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  |
|--------|----------|--------|--------|
| 1      | 14068.68 | 253.01 | 111.52 |
| 2      | 9329.15  | 253.01 | 111.52 |
| 3      | 12129.11 | 253.01 | 111.52 |
| 4      | 7389.58  | 253.01 | 111.52 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 14068.68 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i)   | kN/m3 |
|---------|-------|---------|-------|
| 1       | 20.00 | 2000.00 |       |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)   | My(i)   |
|--------|----------|--------|--------|---------|---------|
| 1      | 18457.77 | 379.51 | 163.53 | 1049.11 | 2434.70 |
| 2      | 13465.23 | 379.51 | 163.53 | 1049.11 | 2434.70 |
| 3      | 16414.18 | 379.51 | 163.53 | 1049.11 | 2434.70 |
| 4      | 11421.64 | 379.51 | 163.53 | 1049.11 | 2434.70 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_biela | Tens_b | Tens_adm | MPa |
|--------|----------|----------|---------|--------|----------|-----|
| 1      | 18457.77 | 0.69     | 1.01    | 18.27  | 11.67    |     |
| 2      | 13465.23 | 0.69     | 1.01    | 13.33  | 11.67    |     |
| 3      | 16414.18 | 0.69     | 1.01    | 16.25  | 11.67    |     |
| 4      | 11421.64 | 0.69     | 1.01    | 11.31  | 11.67    |     |

Tens\_bielas < 0.70·fcd => Correcto



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 2

Armado del pilote: Nmax - Mmax

-----

Características de los materiales (MPa)  
fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2651.112 mkN  
Nd: 18457.773 kN

Características de la sección  
Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado  
Armadura de cálculo  
No es necesaria armadura de cálculo

Cuantía geométrica mínima  
phi(est):22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima  
phi(est):11.62 mm  
phi: 12.00 mm

Elección de armado  
phi: 25. mm

Armado del pilote: Nmin - Mmax

-----

Características de los materiales (MPa)  
fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2651.112 mkN  
Nd: 11421.639 kN

Características de la sección  
Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado  
Armadura de cálculo  
No es necesaria armadura de cálculo

Cuantía geométrica mínima  
phi(est):22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima  
phi(est): 9.14 mm  
phi: 12.00 mm

Elección de armado  
phi: 25. mm

Posicion de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

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VIADUCTO DE ANOLA  
PILA 2

Armadura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:  
Vrd: 413.25 kN  
Vu1: 12065.62 kN  
Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma  
Vrd: 413.25 kN  
Vu2: 2996.37 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm2/m

Propuesta de armado:  
Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm2

Armado del encepado

|                               |            |                 |         |
|-------------------------------|------------|-----------------|---------|
| Arm.principal de bandas lgtd: | 441.66 cm2 | distribuida en: | 2.10 m  |
| Arm.principal de bandas trvs: | 365.75 cm2 | distribuida en: | 2.10 m  |
| Arm.transv. vertical lgtd:    | 206.26 cm2 | distribuida en: | 4.00 m  |
| Arm.transv. vertical trvs:    | 103.13 cm2 | distribuida en: | 4.00 m  |
| Arm. superior/lateral lgtd:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. superior/lateral trvs:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas lgtd:       | 27.60 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas trvs:       | 27.00 cm2  | distribuida en: | 1.00 ml |

CLASIFICACIÓN DEL ARMADO

|                                  |     |           |           |
|----------------------------------|-----|-----------|-----------|
| Lgtd.bandas inferior encepado 1: | phi | n° barras | As_cm2    |
|                                  | 20. | 141       | 442.96    |
|                                  | 25. | 90        | 441.79    |
|                                  | 32. | 55        | 442.34    |
| Lgtd.entre bandas inferior 1a:   | phi | Sep_cm/ml | As_cm2/ml |
| Lgtd.superior encepado 2:        | 20. | 10.0      | 31.42     |
|                                  | 20. | 10.0      | 31.42     |
| Trvs.bandas inferior encepado 3: | phi | n° barras | As_cm2    |
|                                  | 20. | 117       | 367.57    |
|                                  | 25. | 75        | 368.16    |
|                                  | 32. | 46        | 369.95    |
| Trvs.entre bandas inferior 3a:   | phi | Sep_cm/ml | As_cm2/ml |
| Trvs.superior encepado 4:        | 20. | 10.0      | 31.42     |
| Laterales 5,6:                   | 20. | 10.0      | 31.42     |
| Cercos lgtudinales 7:            | phi | Sep_cm/ml | n°cercos  |
|                                  | 20. | 10.0      | 40        |
| Cercos transversales 8:          | 20. | 10.0      | 40        |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 7389.58  
Mk (mkN): -1773.82  
Mfis (mkN): -4695.84

Mk < Mfis: No hay fisuración

DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
ESTRUCTURA: Viaducto Anoia  
ELEMENTO: Pila 2

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 5           | 10                         | 314.2                    |
| 2                    | 3           | 20                         | 377.0                    |
| 3                    | 18          | 93                         | 10518.1                  |
| CARGA POR PUNTA, kPa |             | 1125                       | 3534.3                   |

Diámetro del pilote=

Longitud de empotramiento=

Longitud del pilote=

Carga máxima en pilote=

Tensión de trabajo del pilote=

2

9

26

14743

4.7

m

diámetros

m

kN

MPa

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 3

```
*****
*****
***
***      Programa de calculo para pilas      ***
***      (Puentes in situ)                  ***
***
***      PEDELTA                             ***
***
*****
*****
```

GEOMETRIA DE PILA

Altura = 17.800 m  
Coef. Pandeo = 2.000

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.09 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 4.8720 m2  
Inercia x = 9.7498 m4    Radio de giro x= 1.415 m  
Inercia y = 3.6570 m4    Radio de giro y= 0.866 m

Esbeltez x = 25.17  
Esbeltez y = 41.09

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 3.0000 m  
Ancho transv. = 9.0000 m  
Ancho longtd. = 9.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 11974.40    | 0.00           |
| Carga Permanente               | = 7517.93     | 2931.65        |
| Pretensado                     | = -14.60      | 0.00           |
| Sobrecarga unif. total         | = 852.28      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.05      | 1366.39        |
| Vehiculo/s Centrado            | = 12536.36    | 0.00           |
| Vehiculo/s Excentrico          | = 6478.79     | 11314.24       |
| Gradiente térmico              | = -17.47      | 11314.24       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1007.75  | 0.00       |
| Centrifuga          | = 0.00     | 219.30     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 512.00     |
| Sismo transversal   | = 0.00     | 0.00       |

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VIADUCTO DE ANOIA  
PILA 3

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| FY 113 | 0.0        | 787.4      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| FZ 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| MX 7   | 1007.8     | 509.6      | 26321.1    | 15612.3     | 0.0         | 17752.4    | 8568.7     |
| MY 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| R1 7   | 1007.8     | 509.6      | 26321.1    | 15612.3     | 0.0         | 17752.4    | 8568.7     |
| R2 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 41  | 0.0        | 728.9      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| FY 17  | 1007.8     | 100.0      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| FZ 209 | 0.0        | 100.0      | 19458.8    | 2931.6      | 0.0         | 10591.7    | 8867.2     |
| MX 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| MY 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| R1 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |
| R2 1   | 1007.8     | 509.6      | 32864.9    | 2931.6      | 0.0         | 17294.7    | 15570.2    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| Fuste             | HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|--------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |        |            |            |            |             |             |
| FX 25             | 1049.0 | 100.0      | 35032.9    | 4711.6     | 18325.5     |             |
| FY 113            | 0.0    | 817.7      | 35032.9    | 17232.3    | 0.0         |             |
| FZ 1              | 1007.8 | 533.8      | 35032.9    | 12229.9    | 17937.9     |             |
| MX 119            | 0.0    | 817.7      | 28489.1    | 29913.0    | 0.0         |             |
| MY 25             | 1049.0 | 100.0      | 35032.9    | 4711.6     | 18325.5     |             |
| Esfuerzos minimos |        |            |            |            |             |             |
| FX 41             | 0.0    | 753.1      | 35032.9    | 16133.5    | 0.0         |             |
| FY 17             | 1007.8 | 100.0      | 35032.9    | 4711.6     | 17937.9     |             |
| FZ 209            | 0.0    | 148.4      | 21626.8    | 5166.5     | 0.0         |             |
| MX 17             | 1007.8 | 100.0      | 35032.9    | 4711.6     | 17937.9     |             |
| MY 41             | 0.0    | 753.1      | 35032.9    | 16133.5    | 0.0         |             |

3. Combinaciones frecuentes

| Fuste             | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 257            | 615.0 | 100.0      | 29677.5    | 4711.6     | 10859.7     |             |
| FY 346            | 0.0   | 469.2      | 29674.0    | 11131.1    | 0.0         |             |
| FZ 233            | 604.7 | 208.4      | 29677.5    | 6591.2     | 10762.8     |             |
| MX 351            | 0.0   | 469.2      | 25751.2    | 18739.4    | 0.0         |             |
| MY 257            | 615.0 | 100.0      | 29677.5    | 4711.6     | 10859.7     |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 273            | 0.0   | 340.0      | 29677.5    | 8933.3     | 0.0         |             |
| FY 249            | 604.7 | 100.0      | 29677.5    | 4711.6     | 10762.8     |             |
| FZ 441            | 0.0   | 112.1      | 21635.6    | 4825.4     | 0.0         |             |
| MX 249            | 604.7 | 100.0      | 29677.5    | 4711.6     | 10762.8     |             |
| MY 273            | 0.0   | 340.0      | 29677.5    | 8933.3     | 0.0         |             |

4. Combinaciones casi-permanentes

| Fuste             | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 483            | 211.9 | 100.0      | 24322.0    | 4711.6     | 3684.5      |             |
| FY 499            | 0.0   | 252.3      | 24322.0    | 7371.9     | 0.0         |             |
| FZ 459            | 201.6 | 208.4      | 24322.0    | 6591.2     | 3587.6      |             |
| MX 505            | 0.0   | 252.3      | 23013.3    | 9908.1     | 0.0         |             |
| MY 483            | 211.9 | 100.0      | 24322.0    | 4711.6     | 3684.5      |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 499            | 0.0   | 252.3      | 24322.0    | 7371.9     | 0.0         |             |
| FY 475            | 201.6 | 100.0      | 24322.0    | 4711.6     | 3587.6      |             |
| FZ 667            | 0.0   | 112.1      | 21640.8    | 4825.4     | 0.0         |             |
| MX 475            | 201.6 | 100.0      | 24322.0    | 4711.6     | 3587.6      |             |
| MY 499            | 0.0   | 252.3      | 24322.0    | 7371.9     | 0.0         |             |

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ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica  
Hip: 8 fct: -2.90 MPa tensión: -5.27 MPa  
Nk:28478.7 kN Mxk:24910.6 mkN Myk:17937.9 mkN

ELU INESTABILIDAD

Altura: 17.80 m  
Betapandeo: 2.00  
Lgtud pandeo: 35.60 m  
Radio giro rx: 1.41 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 25.17  
Esbeltez auy: 41.09

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)  
35 < Esbeltez < 100 => Met. aproximado (MA)  
100 < Esbeltez < 200 => Met. general EHE (MG)  
Esbeltez > 200 => No se contempla

Estudio de la Inestabilidad mediante Metodo aproximado de la EHE

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1511.6     | 749.4      | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| FY | 113  | 0.0        | 1166.2     | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| FZ | 1    | 1511.6     | 749.4      | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| MX | 7    | 1511.6     | 749.4      | 36567.3    | 22978.7     | 0.0         | 25042.1    | 11525.2    |
| MY | 1    | 1511.6     | 749.4      | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| R1 | 7    | 1511.6     | 749.4      | 36567.3    | 22978.7     | 0.0         | 25042.1    | 11525.2    |
| R2 | 1    | 1511.6     | 749.4      | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 1078.4     | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| FY | 227  | 0.0        | 100.0      | 19477.7    | 2931.6      | 0.0         | 10601.1    | 8876.6     |
| FZ | 229  | 0.0        | 100.0      | 19474.2    | 2931.6      | 0.0         | 10599.4    | 8874.9     |
| MX | 227  | 0.0        | 100.0      | 19477.7    | 2931.6      | 0.0         | 10601.1    | 8876.6     |
| MY | 1    | 1511.6     | 749.4      | 46383.0    | 3957.7      | 0.0         | 24355.5    | 22027.5    |
| R1 | 229  | 0.0        | 100.0      | 19474.2    | 2931.6      | 0.0         | 10599.4    | 8874.9     |
| R2 | 229  | 0.0        | 100.0      | 19474.2    | 2931.6      | 0.0         | 10599.4    | 8874.9     |

Combinaciones características

| --- Fuste --- 1   |      |            |            |            |                 |                 |                 |                 |                                |
|-------------------|------|------------|------------|------------|-----------------|-----------------|-----------------|-----------------|--------------------------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX(MA)<br>(mkN) | MY(MA)<br>(mkN) | MX(MG)<br>(mkN) | MY(MG)<br>(mkN) | MX(lin) MY(lin)<br>(mkN) (mkN) |
| Esfuerzos maximos |      |            |            |            |                 |                 |                 |                 |                                |
| FX                | 25   | 1573.5     | 135.0      | 49309.9    | 14340.7         | 45345.1         | 11592.8         | 39845.8         | 6360.7 27488.2                 |
| FY                | 113  | 0.0        | 1211.5     | 49309.9    | 35150.1         | 10509.9         | 31298.4         | 8713.1          | 25141.8 0.0                    |
| FZ                | 1    | 1511.6     | 785.7      | 49309.9    | 27077.9         | 44716.3         | 23436.7         | 39194.0         | 17638.2 26906.9                |
| MX                | 119  | 0.0        | 1211.5     | 39494.2    | 53092.8         | 8417.8          | 50227.5         | 7971.5          | 44162.7 0.0                    |
| MY                | 25   | 1573.5     | 135.0      | 49309.9    | 14340.7         | 45345.1         | 11592.8         | 39845.8         | 6360.7 27488.2                 |
| Esfuerzos minimos |      |            |            |            |                 |                 |                 |                 |                                |
| FX                | 41   | 0.0        | 1114.6     | 49309.9    | 33393.6         | 10509.9         | 29572.6         | 8713.1          | 23493.5 0.0                    |
| FY                | 17   | 1511.6     | 135.0      | 49309.9    | 14340.7         | 44716.3         | 11592.8         | 39194.0         | 6360.7 26906.9                 |
| FZ                | 209  | 0.0        | 207.6      | 29200.7    | 12268.6         | 6223.9          | 11214.4         | 5540.3          | 7042.9 0.0                     |
| MX                | 17   | 1511.6     | 135.0      | 49309.9    | 14340.7         | 44716.3         | 11592.8         | 39194.0         | 6360.7 26906.9                 |
| MY                | 41   | 0.0        | 1114.6     | 49309.9    | 33393.6         | 10509.9         | 29572.6         | 8713.1          | 23493.5 0.0                    |



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VIADUCTO DE ANOLA  
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CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. ancho  
(1): Axil máx  $\Leftrightarrow$  My  
(2): My máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 20.1  
2 19.0

Armadura mínima mecánica

HIP. AS1  
3 7.5

Armadura mínima geométrica

HIP. AS1  
4 12.5

Elección del armado de la sección

$\phi$ (est): 20.07 mm  
 $\phi$ : 25.00 mm

25. 0. 812. 4037. 300.

--- Fuste --- 1

Armadura de cálculo - Pandeo dir. canto

(1): Axil máx  $\Leftrightarrow$  Mx  
(2): Mx máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 9.1  
2 4.2

Armadura mínima mecánica

HIP. AS1  
3 7.5

Armadura mínima geométrica

HIP. AS1  
4 12.5

Elección del armado de la sección

$\phi$ (est): 12.45 mm  
 $\phi$ : 16.00 mm

| Diámetro | n° barras | Solapo (mm) | Lgtud espera | Patilla |
|----------|-----------|-------------|--------------|---------|
| 16.      | 160.      | 400.        | 3652.        | 300.    |

ARMADURA TRANSVERSAL (cm<sup>2</sup>/m)

--- Fuste ---

1. Hipótesis de  $F_x$  max:

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 1573.47 kN  
 $F_y$ : 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00  
fcd: 20.00 MPa  
bo: 4.09 m  
d: 2.35 m

Vul: 57669.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004  
eps: 1.29  
sig\_c: 10.12

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot bo$   
Ast: 25.44 cm<sup>2</sup>/m

2. Hipótesis de  $F_y$  max:

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 0.00 kN  
 $F_y$ : 1211.52 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00  
fcd: 20.00 MPa  
bo: 4.09 m  
d: 2.35 m

Vul: 57669.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004  
eps: 1.29  
sig\_c: 10.12

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot bo$   
Ast: 16.99 cm<sup>2</sup>/m

3. Elección de armado:

Ast: 25.4 cm<sup>2</sup>/m

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VIADUCTO DE ANOIA  
PILA 3

```

*****
*****
***
*** Dimensionamiento del encepado de la pila ***
***
*** PEDELTA ***
***
*****
*****

```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 1

Fx\_s: 1007.75 kN  
Fy\_s: 533.79 kN  
Fz\_s: 42606.15 kN  
Mx\_s: 13831.31 mkN  
My\_s: 33512.11 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 14596.82 kN  
Ph\_min: 6706.25 kN

Hipótesis de pilote menos cargado: 8

Fx\_s: 1007.75 kN  
Fy\_s: 533.79 kN  
Fz\_s: 36051.87 kN  
Mx\_s: 26511.94 mkN  
My\_s: 31426.40 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 13841.16 kN  
Ph\_min: 4184.77 kN

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.000  | 3.000  |
| 2      | -3.000 | 3.000  |
| 3      | 3.000  | -3.000 |
| 4      | -3.000 | -3.000 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  |
|--------|----------|--------|--------|
| 1      | 14596.82 | 251.94 | 133.45 |
| 2      | 9011.47  | 251.94 | 133.45 |
| 3      | 12291.60 | 251.94 | 133.45 |
| 4      | 6706.25  | 251.94 | 133.45 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 14596.82 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i)   | _kN/m3 |
|---------|-------|---------|--------|
| 1       | 20.00 | 2000.00 |        |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)   | My(i)   |
|--------|----------|--------|--------|---------|---------|
| 1      | 19017.65 | 377.91 | 196.42 | 1260.10 | 2424.38 |
| 2      | 13180.36 | 377.91 | 196.42 | 1260.10 | 2424.38 |
| 3      | 16586.48 | 377.91 | 196.42 | 1260.10 | 2424.38 |
| 4      | 10749.19 | 377.91 | 196.42 | 1260.10 | 2424.38 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_bielas | Tens_b | Tens_adm | _MPa |
|--------|----------|----------|----------|--------|----------|------|
| 1      | 19017.65 | 0.69     | 1.01     | 18.83  | 11.67    |      |
| 2      | 13180.36 | 0.69     | 1.01     | 13.05  | 11.67    |      |
| 3      | 16586.48 | 0.69     | 1.01     | 16.42  | 11.67    |      |
| 4      | 10749.19 | 0.69     | 1.01     | 10.64  | 11.67    |      |

Tens\_bielas < 0.70·fcd => Correcto



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Armado del pilote: Nmax - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2732.302 mkN  
Nd: 19017.648 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 11.80 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Armado del pilote: Nmin - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2732.302 mkN  
Nd: 10749.193 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 8.87 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Posición de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

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Armadura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:  
Vrd: 425.90 kN  
Vul: 12065.62 kN  
Vrd < Vul => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma  
Vrd: 425.90 kN  
Vu2: 3060.88 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm<sup>2</sup>/m

Propuesta de armado:  
Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm<sup>2</sup>

Armado del encepado

|                               |                        |                 |         |
|-------------------------------|------------------------|-----------------|---------|
| Arm.principal de bandas lgtd: | 455.06 cm <sup>2</sup> | distribuida en: | 2.10 m  |
| Arm.principal de bandas trvs: | 374.95 cm <sup>2</sup> | distribuida en: | 2.10 m  |
| Arm.transv. vertical lgtd:    | 205.32 cm <sup>2</sup> | distribuida en: | 4.00 m  |
| Arm.transv. vertical trvs:    | 102.66 cm <sup>2</sup> | distribuida en: | 4.00 m  |
| Arm. superior/lateral lgtd:   | 27.00 cm <sup>2</sup>  | distribuida en: | 1.00 ml |
| Arm. superior/lateral trvs:   | 27.00 cm <sup>2</sup>  | distribuida en: | 1.00 ml |
| Arm. entre bandas lgtd:       | 28.44 cm <sup>2</sup>  | distribuida en: | 1.00 ml |
| Arm. entre bandas trvs:       | 27.00 cm <sup>2</sup>  | distribuida en: | 1.00 ml |

CLASIFICACIÓN DEL ARMADO

|                                  |     |           |           |
|----------------------------------|-----|-----------|-----------|
| Lgtd.bandas inferior encepado 1: | phi | n° barras | As_cm2    |
|                                  | 20. | 145       | 455.53    |
|                                  | 25. | 93        | 456.51    |
|                                  | 32. | 57        | 458.42    |
| Lgtd.entre bandas inferior 1a:   | phi | Sep_cm/ml | As_cm2/ml |
| Lgtd.superior encepado 2:        | 20. | 10.0      | 31.42     |
|                                  | 20. | 10.0      | 31.42     |
| Trvs.bandas inferior encepado 3: | phi | n° barras | As_cm2    |
|                                  | 20. | 120       | 376.99    |
|                                  | 25. | 77        | 377.97    |
|                                  | 32. | 47        | 378.00    |
| Trvs.entre bandas inferior 3a:   | phi | Sep_cm/ml | As_cm2/ml |
| Trvs.superior encepado 4:        | 20. | 10.0      | 31.42     |
| Laterales 5,6:                   | 20. | 10.0      | 31.42     |
| Cercos lgtudinales 7:            | phi | Sep_cm/ml | n° cercos |
| Cercos transversales 8:          | 20. | 10.0      | 40        |
|                                  | 20. | 10.0      | 40        |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 6706.25  
Mk (mkN): -1828.99  
Mfis (mkN): -4488.12

Mk < Mfis: No hay fisuración

# DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
 ESTRUCTURA: Viaducto Anoia  
 ELEMENTO: Pila 3

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 5           | 10                         | 314.2                    |
| 2                    | 3           | 20                         | 377.0                    |
| 3                    | 18.5        | 93                         | 10810.2                  |
| CARGA POR PUNTA, kPa |             | 1125                       | 3534.3                   |

Diámetro del pilote= 2 m  
 Longitud de empotramiento= 9.25 diámetros

Longitud del pilote= 26.5 m  
 Carga máxima en pilote= 15036 kN

Tensión de trabajo del pilote= 4.8 MPa

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 4

```

*****
*****
***
*** Programa de calculo para pilas
*** (Puentes in situ)
***
*** PEDELTA
***
*****
*****

```

GEOMETRIA DE PILA

Altura = 21.200 m  
Coef. Pandeo = 2.000

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.26 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 5.0080 m2  
Inercia x = 10.8423 m4 Radio de giro x= 1.471 m  
Inercia y = 3.7948 m4 Radio de giro y= 0.870 m

Esbeltez x = 28.82  
Esbeltez y = 48.71

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 5.0000 m  
Ancho transv. = 10.0000 m  
Ancho longtd. = 10.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 11991.22    | 0.00           |
| Carga Permanente               | = 7524.16     | 2934.04        |
| Pretensado                     | = 184.35      | 0.00           |
| Sobrecarga unif. total         | = 855.75      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.32      | 1366.72        |
| Vehiculo/s Centrado            | = 12556.36    | 0.00           |
| Vehiculo/s Excentrico          | = 6500.41     | 11313.41       |
| Gradiente térmico              | = 9.05        | 11313.41       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.95  | 0.00       |
| Centrifuga          | = 0.00     | 204.00     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 475.60     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 4

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| FY 113 | 0.0        | 738.8      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| FZ 2   | 1009.0     | 480.5      | 33135.7    | 2934.0      | 0.0         | 17430.8    | 15704.9    |
| MX 7   | 1009.0     | 480.5      | 26584.9    | 15614.2     | 0.0         | 17884.8    | 8700.0     |
| MY 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| R1 8   | 1009.0     | 480.5      | 26590.3    | 15614.2     | 0.0         | 17887.6    | 8702.8     |
| R2 2   | 1009.0     | 480.5      | 33135.7    | 2934.0      | 0.0         | 17430.8    | 15704.9    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 41  | 0.0        | 684.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| FY 17  | 1009.0     | 100.0      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| FZ 216 | 0.0        | 100.0      | 19718.2    | 2934.0      | 0.0         | 10722.0    | 8996.1     |
| MX 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| MY 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| R1 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |
| R2 1   | 1009.0     | 480.5      | 33130.3    | 2934.0      | 0.0         | 17428.1    | 15702.2    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| --- Fuste --- 1   | HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|--------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |        |            |            |            |             |             |
| FX 25             | 1060.6 | 100.0      | 35784.5    | 5054.0     | 21962.8     |             |
| FY 113            | 0.0    | 775.2      | 35784.5    | 19000.2    | 0.0         |             |
| FZ 2              | 1009.0 | 509.6      | 35789.9    | 13443.1    | 21389.7     |             |
| MX 119            | 0.0    | 775.2      | 29239.1    | 31680.3    | 0.0         |             |
| MY 25             | 1060.6 | 100.0      | 35784.5    | 5054.0     | 21962.8     |             |
| Esfuerzos minimos |        |            |            |            |             |             |
| FX 41             | 0.0    | 713.6      | 35784.5    | 17767.9    | 0.0         |             |
| FY 17             | 1009.0 | 100.0      | 35784.5    | 5054.0     | 21389.7     |             |
| FZ 216            | 0.0    | 172.7      | 22372.4    | 5861.2     | 0.0         |             |
| MX 17             | 1009.0 | 100.0      | 35784.5    | 5054.0     | 21389.7     |             |
| MY 41             | 0.0    | 713.6      | 35784.5    | 17767.9    | 0.0         |             |

3. Combinaciones frecuentes

| --- Fuste --- 1   | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 257            | 618.3 | 100.0      | 30419.7    | 5054.0     | 12977.1     |             |
| FY 346            | 0.0   | 448.0      | 30421.5    | 12210.8    | 0.0         |             |
| FZ 362            | 38.7  | 140.8      | 30425.1    | 5919.0     | 429.8       |             |
| MX 351            | 0.0   | 448.0      | 26492.4    | 19818.9    | 0.0         |             |
| MY 257            | 618.3 | 100.0      | 30419.7    | 5054.0     | 12977.1     |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 273            | 0.0   | 324.8      | 30419.7    | 9746.2     | 0.0         |             |
| FY 249            | 605.4 | 100.0      | 30419.7    | 5054.0     | 12833.8     |             |
| FZ 448            | 0.0   | 143.6      | 22372.4    | 5538.4     | 0.0         |             |
| MX 249            | 605.4 | 100.0      | 30419.7    | 5054.0     | 12833.8     |             |
| MY 273            | 0.0   | 324.8      | 30419.7    | 9746.2     | 0.0         |             |

4. Combinaciones casi-permanentes

| --- Fuste --- 1   | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 483            | 214.7 | 100.0      | 25054.8    | 5054.0     | 4421.2      |             |
| FY 499            | 0.0   | 243.2      | 25054.8    | 8016.3     | 0.0         |             |
| FZ 588            | 12.9  | 140.8      | 25060.3    | 5919.0     | 143.3       |             |
| MX 505            | 0.0   | 243.2      | 23745.7    | 10552.3    | 0.0         |             |
| MY 483            | 214.7 | 100.0      | 25054.8    | 5054.0     | 4421.2      |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 499            | 0.0   | 243.2      | 25054.8    | 8016.3     | 0.0         |             |
| FY 475            | 201.8 | 100.0      | 25054.8    | 5054.0     | 4277.9      |             |
| FZ 674            | 0.0   | 114.5      | 22372.4    | 5215.5     | 0.0         |             |
| MX 475            | 201.8 | 100.0      | 25054.8    | 5054.0     | 4277.9      |             |
| MY 499            | 0.0   | 243.2      | 25054.8    | 8016.3     | 0.0         |             |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 4

ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica

Hip: 7 fct: -2.90 MPa tensión: -6.06 MPa

Nk:29239.1 kN Mxk:26123.2 mkN Myk:21389.7 mkN

ELU INESTABILIDAD

Altura: 21.20 m  
Betapandeo: 2.00  
Lgtud pandeo: 42.40 m  
Radio giro rx: 1.47 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 28.82  
Esbeltez auy: 48.71

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)

35 < Esbeltez < 100 => Met. aproximado (MA)

100 < Esbeltez < 200 => Met. general EHE (MG)

Esbeltez > 200 => No se contempla

Estudio de la Inestabilidad mediante Metodo aproximado de la EHE

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1513.4     | 705.7      | 46648.3    | 3961.0      | 0.0         | 24489.1    | 22159.2    |
| FY | 113  | 0.0        | 1093.2     | 46648.3    | 3961.0      | 0.0         | 24489.1    | 22159.2    |
| FZ | 2    | 1513.4     | 705.7      | 46656.4    | 3961.0      | 0.0         | 24493.2    | 22163.2    |
| MX | 7    | 1513.4     | 705.7      | 36830.2    | 22981.1     | 0.0         | 25174.3    | 11655.9    |
| MY | 1    | 1513.4     | 705.7      | 46648.3    | 3961.0      | 0.0         | 24489.1    | 22159.2    |
| R1 | 8    | 1513.4     | 705.7      | 36838.4    | 22981.1     | 0.0         | 25178.3    | 11660.0    |
| R2 | 2    | 1513.4     | 705.7      | 46656.4    | 3961.0      | 0.0         | 24493.2    | 22163.2    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 1011.7     | 46648.3    | 3961.0      | 0.0         | 24489.1    | 22159.2    |
| FY | 227  | 0.0        | 100.0      | 19699.7    | 2934.0      | 0.0         | 10712.8    | 8986.9     |
| FZ | 227  | 0.0        | 100.0      | 19699.7    | 2934.0      | 0.0         | 10712.8    | 8986.9     |
| MX | 227  | 0.0        | 100.0      | 19699.7    | 2934.0      | 0.0         | 10712.8    | 8986.9     |
| MY | 1    | 1513.4     | 705.7      | 46648.3    | 3961.0      | 0.0         | 24489.1    | 22159.2    |
| R1 | 227  | 0.0        | 100.0      | 19699.7    | 2934.0      | 0.0         | 10712.8    | 8986.9     |
| R2 | 227  | 0.0        | 100.0      | 19699.7    | 2934.0      | 0.0         | 10712.8    | 8986.9     |



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 4

Combinaciones características

| --- Fuste --- 1   |        |        |         |         |         |         |         |         |         |
|-------------------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| HIP.              | FX     | FY     | FZ      | MX(MA)  | MY(MA)  | MX(MG)  | MY(MG)  | MX(lin) | MY(lin) |
|                   | (kN)   | (kN)   | (kN)    | (mkN)   | (mkN)   | (mkN)   | (mkN)   | (mkN)   | (mkN)   |
| Esfuerzos maximos |        |        |         |         |         |         |         |         |         |
| FX 25             | 1590.9 | 135.0  | 50231.5 | 17927.2 | 59125.6 | 14168.8 | 52213.3 | 6823.0  | 32944.3 |
| FY 113            | 0.0    | 1147.7 | 50231.5 | 41732.9 | 15115.4 | 36495.5 | 12837.8 | 27742.2 | 0.0     |
| FZ 2              | 1513.4 | 749.4  | 50239.6 | 32603.6 | 58190.8 | 27615.8 | 51201.1 | 19406.5 | 32084.6 |
| MX 120            | 0.0    | 1147.7 | 40421.6 | 59217.6 | 12163.4 | 55358.7 | 11684.0 | 46762.4 | 0.0     |
| MY 25             | 1590.9 | 135.0  | 50231.5 | 17927.2 | 59125.6 | 14168.8 | 52213.3 | 6823.0  | 32944.3 |
| Esfuerzos minimos |        |        |         |         |         |         |         |         |         |
| FX 41             | 0.0    | 1055.4 | 50231.5 | 39732.3 | 15115.4 | 34527.8 | 12837.8 | 25893.7 | 0.0     |
| FY 17             | 1513.4 | 135.0  | 50231.5 | 17927.2 | 58187.1 | 14168.8 | 51198.8 | 6823.0  | 32084.6 |
| FZ 216            | 0.0    | 244.1  | 30113.3 | 15459.0 | 9061.5  | 13915.7 | 8032.8  | 8033.7  | 0.0     |
| MX 17             | 1513.4 | 135.0  | 50231.5 | 17927.2 | 58187.1 | 14168.8 | 51198.8 | 6823.0  | 32084.6 |
| MY 41             | 0.0    | 1055.4 | 50231.5 | 39732.3 | 15115.4 | 34527.8 | 12837.8 | 25893.7 | 0.0     |

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

|                                         |          |     |      |
|-----------------------------------------|----------|-----|------|
| ---                                     | Fuste    | --- | 1    |
| Armadura de cálculo - Pandeo dir. ancho |          |     |      |
| (1):                                    | Axil máx | <=> | My   |
| (2):                                    | My máx   | <=> | Axil |
| HIP.                                    | AS1      |     |      |
| 1                                       | 25.5     |     |      |
| 2                                       | 24.7     |     |      |
| Armadura mínima mecánica                |          |     |      |
| HIP.                                    | AS1      |     |      |
| 3                                       | 7.4      |     |      |
| Armadura mínima geométrica              |          |     |      |
| HIP.                                    | AS1      |     |      |
| 4                                       | 12.4     |     |      |

Elección del armado de la sección  
phi(est): 25.51 mm  
phi: 32.00 mm

32. 0. 1331. 6535. 300.

--- Fuste --- 1

Armadura de cálculo - Pandeo dir. canto  
(1): Axil máx <=> Mx  
(2): Mx máx <=> Axil

|      |      |
|------|------|
| HIP. | AS1  |
| 1    | 14.4 |
| 2    | 7.5  |

Armadura mínima mecánica

|      |     |
|------|-----|
| HIP. | AS1 |
| 3    | 7.4 |

Armadura mínima geométrica

|      |      |
|------|------|
| HIP. | AS1  |
| 4    | 12.4 |

Elección del armado de la sección  
phi(est): 14.42 mm  
phi: 16.00 mm

| Diámetro | n° barras | Solapo(mm) | Lgtud espera | Patilla |
|----------|-----------|------------|--------------|---------|
| 16.      | 165.      | 400.       | 5652.        | 300.    |

ARMADURA TRANSVERSAL (cm2/m)

--- Fuste ---

1. Hipótesis de Fx\_max:

Esfuerzo cortante efectivo de cálculo:

|     |            |
|-----|------------|
| Fx: | 1590.87 kN |
| Fy: | 135.00 kN  |

Comprobación de agotamiento por compresión oblicua en el alma

|      |           |
|------|-----------|
| k:   | 1.00      |
| fcd: | 20.00 MPa |
| bo:  | 4.26 m    |
| d:   | 2.35 m    |

Vul: 60066.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

|        |        |
|--------|--------|
| ro:    | 0.0004 |
| eps:   | 1.29   |
| sig_c: | 10.03  |

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

Ast=0.02·(fck/Gc)/(fyk/Gs)·bo  
Ast: 26.50 cm2/m

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 4

2. Hipótesis de  $F_{y\_max}$ :

Esfuerzo cortante efectivo de cálculo:

Fx: 0.00 kN  
Fy: 1147.74 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00  
fcd: 20.00 MPa  
bo: 4.26 m  
d: 2.35 m

Vul: 60066.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004  
eps: 1.29  
sig\_c: 10.03

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$Ast = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot bo$   
Ast: 17.20 cm<sup>2</sup>/m

3. Elección de armado:

Ast: 26.5 cm<sup>2</sup>/m



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*****
*****
***
***      Dimensionamiento del encepado de la pila      ***
***
***      PEDELTA      ***
***
*****
*****

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#### Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 2

Fx\_s: 1008.95 kN  
 Fy\_s: 509.57 kN  
 Fz\_s: 48842.30 kN  
 Mx\_s: 15277.54 mkN  
 My\_s: 48425.26 mkN

Diam.requerido: 2.00 m  
 N°pilotes\_x: 2  
 N°pilotes\_y: 2  
 Ph\_max: 16760.78 kN  
 Ph\_min: 7660.38 kN

Hipótesis de pilote menos cargado: 7

Fx\_s: 1008.95 kN  
 Fy\_s: 509.57 kN  
 Fz\_s: 42291.50 kN  
 Mx\_s: 27957.67 mkN  
 My\_s: 44832.21 mkN

Diam.requerido: 2.00 m  
 N°pilotes\_x: 2  
 N°pilotes\_y: 2  
 Ph\_max: 15772.15 kN  
 Ph\_min: 5373.60 kN

#### Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.500  | 3.500  |
| 2      | -3.500 | 3.500  |
| 3      | 3.500  | -3.500 |
| 4      | -3.500 | -3.500 |

#### Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  |
|--------|----------|--------|--------|
| 1      | 16760.78 | 252.24 | 127.39 |
| 2      | 9842.88  | 252.24 | 127.39 |
| 3      | 14578.27 | 252.24 | 127.39 |
| 4      | 7660.38  | 252.24 | 127.39 |

#### Verificación del diámetro del pilote

Carga hundimiento admisible: 18849.56 kN  
 Pilote más cargado: 16760.78 kN  
 Q\_adm > F\_max => Correcto

#### Características del terreno

| Estrato | h(i)  | ni(i) kN/m3 |
|---------|-------|-------------|
| 1       | 20.00 | 2000.00     |

Cohesivo/granular: 0  
 Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
 Lgtd momentos: 12.83 m  
 Lgtd desplaz: 18.82 m

#### Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)   | My(i)   |
|--------|----------|--------|--------|---------|---------|
| 1      | 21706.66 | 378.36 | 187.34 | 1201.83 | 2427.27 |
| 2      | 14529.33 | 378.36 | 187.34 | 1201.83 | 2427.27 |
| 3      | 19400.84 | 378.36 | 187.34 | 1201.83 | 2427.27 |
| 4      | 12223.50 | 378.36 | 187.34 | 1201.83 | 2427.27 |

#### Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_bielas | Tens_b | Tens_adm MPa |
|--------|----------|----------|----------|--------|--------------|
| 1      | 21706.66 | 0.69     | 1.02     | 21.27  | 11.67        |
| 2      | 14529.33 | 0.69     | 1.02     | 14.23  | 11.67        |
| 3      | 19400.84 | 0.69     | 1.02     | 19.01  | 11.67        |
| 4      | 12223.50 | 0.69     | 1.02     | 11.98  | 11.67        |

Tens\_bielas < 0.70·fcd => Correcto

Armado del pilote: Nmax - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2708.506 mkN  
Nd: 21706.664 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

phi(est): 12.56 mm  
phi: 16.00 mm

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 12.61 mm  
phi: 16.00 mm

Elección de armado

phi: 25. mm

Armado del pilote: Nmin - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2708.506 mkN  
Nd: 12223.504 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 9.46 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Posicion de cada una de las armaduras

-----  
barra x(i) y(i)  
1 0.00 0.95  
2 0.15 0.94  
3 0.29 0.90  
4 0.43 0.85  
5 0.56 0.77  
6 0.67 0.67  
7 0.77 0.56  
8 0.85 0.43  
9 0.90 0.29  
10 0.94 0.15  
11 0.95 0.00  
12 0.94 -0.15  
13 0.90 -0.29  
14 0.85 -0.43  
15 0.77 -0.56  
16 0.67 -0.67  
17 0.56 -0.77  
18 0.43 -0.85  
19 0.29 -0.90  
20 0.15 -0.94  
21 0.00 -0.95  
22 -0.15 -0.94  
23 -0.29 -0.90  
24 -0.43 -0.85  
25 -0.56 -0.77  
26 -0.67 -0.67  
27 -0.77 -0.56  
28 -0.85 -0.43  
29 -0.90 -0.29  
30 -0.94 -0.15  
31 -0.95 0.00  
32 -0.94 0.15  
33 -0.90 0.29  
34 -0.85 0.43  
35 -0.77 0.56  
36 -0.67 0.67  
37 -0.56 0.77  
38 -0.43 0.85  
39 -0.29 0.90  
40 -0.15 0.94

Diámetro barra: 25.

# Armatura de cortante de los pilotes

-----  
 Esfuerzo cortante de agotamiento por compresión oblicua en el alma:

Vrd: 422.20 kN

Vu1: 12065.62 kN

Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma

Vrd: 422.20 kN

Vu2: 3370.70 kN

Vrd < Vu2 => Armadura mínima

Arm.mín: 12.37 cm2/m

Propuesta de armado:

Diam.cercos: 10. mm

Sep.cercos: 10. cm

Cuantía: 15.71 cm2

## Armado del encepado

-----  
 Arm.principal de bandas lgtd: 521.54 cm2 distribuida en: 2.10 m  
 Arm.principal de bandas trvs: 437.91 cm2 distribuida en: 2.10 m  
 Arm.transv. vertical lgtd: 221.92 cm2 distribuida en: 5.00 m  
 Arm.transv. vertical trvs: 110.96 cm2 distribuida en: 5.00 m  
 Arm. superior/lateral lgtd: 32.40 cm2 distribuida en: 1.00 ml  
 Arm. superior/lateral trvs: 32.40 cm2 distribuida en: 1.00 ml  
 Arm. entre bandas lgtd: 32.40 cm2 distribuida en: 1.00 ml  
 Arm. entre bandas trvs: 32.40 cm2 distribuida en: 1.00 ml

## CLASIFICACIÓN DEL ARMADO

-----  
 Lgtd.bandas inferior encepado 1: phi n° barras As\_cm2  
 20. 166 521.50  
 25. 107 525.24  
 32. 65 522.76  
 Lgtd.entre bandas inferior 1a: phi Sep\_cm/ml As\_cm2/ml  
 Lgtd.superior encepado 2: 25. 10.0 49.09  
 25. 10.0 49.09  
 Trvs.bandas inferior encepado 3: phi n° barras As\_cm2  
 20. 140 439.82  
 25. 90 441.79  
 32. 55 442.34  
 Trvs.entre bandas inferior 3a: phi Sep\_cm/ml As\_cm2/ml  
 Trvs.superior encepado 4: 25. 10.0 49.09  
 Laterales 5,6: 25. 10.0 49.09  
 Cercos lgtudinales 7: phi Sep\_cm/ml n°cercos  
 20. 12.5 40  
 Cercos transversales 8: 20. 12.5 40

## Verificación de la fisuración en pilotes

### ----- Acciones

Nk (kN): 7660.38

Mk (mkN): -1812.84

Mfis(mkN): -4778.16

Mk < .Mfis: No hay fisuración

DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
ESTRUCTURA: Viaducto Anoia  
ELEMENTO: Pila 4

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 7           | 10                         | 439.8                    |
| 2                    | 8           | 20                         | 1005.3                   |
| 3                    | 19          | 93                         | 11102.4                  |
| CARGA POR PUNTA, kPa |             | 1125                       | 3534.3                   |

Diámetro del pilote= 2 m  
Longitud de empotramiento= 9.5 m  
  
Longitud del pilote= 34 m  
Carga máxima en pilote= 16082 kN  
  
Tensión de trabajo del pilote= 5.1 MPa

J.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
PILA 5

```
*****
*****
***
*** Programa de calculo para pilas
*** (Puentes in situ)
***
*** PEDELTA
***
*****
*****
```

GEOMETRIA DE PILA

Altura = 21.200 m  
Coef. Pandeo = 2.000

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.26 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 5.0080 m2  
Inercia x = 10.8423 m4 Radio de giro x= 1.471 m  
Inercia y = 3.7948 m4 Radio de giro y= 0.870 m

Esbeltez x = 28.82  
Esbeltez y = 48.71

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 3.6000 m  
Ancho transv. = 10.0000 m  
Ancho longtd. = 10.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 12654.54    | 0.00           |
| Carga Permanente               | = 7524.45     | 3280.19        |
| Pretensado                     | = 183.73      | 0.00           |
| Sobrecarga unif. total         | = 855.94      | 0.00           |
| Sobrecarga unif. medio tablero | = 366.02      | 1487.90        |
| Vehiculo/s Centrado            | = 13454.49    | 0.00           |
| Vehiculo/s Excentrico          | = 6836.21     | 11912.11       |
| Gradiente térmico              | = 9.08        | 11912.11       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.95  | 0.00       |
| Centrifuga          | = 0.00     | 174.60     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 411.30     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.Y. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 5

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| FY | 113  | 0.0        | 651.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| FZ | 2    | 1009.0     | 429.0      | 34697.0    | 3280.2      | 0.0         | 18313.2    | 16383.7    |
| MX | 7    | 1009.0     | 429.0      | 27583.3    | 16680.2     | 0.0         | 18697.6    | 8885.7     |
| MY | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| R1 | 8    | 1009.0     | 429.0      | 27588.8    | 16680.2     | 0.0         | 18700.3    | 8888.4     |
| R2 | 2    | 1009.0     | 429.0      | 34697.0    | 3280.2      | 0.0         | 18313.2    | 16383.7    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 603.6      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| FY | 17   | 1009.0     | 100.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| FZ | 216  | 0.0        | 100.0      | 20381.1    | 3280.2      | 0.0         | 11155.3    | 9225.8     |
| MX | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| MY | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| R1 | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |
| R2 | 1    | 1009.0     | 429.0      | 34691.5    | 3280.2      | 0.0         | 18310.5    | 16381.0    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| Fuste             |      | 1          |            |            |             |             |  |
|-------------------|------|------------|------------|------------|-------------|-------------|--|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |  |
| Esfuerzos maximos |      |            |            |            |             |             |  |
| FX                | 25   | 1060.6     | 100.0      | 37345.8    | 5400.2      | 21962.8     |  |
| FY                | 113  | 0.0        | 687.3      | 37345.8    | 17484.6     | 0.0         |  |
| FZ                | 2    | 1009.0     | 458.1      | 37351.2    | 12698.7     | 21389.7     |  |
| MX                | 119  | 0.0        | 687.3      | 30237.6    | 30884.6     | 0.0         |  |
| MY                | 25   | 1060.6     | 100.0      | 37345.8    | 5400.2      | 21962.8     |  |
| Esfuerzos minimos |      |            |            |            |             |             |  |
| FX                | 41   | 0.0        | 632.7      | 37345.8    | 16400.2     | 0.0         |  |
| FY                | 17   | 1009.0     | 100.0      | 37345.8    | 5400.2      | 21389.7     |  |
| FZ                | 216  | 0.0        | 172.7      | 23035.3    | 6207.4      | 0.0         |  |
| MX                | 17   | 1009.0     | 100.0      | 37345.8    | 5400.2      | 21389.7     |  |
| MY                | 41   | 0.0        | 632.7      | 37345.8    | 16400.2     | 0.0         |  |

3. Combinaciones frecuentes

| Fuste             |      | 1          |            |            |             |             |
|-------------------|------|------------|------------|------------|-------------|-------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
| Esfuerzos maximos |      |            |            |            |             |             |
| FX                | 257  | 618.3      | 100.0      | 31621.6    | 5400.2      | 12977.1     |
| FY                | 346  | 0.0        | 403.5      | 31623.4    | 11614.4     | 0.0         |
| FZ                | 362  | 38.7       | 134.9      | 31627.0    | 6140.5      | 429.8       |
| MX                | 351  | 0.0        | 403.5      | 27356.7    | 19654.4     | 0.0         |
| MY                | 257  | 618.3      | 100.0      | 31621.6    | 5400.2      | 12977.1     |
| Esfuerzos minimos |      |            |            |            |             |             |
| FX                | 273  | 0.0        | 294.3      | 31621.6    | 9445.7      | 0.0         |
| FY                | 249  | 605.4      | 100.0      | 31621.6    | 5400.2      | 12833.8     |
| FZ                | 448  | 0.0        | 143.6      | 23035.3    | 5884.5      | 0.0         |
| MX                | 249  | 605.4      | 100.0      | 31621.6    | 5400.2      | 12833.8     |
| MY                | 273  | 0.0        | 294.3      | 31621.6    | 9445.7      | 0.0         |

4. Combinaciones casi-permanentes

| Fuste             |      | 1          |            |            |             |             |
|-------------------|------|------------|------------|------------|-------------|-------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
| Esfuerzos maximos |      |            |            |            |             |             |
| FX                | 483  | 214.7      | 100.0      | 25897.4    | 5400.2      | 4421.2      |
| FY                | 499  | 0.0        | 224.5      | 25897.4    | 7965.1      | 0.0         |
| FZ                | 588  | 12.9       | 134.9      | 25902.9    | 6140.5      | 143.3       |
| MX                | 505  | 0.0        | 224.5      | 24475.8    | 10645.1     | 0.0         |
| MY                | 483  | 214.7      | 100.0      | 25897.4    | 5400.2      | 4421.2      |
| Esfuerzos minimos |      |            |            |            |             |             |
| FX                | 499  | 0.0        | 224.5      | 25897.4    | 7965.1      | 0.0         |
| FY                | 475  | 201.8      | 100.0      | 25897.4    | 5400.2      | 4277.9      |
| FZ                | 674  | 0.0        | 114.5      | 23035.3    | 5561.6      | 0.0         |
| MX                | 475  | 201.8      | 100.0      | 25897.4    | 5400.2      | 4277.9      |
| MY                | 499  | 0.0        | 224.5      | 25897.4    | 7965.1      | 0.0         |



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
PILA 5

ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica

Hip: 7 fct: -2.90 MPa tensión: -5.85 MPa

Nk:30237.6 kN Mxk:26098.7 mkN Myk:21389.7 mkN

ELU INESTABILIDAD

Altura: 21.20 m  
Betapandeo: 2.00  
Lgtud pandeo: 42.40 m  
Radio giro rx: 1.47 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 28.82  
Esbeltez auy: 48.71

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)

35 < Esbeltez < 100 => Met. aproximado (MA)

100 < Esbeltez < 200 => Met. general EHE (MG)

Esbeltez > 200 => No se contempla

Estudio de la Inestabilidad mediante Metodo aproximado de la EHE

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1513.4     | 628.6      | 48891.0    | 4428.3      | 0.0         | 25747.9    | 23143.1    |
| FY | 113  | 0.0        | 961.5      | 48891.0    | 4428.3      | 0.0         | 25747.9    | 23143.1    |
| FZ | 2    | 1513.4     | 628.6      | 48899.2    | 4428.3      | 0.0         | 25752.0    | 23147.2    |
| MX | 7    | 1513.4     | 628.6      | 38228.7    | 24528.3     | 0.0         | 26328.6    | 11900.2    |
| MY | 1    | 1513.4     | 628.6      | 48891.0    | 4428.3      | 0.0         | 25747.9    | 23143.1    |
| R1 | 8    | 1513.4     | 628.6      | 38236.9    | 24528.3     | 0.0         | 26332.6    | 11904.2    |
| R2 | 2    | 1513.4     | 628.6      | 48899.2    | 4428.3      | 0.0         | 25752.0    | 23147.2    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 890.5      | 48891.0    | 4428.3      | 0.0         | 25747.9    | 23143.1    |
| FY | 227  | 0.0        | 100.0      | 20362.7    | 3280.2      | 0.0         | 11146.1    | 9216.6     |
| FZ | 227  | 0.0        | 100.0      | 20362.7    | 3280.2      | 0.0         | 11146.1    | 9216.6     |
| MX | 227  | 0.0        | 100.0      | 20362.7    | 3280.2      | 0.0         | 11146.1    | 9216.6     |
| MY | 1    | 1513.4     | 628.6      | 48891.0    | 4428.3      | 0.0         | 25747.9    | 23143.1    |
| R1 | 227  | 0.0        | 100.0      | 20362.7    | 3280.2      | 0.0         | 11146.1    | 9216.6     |
| R2 | 227  | 0.0        | 100.0      | 20362.7    | 3280.2      | 0.0         | 11146.1    | 9216.6     |

Combinaciones características

| --- Fuste --- 1   |      |            |            |            |                 |                 |                 |                 |                  |                  |
|-------------------|------|------------|------------|------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX(MA)<br>(mkN) | MY(MA)<br>(mkN) | MX(MG)<br>(mkN) | MY(MG)<br>(mkN) | MX(lin)<br>(mkN) | MY(lin)<br>(mkN) |
| Esfuerzos maximos |      |            |            |            |                 |                 |                 |                 |                  |                  |
| FX                | 25   | 1590.9     | 135.0      | 52474.2    | 18929.2         | 60157.9         | 14773.9         | 52460.5         | 7290.3           | 32944.3          |
| FY                | 113  | 0.0        | 1016.0     | 52474.2    | 39728.7         | 15790.3         | 34130.1         | 13079.6         | 25416.8          | 0.0              |
| FZ                | 2    | 1513.4     | 672.2      | 52482.4    | 31778.6         | 59218.0         | 26478.2         | 51449.1         | 18238.0          | 32084.6          |
| MX                | 120  | 0.0        | 1016.0     | 41820.1    | 58312.4         | 12584.3         | 54118.0         | 11859.8         | 45516.8          | 0.0              |
| MY                | 25   | 1590.9     | 135.0      | 52474.2    | 18929.2         | 60157.9         | 14773.9         | 52460.5         | 7290.3           | 32944.3          |
| Esfuerzos minimos |      |            |            |            |                 |                 |                 |                 |                  |                  |
| FX                | 41   | 0.0        | 934.1      | 52474.2    | 37948.1         | 15790.3         | 32397.6         | 13079.6         | 23790.3          | 0.0              |
| FY                | 17   | 1513.4     | 135.0      | 52474.2    | 18929.2         | 59214.2         | 14773.9         | 51446.8         | 7290.3           | 32084.6          |
| FZ                | 216  | 0.0        | 244.1      | 31008.6    | 16182.8         | 9330.9          | 14465.1         | 8401.5          | 8501.0           | 0.0              |
| MX                | 17   | 1513.4     | 135.0      | 52474.2    | 18929.2         | 59214.2         | 14773.9         | 51446.8         | 7290.3           | 32084.6          |
| MY                | 41   | 0.0        | 934.1      | 52474.2    | 37948.1         | 15790.3         | 32397.6         | 13079.6         | 23790.3          | 0.0              |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOLA  
PILA 5

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. ancho  
(1): Axil máx  $\Leftrightarrow$  My  
(2): My máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 26.2  
2 25.7

Armadura mínima mecánica

HIP. AS1  
3 7.6

Armadura mínima geométrica

HIP. AS1  
4 12.4

Elección del armado de la sección

$\phi$ (est): 26.19 mm

$\phi$ i: 32.00 mm

32. 0. 1331. 5135. 300.

--- Fuste --- 1

Armadura de cálculo - Pandeo dir. canto

(1): Axil máx  $\Leftrightarrow$  Mx  
(2): Mx máx  $\Leftrightarrow$  Axil

HIP. AS1  
1 14.7  
2 6.5

Armadura mínima mecánica

HIP. AS1  
3 7.6

Armadura mínima geométrica

HIP. AS1  
4 12.4

Elección del armado de la sección

$\phi$ (est): 14.74 mm

$\phi$ i: 16.00 mm

| Diámetro | n° barras | Solapo(mm) | Lgtud espera | Patilla |
|----------|-----------|------------|--------------|---------|
| 16.      | 165.      | 400.       | 4252.        | 300.    |

ARMADURA TRANSVERSAL (cm<sup>2</sup>/m)

--- Fuste ---

1. Hipótesis de  $F_{x\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 1590.87 kN

$F_y$ : 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.26 m

d: 2.35 m

Vu1: 60066.01 kN

Vu1 > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.48

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

$A_{st}$ : 26.50 cm<sup>2</sup>/m

2. Hipótesis de  $F_{y\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 0.00 kN

$F_y$ : 1016.01 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.26 m

d: 2.35 m

Vu1: 60066.01 kN

Vu1 > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.48

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st} = 0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

$A_{st}$ : 17.20 cm<sup>2</sup>/m

3. Elección de armado:

$A_{st}$ : 26.5 cm<sup>2</sup>/m



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 5

```
*****
*****
***
***   Dimensionamiento del encepado de la pila   ***
***
***               PEDELTA               ***
***
*****
*****
```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 2

|       |              |
|-------|--------------|
| FX_s: | 1008.95 kN   |
| FY_s: | 458.13 kN    |
| Fz_s: | 48226.01 kN  |
| Mx_s: | 14347.98 mkN |
| My_s: | 44181.71 mkN |

|                 |             |
|-----------------|-------------|
| Diam.requerido: | 2.00 m      |
| N°pilotes_x:    | 2           |
| N°pilotes_y:    | 2           |
| Ph_max:         | 16237.20 kN |
| Ph_min:         | 7875.81 kN  |

Hipótesis de pilote menos cargado: 7

|       |              |
|-------|--------------|
| FX_s: | 1008.95 kN   |
| FY_s: | 458.13 kN    |
| Fz_s: | 41112.36 kN  |
| Mx_s: | 27747.99 mkN |
| My_s: | 40914.80 mkN |

|                 |             |
|-----------------|-------------|
| Diam.requerido: | 2.00 m      |
| N°pilotes_x:    | 2           |
| N°pilotes_y:    | 2           |
| Ph_max:         | 15182.58 kN |
| Ph_min:         | 5373.61 kN  |

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.500  | 3.500  |
| 2      | -3.500 | 3.500  |
| 3      | 3.500  | -3.500 |
| 4      | -3.500 | -3.500 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  |
|--------|----------|--------|--------|
| 1      | 16237.20 | 252.24 | 114.53 |
| 2      | 9925.52  | 252.24 | 114.53 |
| 3      | 14187.48 | 252.24 | 114.53 |
| 4      | 7875.81  | 252.24 | 114.53 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 16237.20 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i)   | kN/m3 |
|---------|-------|---------|-------|
| 1       | 20.00 | 2000.00 |       |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)   | My(i)   |
|--------|----------|--------|--------|---------|---------|
| 1      | 21156.31 | 378.36 | 168.05 | 1078.08 | 2427.27 |
| 2      | 14585.19 | 378.36 | 168.05 | 1078.08 | 2427.27 |
| 3      | 18996.51 | 378.36 | 168.05 | 1078.08 | 2427.27 |
| 4      | 12425.39 | 378.36 | 168.05 | 1078.08 | 2427.27 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_biela | Tens_b | Tens_adm | MPa |
|--------|----------|----------|---------|--------|----------|-----|
| 1      | 21156.31 | 0.69     | 1.02    | 20.73  | 11.67    |     |
| 2      | 14585.19 | 0.69     | 1.02    | 14.29  | 11.67    |     |
| 3      | 18996.51 | 0.69     | 1.02    | 18.61  | 11.67    |     |
| 4      | 12425.39 | 0.69     | 1.02    | 12.17  | 11.67    |     |

Tens\_bielas < 0.70·fcd => Correcto

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VIADUCTO DE ANOIA  
PILA 5

Armado del pilote: Nmax - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2655.912 mkN  
Nd: 21156.307 kN

Características de la sección  
Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado  
Armadura de cálculo  
phi(est): 15.75 mm  
phi: 16.00 mm

Cuantía geométrica mínima  
phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima  
phi(est): 12.45 mm  
phi: 16.00 mm

Elección de armado  
phi: 25. mm

Armado del pilote: Nmin - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2655.912 mkN  
Nd: 12425.389 kN

Características de la sección  
Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado  
Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima  
phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima  
phi(est): 9.54 mm  
phi: 12.00 mm

Elección de armado  
phi: 25. mm

Posicion de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

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PILA 5

Armatura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:

Vrd: 414.00 kN  
Vu1: 12065.62 kN  
Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma

Vrd: 414.00 kN  
Vu2: 3307.29 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm2/m

Propuesta de armado:

Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm2

Armado del encepado

|                               |            |                 |         |
|-------------------------------|------------|-----------------|---------|
| Arm.principal de bandas lgtd: | 508.31 cm2 | distribuida en: | 2.10 m  |
| Arm.principal de bandas trvs: | 426.81 cm2 | distribuida en: | 2.10 m  |
| Arm.transv. vertical lgtd:    | 218.54 cm2 | distribuida en: | 5.00 m  |
| Arm.transv. vertical trvs:    | 109.27 cm2 | distribuida en: | 5.00 m  |
| Arm. superior/lateral lgtd:   | 32.40 cm2  | distribuida en: | 1.00 ml |
| Arm. superior/lateral trvs:   | 32.40 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas lgtd:       | 32.40 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas trvs:       | 32.40 cm2  | distribuida en: | 1.00 ml |

CLASIFICACIÓN DEL ARMADO

|                                  |      | phi | n° barras | As_cm2    |
|----------------------------------|------|-----|-----------|-----------|
| Lgtd.bandas inferior encepado 1: |      | 20. | 162       | 508.94    |
|                                  |      | 25. | 104       | 510.51    |
|                                  |      | 32. | 64        | 514.72    |
|                                  |      | phi | Sep_cm/ml | As_cm2/ml |
| Lgtd.entre bandas inferior       | 1a:  | 25. | 10.0      | 49.09     |
| Lgtd.superior encepado           | 2:   | 25. | 10.0      | 49.09     |
|                                  |      | phi | n° barras | As_cm2    |
| Trvs.bandas inferior encepado 3: |      | 20. | 136       | 427.26    |
|                                  |      | 25. | 87        | 427.06    |
|                                  |      | 32. | 54        | 434.29    |
|                                  |      | phi | Sep_cm/ml | As_cm2/ml |
| Trvs.entre bandas inferior       | 3a:  | 25. | 10.0      | 49.09     |
| Trvs.superior encepado           | 4:   | 25. | 10.0      | 49.09     |
| Laterales                        | 5,6: | 25. | 10.0      | 49.09     |
|                                  |      | phi | Sep_cm/ml | n°cercos  |
| Cercos lgtudinales               | 7:   | 20. | 12.5      | 40        |
| Cercos transversales             | 8:   | 20. | 12.5      | 40        |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 7875.81  
Mk (mkN): -1777.18  
Mfis (mkN): -4843.65

Mk < Mfis: No hay fisuración

DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
ESTRUCTURA: Viaducto Anoia  
ELEMENTO: Pila 5

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 5.5         | 10                         | 345.6                    |
| 2                    | 7.5         | 20                         | 942.5                    |
| 3                    | 45          | 40                         | 11309.7                  |
| CARGA POR PUNTA, kPa |             | 1125                       | 3534.3                   |

Diámetro del pilote=

Longitud de empotramiento=

Longitud del pilote=

Carga máxima en pilote=

Tensión de trabajo del pilote=

2

22.5

58

16132

5.1

m

diámetros

m

kN

MPa

L.A.V. LUEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 6

```
*****
*****
***
*** Programa de calculo para pilas
*** (Puentes in situ)
***
*** PEDELTA
***
*****
*****
```

GEOMETRIA DE PILA

Altura = 17.250 m  
Coef. Pandeo = 1.700

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.07 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

Propiedades de la Seccion de la pila

Area = 4.8560 m2  
Inercia x = 9.6259 m4 Radio de giro x= 1.408 m  
Inercia y = 3.6407 m4 Radio de giro y= 0.866 m

Esbeltez x = 20.83  
Esbeltez y = 33.87

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

Dimensiones de la Zapata

Canto = 3.0000 m  
Ancho transv. = 9.0000 m  
Ancho longtd. = 9.0000 m  
Altura de tierras = 1.0000 m

ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom_x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 12632.88    | 0.00           |
| Carga Permanente               | = 7536.96     | 3263.12        |
| Pretensado                     | = 323.20      | 0.00           |
| Sobrecarga unif. total         | = 838.24      | 0.00           |
| Sobrecarga unif. medio tablero | = 367.82      | 1485.34        |
| Vehiculo/s Centrado            | = 13415.57    | 0.00           |
| Vehiculo/s Excentrico          | = 6740.49     | 11894.65       |
| Gradiente térmico              | = 58.81       | 11894.65       |
| Deformación                    | = 0.00        | 0.00           |

ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1008.49  | 0.00       |
| Centrifuga          | = 0.00     | 232.50     |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 544.20     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 6

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| FY 113 | 0.0        | 830.2      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| FZ 2   | 1008.5     | 535.4      | 34814.5    | 3263.1      | 0.0         | 18367.0    | 16447.5    |
| MX 7   | 1008.5     | 535.4      | 27633.7    | 16643.1     | 0.0         | 18711.9    | 8921.8     |
| MY 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| R1 8   | 1008.5     | 535.4      | 27669.0    | 16643.1     | 0.0         | 18729.5    | 8939.4     |
| R2 2   | 1008.5     | 535.4      | 34814.5    | 3263.1      | 0.0         | 18367.0    | 16447.5    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 41  | 0.0        | 767.9      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| FY 17  | 1008.5     | 100.0      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| FZ 216 | 0.0        | 100.0      | 20525.4    | 3263.1      | 0.0         | 11222.4    | 9302.9     |
| MX 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| MY 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| R1 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |
| R2 1   | 1008.5     | 535.4      | 34779.2    | 3263.1      | 0.0         | 18349.3    | 16429.8    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| --- Fuste --- 1   | HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|--------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |        |            |            |            |             |             |
| FX 25             | 1048.2 | 100.0      | 36873.3    | 4988.1     | 17758.6     |             |
| FY 113            | 0.0    | 859.5      | 36873.3    | 17851.0    | 0.0         |             |
| FZ 2              | 1008.5 | 558.8      | 36908.6    | 12711.6    | 17396.5     |             |
| MX 119            | 0.0    | 859.5      | 29727.8    | 31231.0    | 0.0         |             |
| MY 25             | 1048.2 | 100.0      | 36873.3    | 4988.1     | 17758.6     |             |
| Esfuerzos minimos |        |            |            |            |             |             |
| FX 41             | 0.0    | 791.3      | 36873.3    | 16722.2    | 0.0         |             |
| FY 17             | 1008.5 | 100.0      | 36873.3    | 4988.1     | 17396.5     |             |
| FZ 216            | 0.0    | 158.5      | 22619.5    | 5521.9     | 0.0         |             |
| MX 17             | 1008.5 | 100.0      | 36873.3    | 4988.1     | 17396.5     |             |
| MY 41             | 0.0    | 791.3      | 36873.3    | 16722.2    | 0.0         |             |

3. Combinaciones frecuentes

| --- Fuste --- 1   | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 257            | 615.0 | 100.0      | 31171.8    | 4988.1     | 10528.4     |             |
| FY 346            | 0.0   | 490.6      | 31183.6    | 11582.9    | 0.0         |             |
| FZ 362            | 29.8  | 146.5      | 31207.1    | 5790.2     | 271.6       |             |
| MX 351            | 0.0   | 490.6      | 26884.5    | 19610.9    | 0.0         |             |
| MY 257            | 615.0 | 100.0      | 31171.8    | 4988.1     | 10528.4     |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 273            | 0.0   | 354.2      | 31171.8    | 9325.4     | 0.0         |             |
| FY 249            | 605.1 | 100.0      | 31171.8    | 4988.1     | 10437.9     |             |
| FZ 448            | 0.0   | 135.1      | 22619.5    | 5308.4     | 0.0         |             |
| MX 249            | 605.1 | 100.0      | 31171.8    | 4988.1     | 10437.9     |             |
| MY 273            | 0.0   | 354.2      | 31171.8    | 9325.4     | 0.0         |             |

4. Combinaciones casi-permanentes

| --- Fuste --- 1   | HIP.  | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |
|-------------------|-------|------------|------------|------------|-------------|-------------|
| Esfuerzos maximos |       |            |            |            |             |             |
| FX 483            | 211.6 | 100.0      | 25470.3    | 4988.1     | 3569.8      |             |
| FY 499            | 0.0   | 261.2      | 25470.3    | 7721.1     | 0.0         |             |
| FZ 588            | 9.9   | 146.5      | 25505.6    | 5790.2     | 90.5        |             |
| MX 505            | 0.0   | 261.2      | 24041.2    | 10397.1    | 0.0         |             |
| MY 483            | 211.6 | 100.0      | 25470.3    | 4988.1     | 3569.8      |             |
| Esfuerzos minimos |       |            |            |            |             |             |
| FX 499            | 0.0   | 261.2      | 25470.3    | 7721.1     | 0.0         |             |
| FY 475            | 201.7 | 100.0      | 25470.3    | 4988.1     | 3479.3      |             |
| FZ 674            | 0.0   | 111.7      | 22619.5    | 5094.9     | 0.0         |             |
| MX 475            | 201.7 | 100.0      | 25470.3    | 4988.1     | 3479.3      |             |
| MY 499            | 0.0   | 261.2      | 25470.3    | 7721.1     | 0.0         |             |



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VIADUCTO DE ANOIA  
PILA 6

ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica

Hip: 7 fct: -2.90 MPa tensión: -5.13 MPa

Nk:29727.8 kN Mxk:26091.6 mkN Myk:17396.5 mkN

ELU INESTABILIDAD

Altura: 17.25 m  
Betapandeo: 1.70  
Lgtud pandeo: 29.33 m  
Radio giro rx: 1.41 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 20.83  
Esbeltez auy: 33.87

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)  
35 < Esbeltez < 100 => Met. aproximado (MA)  
100 < Esbeltez < 200 => Met. general EHE (MG)  
Esbeltez > 200 => No se contempla

No hace falta verificar el ELU Inestabilidad

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 1   | 1512.7     | 788.0      | 48933.2    | 4405.2      | 0.0         | 25762.2    | 23170.9    |
| FY 113 | 0.0        | 1230.3     | 48933.2    | 4405.2      | 0.0         | 25762.2    | 23170.9    |
| FZ 2   | 1512.7     | 788.0      | 48986.1    | 4405.2      | 0.0         | 25788.7    | 23197.4    |
| MX 7   | 1512.7     | 788.0      | 38214.9    | 24475.2     | 0.0         | 26306.1    | 11908.9    |
| MY 1   | 1512.7     | 788.0      | 48933.2    | 4405.2      | 0.0         | 25762.2    | 23170.9    |
| R1 8   | 1512.7     | 788.0      | 38267.9    | 24475.2     | 0.0         | 26332.5    | 11935.4    |
| R2 2   | 1512.7     | 788.0      | 48986.1    | 4405.2      | 0.0         | 25788.7    | 23197.4    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

| HIP.   | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|--------|------------|------------|------------|-------------|-------------|------------|------------|
| FX 41  | 0.0        | 1136.8     | 48933.2    | 4405.2      | 0.0         | 25762.2    | 23170.9    |
| FY 227 | 0.0        | 100.0      | 20493.0    | 3263.1      | 0.0         | 11206.3    | 9286.8     |
| FZ 227 | 0.0        | 100.0      | 20493.0    | 3263.1      | 0.0         | 11206.3    | 9286.8     |
| MX 227 | 0.0        | 100.0      | 20493.0    | 3263.1      | 0.0         | 11206.3    | 9286.8     |
| MY 1   | 1512.7     | 788.0      | 48933.2    | 4405.2      | 0.0         | 25762.2    | 23170.9    |
| R1 227 | 0.0        | 100.0      | 20493.0    | 3263.1      | 0.0         | 11206.3    | 9286.8     |
| R2 227 | 0.0        | 100.0      | 20493.0    | 3263.1      | 0.0         | 11206.3    | 9286.8     |

Combinaciones características

| Fuste --- 1       |            |            |            |                  |                  |                  |                  |                   |                   |
|-------------------|------------|------------|------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| HIP.              | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX (MA)<br>(mkN) | MY (MA)<br>(mkN) | MX (MG)<br>(mkN) | MY (MG)<br>(mkN) | MX (lin)<br>(mkN) | MY (lin)<br>(mkN) |
| Esfuerzos maximos |            |            |            |                  |                  |                  |                  |                   |                   |
| FX 25             | 1572.3     | 135.0      | 51760.3    | 12456.2          | 39236.0          | 10361.9          | 35137.6          | 6734.0            | 26637.8           |
| FY 113            | 0.0        | 1274.2     | 51760.3    | 33180.5          | 7490.1           | 30351.0          | 5931.4           | 26028.2           | 0.0               |
| FZ 2              | 1512.7     | 823.1      | 51813.2    | 25073.9          | 38670.4          | 22375.2          | 34552.6          | 18319.2           | 26094.7           |
| MX 120            | 0.0        | 1274.2     | 41095.0    | 52439.1          | 5946.8           | 50383.0          | 5449.0           | 46098.2           | 0.0               |
| MY 25             | 1572.3     | 135.0      | 51760.3    | 12456.2          | 39236.0          | 10361.9          | 35137.6          | 6734.0            | 26637.8           |
| Esfuerzos minimos |            |            |            |                  |                  |                  |                  |                   |                   |
| FX 41             | 0.0        | 1171.9     | 51760.3    | 31410.6          | 7490.1           | 28599.7          | 5931.4           | 24335.1           | 0.0               |
| FY 17             | 1512.7     | 135.0      | 51760.3    | 12456.2          | 38659.2          | 10361.9          | 34547.0          | 6734.0            | 26094.7           |
| FZ 216            | 0.0        | 222.7      | 30379.6    | 11262.0          | 4396.2           | 10440.3          | 4007.3           | 7534.7            | 0.0               |
| MX 17             | 1512.7     | 135.0      | 51760.3    | 12456.2          | 38659.2          | 10361.9          | 34547.0          | 6734.0            | 26094.7           |
| MY 41             | 0.0        | 1171.9     | 51760.3    | 31410.6          | 7490.1           | 28599.7          | 5931.4           | 24335.1           | 0.0               |

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VIADUCTO DE ANOIA  
PILA 6

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1  
Armatura de cálculo - Pandeo dir. ancho  
(1): Axil máx  $\Leftrightarrow$  My  
(2): My máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 4.1  
2 No es necesaria armadura de cálculo  
Armatura mínima mecánica  
HIP. AS1  
3 7.7  
Armatura mínima geométrica  
HIP. AS1  
4 12.4

Elección del armado de la sección

phi(est): 12.43 mm

phi: 16.00 mm

16. 0. 400. 3652. 300.

--- Fuste --- 1  
Armatura de cálculo - Pandeo dir. canto  
(1): Axil máx  $\Leftrightarrow$  Mx  
(2): Mx máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 8.7  
2 3.6  
Armatura mínima mecánica  
HIP. AS1  
3 7.7  
Armatura mínima geométrica  
HIP. AS1  
4 12.4

Elección del armado de la sección

phi(est): 12.43 mm

phi: 16.00 mm

| Diámetro | n° barras | Solapo(mm) | Lgtud espera | Patilla |
|----------|-----------|------------|--------------|---------|
| 16.      | 160.      | 400.       | 3652.        | 300.    |

ARMADURA TRANSVERSAL (cm<sup>2</sup>/m)

--- Fuste ---

1. Hipótesis de Fx\_max:

Esfuerzo cortante efectivo de cálculo:

Fx: 1572.26 kN

Fy: 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.07 m

d: 2.35 m

Vul: 57387.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.66

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armatura mínima de cortante

Ast=0.02·(fck/Gc)/(fyk/Gs)·bo

Ast: 25.31 cm<sup>2</sup>/m

2. Hipótesis de Fy\_max:

Esfuerzo cortante efectivo de cálculo:

Fx: 0.00 kN

Fy: 1274.18 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

fcd: 20.00 MPa

bo: 4.07 m

d: 2.35 m

Vul: 57387.01 kN

Vul > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.66

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armatura mínima de cortante

Ast=0.02·(fck/Gc)/(fyk/Gs)·bo

Ast: 16.96 cm<sup>2</sup>/m

3. Elección de armado:

Ast: 25.3 cm<sup>2</sup>/m



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VIADUCTO DE ANOLA  
PILA 6

```
*****
*****
***
*** Dimensionamiento del encepado de la pila ***
***
*** PEDELTA ***
***
*****
*****
```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 2

Fx\_s: 1008.49 kN  
Fy\_s: 558.76 kN  
Fz\_s: 44482.21 kN  
Mx\_s: 14387.88 mkN  
My\_s: 29301.87 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 14761.36 kN  
Ph\_min: 7479.74 kN

Hipótesis de pilote menos cargado: 7

Fx\_s: 1008.49 kN  
Fy\_s: 558.76 kN  
Fz\_s: 37301.42 kN  
Mx\_s: 27767.87 mkN  
My\_s: 27774.47 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 13953.88 kN  
Ph\_min: 4696.83 kN

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.000  | 3.000  |
| 2      | -3.000 | 3.000  |
| 3      | 3.000  | -3.000 |
| 4      | -3.000 | -3.000 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  |
|--------|----------|--------|--------|
| 1      | 14761.36 | 252.12 | 139.69 |
| 2      | 9877.72  | 252.12 | 139.69 |
| 3      | 12363.38 | 252.12 | 139.69 |
| 4      | 7479.74  | 252.12 | 139.69 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 14761.36 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i) _kN/m3 |
|---------|-------|--------------|
| 1       | 20.00 | 2000.00      |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)   | My(i)   |
|--------|----------|--------|--------|---------|---------|
| 1      | 19342.37 | 378.18 | 205.79 | 1320.17 | 2426.16 |
| 2      | 14206.60 | 378.18 | 205.79 | 1320.17 | 2426.16 |
| 3      | 16812.20 | 378.18 | 205.79 | 1320.17 | 2426.16 |
| 4      | 11676.43 | 378.18 | 205.79 | 1320.17 | 2426.16 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_bielas | Tens_b | Tens_adm _MPa |
|--------|----------|----------|----------|--------|---------------|
| 1      | 19342.37 | 0.69     | 1.01     | 19.15  | 11.67         |
| 2      | 14206.60 | 0.69     | 1.01     | 14.07  | 11.67         |
| 3      | 16812.20 | 0.69     | 1.01     | 16.64  | 11.67         |
| 4      | 11676.43 | 0.69     | 1.01     | 11.56  | 11.67         |

Tens\_bielas < 0.70·fcd => Correcto

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VIADUCTO DE ANOIA  
PILA 6

Armado del pilote: Nmax - Mmax

Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2762.082 mkN  
Nd: 19342.367 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 11.90 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Armado del pilote: Nmin - Mmax

Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes

Md: 2762.082 mkN  
Nd: 11676.428 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 9.25 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Posicion de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

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VIADUCTO DE ANOIA  
PILA 6

Armatura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:  
Vrd: 430.55 kN  
Vu1: 12065.62 kN  
Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma  
Vrd: 430.55 kN  
Vu2: 3098.29 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm2/m

Propuesta de armado:  
Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm2

Armado del encepado

|                               |            |                 |         |
|-------------------------------|------------|-----------------|---------|
| Arm.principal de bandas lgtd: | 462.83 cm2 | distribuida en: | 2.10 m  |
| Arm.principal de bandas trvs: | 382.32 cm2 | distribuida en: | 2.10 m  |
| Arm.transv. vertical lgtd:    | 215.75 cm2 | distribuida en: | 4.00 m  |
| Arm.transv. vertical trvs:    | 107.88 cm2 | distribuida en: | 4.00 m  |
| Arm. superior/lateral lgtd:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. superior/lateral trvs:   | 27.00 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas lgtd:       | 28.93 cm2  | distribuida en: | 1.00 ml |
| Arm. entre bandas trvs:       | 27.00 cm2  | distribuida en: | 1.00 ml |

CLASIFICACIÓN DEL ARMADO

|                                  |      |     |           |           |
|----------------------------------|------|-----|-----------|-----------|
| Lgtd.bandas inferior encepado 1: |      | phi | n° barras | As_cm2    |
|                                  |      | 20. | 148       | 464.96    |
|                                  |      | 25. | 95        | 466.33    |
|                                  |      | 32. | 58        | 466.46    |
| Lgtd.entre bandas inferior       | 1a:  | phi | Sep_cm/ml | As_cm2/ml |
| Lgtd.superior encepado           | 2:   | 20. | 10.0      | 31.42     |
|                                  |      | 20. | 10.0      | 31.42     |
| Trvs.bandas inferior encepado 3: |      | phi | n° barras | As_cm2    |
|                                  |      | 20. | 122       | 383.27    |
|                                  |      | 25. | 78        | 382.88    |
|                                  |      | 32. | 48        | 386.04    |
| Trvs.entre bandas inferior       | 3a:  | phi | Sep_cm/ml | As_cm2/ml |
| Trvs.superior encepado           | 4:   | 20. | 10.0      | 31.42     |
| Laterales                        | 5,6: | 20. | 10.0      | 31.42     |
| Cercos lgtudinales               | 7:   | phi | Sep_cm/ml | n°cercos  |
|                                  |      | 20. | 10.0      | 40        |
| Cercos transversales             | 8:   | 20. | 10.0      | 40        |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 7479.74  
Mk (mkN): -1849.11  
Mfis (mkN): -4723.25

Mk < Mfis: No hay fisuración

DETERMINACIÓN DE LA CARGA ADMISIBLE EN PILOTES

PROYECTO: L.A.V. Lleida-Martorell  
ESTRUCTURA: Viaducto Anoia  
ELEMENTO: Pila 6

| CAPA                 | POTENCIA, m | RESISTENCIA POR FUSTE, kPa | RESISTENCIA POR CAPA, kN |
|----------------------|-------------|----------------------------|--------------------------|
| 1                    | 3.6         | 25                         | 565.5                    |
| 2                    | 3           | 12                         | 226.2                    |
| 3                    | 20.9        | 80                         | 10505.5                  |
|                      |             |                            |                          |
| CARGA POR PUNTA, kPa |             | 1300                       | 4084.1                   |

Diámetro del pilote=

2

m

Longitud de empotramiento=

10.45

diámetros

Longitud del pilote=

27.5

m

Carga máxima en pilote=

15381

kN

Tensión de trabajo del pilote=

4.9

MPa

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

```

*****
*****
***
***      Programa de calculo para pilas      ****
***      (Puentes in situ)                  ****
***                                           ****
***      PEDELTA                             ****
***                                           ****
*****
*****

```

#### GEOMETRIA DE PILA

Altura = 16.900 m  
Coef. Pandeo = 1.700

Tipo = 4

Tipo = 1 seccion rectangular  
Tipo = 2 seccion circular  
Tipo = 3 seccion poligonal  
Tipo = 4 seccion rectangular hueca  
Tipo = 5 seccion circular hueca

Ancho seccion = 4.05 m  
Canto seccion = 2.40 m  
Canto seccion = 0.00 m

#### Propiedades de la Seccion de la pila

Area = 4.8400 m<sup>2</sup>  
Inercia x = 9.5030 m<sup>4</sup>    Radio de giro x= 1.401 m  
Inercia y = 3.6245 m<sup>4</sup>    Radio de giro y= 0.865 m

Esbeltez x = 20.50  
Esbeltez y = 33.20

Num total de apoyos = 2  
Num de fustes = 1  
Separacion transv. entre apoyos = 3.40 m

#### Dimensiones de la Zapata

Canto = 3.0000 m  
Ancho transv. = 9.0000 m  
Ancho longtd. = 9.0000 m  
Altura de tierras = 1.0000 m

#### ACCIONES EN CORONACION

|                                | Rvert<br>(kN) | Mom x<br>(mkN) |
|--------------------------------|---------------|----------------|
| Peso Propio                    | = 13227.70    | 0.00           |
| Carga Permanente               | = 7549.79     | 2903.01        |
| Pretensado                     | = -1399.43    | 0.00           |
| Sobrecarga unif. total         | = 792.92      | 0.00           |
| Sobrecarga unif. medio tablero | = 364.58      | 1350.88        |
| Vehiculo/s Centrado            | = 12692.27    | 0.00           |
| Vehiculo/s Excentrico          | = 6376.64     | 11257.98       |
| Gradiente térmico              | = -269.19     | 11257.98       |
| Deformación                    | = 0.00        | 0.00           |

#### ACCIONES HORIZONTALES

|                     | FX<br>(kN) | FY<br>(kN) |
|---------------------|------------|------------|
| Reologicas          | = 0.00     | 100.00     |
| Temperatura         | = 0.00     | 0.00       |
| Frenado             | = 1038.87  | 0.00       |
| Centrifuga          | = 0.00     | 90.60      |
| Viento long         | = 0.00     | 0.00       |
| Sismo long.         | = 0.00     | 0.00       |
| Viento transv       | = 0.00     | 0.00       |
| Viento longtd conc. | = 0.00     | 0.00       |
| Viento transv conc. | = 0.00     | 222.50     |
| Sismo transversal   | = 0.00     | 0.00       |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

ENVOLVENTES DE ESFUERZOS (ELS)

ESTADO LIMITE DE SERVICIO

ESFUERZOS MÁXIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| FY | 113  | 0.0        | 395.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| FZ | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| MX | 7    | 1038.9     | 278.0      | 25979.3    | 15511.9     | 0.0         | 17552.0    | 8427.4     |
| MY | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| R1 | 7    | 1038.9     | 278.0      | 25979.3    | 15511.9     | 0.0         | 17552.0    | 8427.4     |
| R2 | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |

ESFUERZOS MÍNIMOS EN CORONACIÓN DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 368.6      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| FY | 17   | 1038.9     | 100.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| FZ | 209  | 0.0        | 100.0      | 18968.9    | 2903.0      | 0.0         | 10338.3    | 8630.6     |
| MX | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| MY | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| R1 | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |
| R2 | 1    | 1038.9     | 278.0      | 32723.3    | 2903.0      | 0.0         | 17215.5    | 15507.8    |

ESFUERZOS MAXIMOS EN LA BASE DE PILA

2. Combinaciones características

| Fuste             |      | 1          |            |            |             |             |  |
|-------------------|------|------------|------------|------------|-------------|-------------|--|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |  |
| Esfuerzos maximos |      |            |            |            |             |             |  |
| FX                | 25   | 1077.5     | 100.0      | 34768.2    | 4593.0      | 17902.7     |  |
| FY                | 113  | 0.0        | 423.6      | 34768.2    | 9834.3      | 0.0         |  |
| FZ                | 1    | 1038.9     | 300.9      | 34768.2    | 7806.1      | 17556.9     |  |
| MX                | 119  | 0.0        | 423.6      | 28024.2    | 22443.2     | 0.0         |  |
| MY                | 25   | 1077.5     | 100.0      | 34768.2    | 4593.0      | 17902.7     |  |
| Esfuerzos minimos |      |            |            |            |             |             |  |
| FX                | 41   | 0.0        | 391.5      | 34768.2    | 9337.3      | 0.0         |  |
| FY                | 17   | 1038.9     | 100.0      | 34768.2    | 4593.0      | 17556.9     |  |
| FZ                | 209  | 0.0        | 145.8      | 21013.8    | 5002.8      | 0.0         |  |
| MX                | 17   | 1038.9     | 100.0      | 34768.2    | 4593.0      | 17556.9     |  |
| MY                | 41   | 0.0        | 391.5      | 34768.2    | 9337.3      | 0.0         |  |

3. Combinaciones frecuentes

| Fuste             |      | 1          |            |            |             |             |  |
|-------------------|------|------------|------------|------------|-------------|-------------|--|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |  |
| Esfuerzos maximos |      |            |            |            |             |             |  |
| FX                | 257  | 633.0      | 100.0      | 29374.1    | 4593.0      | 10620.6     |  |
| FY                | 346  | 0.0        | 268.8      | 29320.3    | 7309.1      | 0.0         |  |
| FZ                | 233  | 623.3      | 150.2      | 29374.1    | 5396.3      | 10534.1     |  |
| MX                | 351  | 0.0        | 268.8      | 25327.7    | 14874.4     | 0.0         |  |
| MY                | 257  | 633.0      | 100.0      | 29374.1    | 4593.0      | 10620.6     |  |
| Esfuerzos minimos |      |            |            |            |             |             |  |
| FX                | 273  | 0.0        | 204.6      | 29374.1    | 6315.0      | 0.0         |  |
| FY                | 249  | 623.3      | 100.0      | 29374.1    | 4593.0      | 10534.1     |  |
| FZ                | 441  | 0.0        | 111.4      | 21148.4    | 4695.5      | 0.0         |  |
| MX                | 249  | 623.3      | 100.0      | 29374.1    | 4593.0      | 10534.1     |  |
| MY                | 273  | 0.0        | 204.6      | 29374.1    | 6315.0      | 0.0         |  |

4. Combinaciones casi-permanentes

| Fuste             |      | 1          |            |            |             |             |  |
|-------------------|------|------------|------------|------------|-------------|-------------|--|
|                   | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) |  |
| Esfuerzos maximos |      |            |            |            |             |             |  |
| FX                | 483  | 217.4      | 100.0      | 23980.1    | 4593.0      | 3597.8      |  |
| FY                | 499  | 0.0        | 168.3      | 23980.1    | 5702.5      | 0.0         |  |
| FZ                | 459  | 207.8      | 150.2      | 23980.1    | 5396.3      | 3511.4      |  |
| MX                | 505  | 0.0        | 168.3      | 22631.3    | 8224.3      | 0.0         |  |
| MY                | 483  | 217.4      | 100.0      | 23980.1    | 4593.0      | 3597.8      |  |
| Esfuerzos minimos |      |            |            |            |             |             |  |
| FX                | 499  | 0.0        | 168.3      | 23980.1    | 5702.5      | 0.0         |  |
| FY                | 475  | 207.8      | 100.0      | 23980.1    | 4593.0      | 3511.4      |  |
| FZ                | 667  | 0.0        | 111.4      | 21229.2    | 4695.5      | 0.0         |  |
| MX                | 475  | 207.8      | 100.0      | 23980.1    | 4593.0      | 3511.4      |  |
| MY                | 499  | 0.0        | 168.3      | 23980.1    | 5702.5      | 0.0         |  |



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

ELS FISURACIÓN

2. Fisuración por tracción en la pila

En el fuste se producen tracciones: Combinación característica

Hip: 8 fct: -2.90 MPa tensión: -4.41 MPa

Nk:27862.7 kN Mxk:20415.0 mkN Myk:17556.9 mkN

ELU INESTABILIDAD

Altura: 16.90 m  
Betapandeo: 1.70  
Lgtud pandeo: 28.73 m  
Radio giro rx: 1.40 m  
Radio giro ry: 0.87 m  
Esbeltez aux: 20.50  
Esbeltez auy: 33.20

Anotación:

Esbeltez < 35 => Pandeo OK (Mlin)

35 < Esbeltez < 100 => Met. aproximado (MA)

100 < Esbeltez < 200 => Met. general EHE (MG)

Esbeltez > 200 => No se contempla

No hace falta verificar el ELU Inestabilidad

ENVOLVENTES DE ESFUERZOS (ELU)

ESTADO LIMITE ULTIMO

ESFUERZOS MAXIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 1    | 1558.3     | 402.0      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| FY | 113  | 0.0        | 577.5      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| FZ | 1    | 1558.3     | 402.0      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| MX | 7    | 1558.3     | 402.0      | 36762.0    | 22832.4     | 0.0         | 25096.4    | 11665.6    |
| MY | 1    | 1558.3     | 402.0      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| R1 | 7    | 1558.3     | 402.0      | 36762.0    | 22832.4     | 0.0         | 25096.4    | 11665.6    |
| R2 | 1    | 1558.3     | 402.0      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |

ESFUERZOS MINIMOS EN CORONACION DE PILA

|    | HIP. | FX<br>(kN) | FY<br>(kN) | FZ<br>(kN) | MX<br>(mkN) | MY<br>(mkN) | R1<br>(kN) | R2<br>(kN) |
|----|------|------------|------------|------------|-------------|-------------|------------|------------|
| FX | 41   | 0.0        | 537.9      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| FY | 227  | 0.0        | 100.0      | 19378.1    | 2903.0      | 0.0         | 10542.9    | 8835.2     |
| FZ | 229  | 0.0        | 100.0      | 19324.2    | 2903.0      | 0.0         | 10515.9    | 8808.3     |
| MX | 227  | 0.0        | 100.0      | 19378.1    | 2903.0      | 0.0         | 10542.9    | 8835.2     |
| MY | 1    | 1558.3     | 402.0      | 46878.0    | 3919.1      | 0.0         | 24591.6    | 22286.3    |
| R1 | 229  | 0.0        | 100.0      | 19324.2    | 2903.0      | 0.0         | 10515.9    | 8808.3     |
| R2 | 229  | 0.0        | 100.0      | 19324.2    | 2903.0      | 0.0         | 10515.9    | 8808.3     |

Combinaciones características

|                   |       |        |       |         |         |         |         |         |          |          |
|-------------------|-------|--------|-------|---------|---------|---------|---------|---------|----------|----------|
| --                | Fuste | ---    | 1     |         |         |         |         |         |          |          |
|                   | HIP.  | FX     | FY    | FZ      | MX (MA) | MY (MA) | MX (MG) | MY (MG) | MX (lin) | MY (lin) |
|                   |       | (kN)   | (kN)  | (kN)    | (mkN)   | (mkN)   | (mkN)   | (mkN)   | (mkN)    | (mkN)    |
| Esfuerzos maximos |       |        |       |         |         |         |         |         |          |          |
| FX                | 25    | 1616.3 | 135.0 | 49638.6 | 11465.3 | 38531.3 | 9620.2  | 34801.0 | 6200.6   | 26854.1  |
| FY                | 113   | 0.0    | 620.4 | 49638.6 | 20076.5 | 6898.6  | 17751.8 | 5590.7  | 14062.5  | 0.0      |
| FZ                | 1     | 1558.3 | 436.3 | 49638.6 | 16789.2 | 37983.8 | 14606.8 | 34241.0 | 11020.2  | 26335.4  |
| MX                | 119   | 0.0    | 620.4 | 39522.6 | 38651.7 | 5492.7  | 36721.6 | 5139.2  | 32975.8  | 0.0      |
| MY                | 25    | 1616.3 | 135.0 | 49638.6 | 11465.3 | 38531.3 | 9620.2  | 34801.0 | 6200.6   | 26854.1  |
| Esfuerzos minimos |       |        |       |         |         |         |         |         |          |          |
| FX                | 41    | 0.0    | 572.2 | 49638.6 | 19275.0 | 6898.6  | 16981.3 | 5590.7  | 13317.0  | 0.0      |
| FY                | 17    | 1558.3 | 135.0 | 49638.6 | 11465.3 | 37983.8 | 9620.2  | 34241.0 | 6200.6   | 26335.4  |
| FZ                | 209   | 0.0    | 203.7 | 29007.0 | 10219.0 | 4031.3  | 9539.2  | 3592.9  | 6815.3   | 0.0      |
| MX                | 17    | 1558.3 | 135.0 | 49638.6 | 11465.3 | 37983.8 | 9620.2  | 34241.0 | 6200.6   | 26335.4  |
| MY                | 41    | 0.0    | 572.2 | 49638.6 | 19275.0 | 6898.6  | 16981.3 | 5590.7  | 13317.0  | 0.0      |

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

CÁLCULO DE PILARES DE SECCIÓN RECTANGULAR HUECA  
SOMETIDOS A FLEXO-COMPRESIÓN ESVIADA

ARMADO DE LA PILA

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. ancho  
(1): Axil máx  $\Leftrightarrow$  My  
(2): My máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 No es necesaria armadura de cálculo  
2 No es necesaria armadura de cálculo  
Armadura mínima mecánica  
HIP. AS1  
3 7.6  
Armadura mínima geométrica  
HIP. AS1  
4 12.5

Elección del armado de la sección  
 $\phi$ (est): 12.49 mm  
 $\phi$ i: 16.00 mm

16. 0. 400. 3652. 300.

--- Fuste --- 1  
Armadura de cálculo - Pandeo dir. canto  
(1): Axil máx  $\Leftrightarrow$  Mx  
(2): Mx máx  $\Leftrightarrow$  Axil  
HIP. AS1  
1 No es necesaria armadura de cálculo  
2 No es necesaria armadura de cálculo  
Armadura mínima mecánica  
HIP. AS1  
3 7.6  
Armadura mínima geométrica  
HIP. AS1  
4 12.5

Elección del armado de la sección  
 $\phi$ (est): 12.49 mm  
 $\phi$ i: 16.00 mm

| Diámetro | n° barras | Solapo (mm) | Lgtud espera | Patilla |
|----------|-----------|-------------|--------------|---------|
| 16.      | 158.      | 400.        | 3652.        | 300.    |

ARMADURA TRANSVERSAL (cm<sup>2</sup>/m)

--- Fuste ---  
1. Hipótesis de  $F_{x\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 1616.26 kN

$F_y$ : 135.00 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

$f_{cd}$ : 20.00 MPa

bo: 4.05 m

d: 2.35 m

Vu1: 57105.01 kN

Vu1 > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.26

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st}=0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

Ast: 25.19 cm<sup>2</sup>/m

2. Hipótesis de  $F_{y\_max}$ :

Esfuerzo cortante efectivo de cálculo:

$F_x$ : 0.00 kN

$F_y$ : 620.40 kN

Comprobación de agotamiento por compresión oblicua en el alma

k: 1.00

$f_{cd}$ : 20.00 MPa

bo: 4.05 m

d: 2.35 m

Vu1: 57105.01 kN

Vu1 > Vrd: Correcto

Comprobación de agotamiento por tracción en alma

ro: 0.0004

eps: 1.29

sig\_c: 10.26

Vcu:

Vcu > Vrd: No se necesita armadura de cortante

Armadura mínima de cortante

$A_{st}=0.02 \cdot (f_{ck}/G_c) / (f_{yk}/G_s) \cdot b_o$

Ast: 16.94 cm<sup>2</sup>/m

3. Elección de armado:

Ast: 25.2 cm<sup>2</sup>/m



L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

```
*****
*****
***
*** Dimensionamiento del encepado de la pila ***
***
*** PEDELTA ***
***
*****
*****
```

Cálculo contando con la contrib. del encepado

Hipótesis de pilote más cargado: 1

Fx\_s: 1038.87 kN  
Fy\_s: 300.90 kN  
Fz\_s: 42342.21 kN  
Mx\_s: 8708.82 mkN  
My\_s: 28780.75 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 13709.68 kN  
Ph\_min: 7461.42 kN

Hipótesis de pilote menos cargado: 8

Fx\_s: 1038.87 kN  
Fy\_s: 300.90 kN  
Fz\_s: 35436.72 kN  
Mx\_s: 21317.68 mkN  
My\_s: 27349.96 mkN

Diam.requerido: 2.00 m  
N°pilotes\_x: 2  
N°pilotes\_y: 2  
Ph\_max: 12914.82 kN  
Ph\_min: 4803.54 kN

Definición de los cdg de los pilotes

| Pilote | x(i)   | y(i)   |
|--------|--------|--------|
| 1      | 3.000  | 3.000  |
| 2      | -3.000 | 3.000  |
| 3      | 3.000  | -3.000 |
| 4      | -3.000 | -3.000 |

Cargas de hundimiento (ELS)

| Pilote | Ph(i)    | Vx(i)  | Vy(i) |
|--------|----------|--------|-------|
| 1      | 13709.68 | 259.72 | 75.22 |
| 2      | 8912.89  | 259.72 | 75.22 |
| 3      | 12258.21 | 259.72 | 75.22 |
| 4      | 7461.42  | 259.72 | 75.22 |

Verificación del diámetro del pilote

Carga hundimiento admisible: 3518.58 kN  
Pilote más cargado: 13709.68 kN  
Q\_adm < F\_max => No es correcto

Características del terreno

| Estrato | h(i)  | ni(i)   | _kN/m3 |
|---------|-------|---------|--------|
| 1       | 20.00 | 2000.00 |        |

Cohesivo/granular: 0  
Nota: Estrato cohesivo = 0. / No cohesivo = 1.

Lgtd equivalente: 8.55 m  
Lgtd momentos: 12.83 m  
Lgtd desplaz: 18.82 m

Cargas de hundimiento (ELU)

| Pilote | Ph(i)    | Vx(i)  | Vy(i)  | Mx(i)  | My(i)   |
|--------|----------|--------|--------|--------|---------|
| 1      | 18253.72 | 389.58 | 109.09 | 699.82 | 2499.24 |
| 2      | 13197.21 | 389.58 | 109.09 | 699.82 | 2499.24 |
| 3      | 16734.53 | 389.58 | 109.09 | 699.82 | 2499.24 |
| 4      | 11678.02 | 389.58 | 109.09 | 699.82 | 2499.24 |

Comprobación de la compresión en los nudos

| Pilote | Axil     | tg_alpha | A_bielas | Tens_b | Tens_adm | _MPa |
|--------|----------|----------|----------|--------|----------|------|
| 1      | 18253.72 | 0.69     | 1.01     | 18.07  | 11.67    |      |
| 2      | 13197.21 | 0.69     | 1.01     | 13.07  | 11.67    |      |
| 3      | 16734.53 | 0.69     | 1.01     | 16.57  | 11.67    |      |
| 4      | 11678.02 | 0.69     | 1.01     | 11.56  | 11.67    |      |

Tens\_bielas < 0.70.fcd => Correcto

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
FILA 7

Armado del pilote: Nmax - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2595.375 mkN  
Nd: 18253.721 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 11.56 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Armado del pilote: Nmin - Mmax

-----  
Características de los materiales (MPa)

fck: 25.000  
fyk: 500.000

Esfuerzos solicitantes  
Md: 2595.375 mkN  
Nd: 11678.019 kN

Características de la sección

Diametro: 2.000 m  
Recubr.: 0.050 m

Resultados del armado

Armadura de cálculo

No es necesaria armadura de cálculo

Cuantía geométrica mínima

phi(est): 22.36 mm  
phi: 25.00 mm

Cuantía mecánica mínima

phi(est): 9.25 mm  
phi: 12.00 mm

Elección de armado

phi: 25. mm

Posicion de cada una de las armaduras

| barra | x(i)  | y(i)  |
|-------|-------|-------|
| 1     | 0.00  | 0.95  |
| 2     | 0.15  | 0.94  |
| 3     | 0.29  | 0.90  |
| 4     | 0.43  | 0.85  |
| 5     | 0.56  | 0.77  |
| 6     | 0.67  | 0.67  |
| 7     | 0.77  | 0.56  |
| 8     | 0.85  | 0.43  |
| 9     | 0.90  | 0.29  |
| 10    | 0.94  | 0.15  |
| 11    | 0.95  | 0.00  |
| 12    | 0.94  | -0.15 |
| 13    | 0.90  | -0.29 |
| 14    | 0.85  | -0.43 |
| 15    | 0.77  | -0.56 |
| 16    | 0.67  | -0.67 |
| 17    | 0.56  | -0.77 |
| 18    | 0.43  | -0.85 |
| 19    | 0.29  | -0.90 |
| 20    | 0.15  | -0.94 |
| 21    | 0.00  | -0.95 |
| 22    | -0.15 | -0.94 |
| 23    | -0.29 | -0.90 |
| 24    | -0.43 | -0.85 |
| 25    | -0.56 | -0.77 |
| 26    | -0.67 | -0.67 |
| 27    | -0.77 | -0.56 |
| 28    | -0.85 | -0.43 |
| 29    | -0.90 | -0.29 |
| 30    | -0.94 | -0.15 |
| 31    | -0.95 | 0.00  |
| 32    | -0.94 | 0.15  |
| 33    | -0.90 | 0.29  |
| 34    | -0.85 | 0.43  |
| 35    | -0.77 | 0.56  |
| 36    | -0.67 | 0.67  |
| 37    | -0.56 | 0.77  |
| 38    | -0.43 | 0.85  |
| 39    | -0.29 | 0.90  |
| 40    | -0.15 | 0.94  |

Diámetro barra: 25.

L.A.V. LLEIDA-MARTORELL  
VIADUCTO DE ANOIA  
PILA 7

Armatura de cortante de los pilotes

Esfuerzo cortante de agotamiento por compresión oblicua en el alma:

Vrd: 404.56 kN  
Vu1: 12065.62 kN  
Vrd < Vu1 => Correcto

Esfuerzo cortante de agotamiento por tracción en el alma

Vrd: 404.56 kN  
Vu2: 2972.86 kN  
Vrd < Vu2 => Armadura mínima  
Arm.mín: 12.37 cm2/m

Propuesta de armado:

Diam.cercos: 10. mm  
Sep.cercos: 10. cm  
Cuantía: 15.71 cm2

Armado del encepado

Arm.principal de bandas lgtd: 436.78 cm2 distribuida en: 2.10 m  
Arm.principal de bandas trvs: 361.71 cm2 distribuida en: 2.10 m  
Arm.transv. vertical lgtd: 206.69 cm2 distribuida en: 4.00 m  
Arm.transv. vertical trvs: 103.35 cm2 distribuida en: 4.00 m  
Arm. superior/lateral lgtd: 27.00 cm2 distribuida en: 1.00 ml  
Arm. superior/lateral trvs: 27.00 cm2 distribuida en: 1.00 ml  
Arm. entre bandas lgtd: 27.30 cm2 distribuida en: 1.00 ml  
Arm. entre bandas trvs: 27.00 cm2 distribuida en: 1.00 ml

CLASIFICACIÓN DEL ARMADO

|                                  |      | phi | n° barras | As_cm2    |
|----------------------------------|------|-----|-----------|-----------|
| Lgtd.bandas inferior encepado 1: |      | 20. | 139       | 436.68    |
|                                  |      | 25. | 89        | 436.88    |
|                                  |      | 32. | 55        | 442.34    |
|                                  |      | phi | Sep_cm/ml | As_cm2/ml |
| Lgtd.entre bandas inferior       | 1a:  | 20. | 10.0      | 31.42     |
| Lgtd.superior encepado           | 2:   | 20. | 10.0      | 31.42     |
|                                  |      | phi | n° barras | As_cm2    |
| Trvs.bandas inferior encepado 3: |      | 20. | 116       | 364.42    |
|                                  |      | 25. | 74        | 363.25    |
|                                  |      | 32. | 45        | 361.91    |
|                                  |      | phi | Sep_cm/ml | As_cm2/ml |
| Trvs.entre bandas inferior       | 3a:  | 20. | 10.0      | 31.42     |
| Trvs.superior encepado           | 4:   | 20. | 10.0      | 31.42     |
| Laterales                        | 5,6: | 20. | 10.0      | 31.42     |
|                                  |      | phi | Sep_cm/ml | n°cercos  |
| Cercos lgtudinales               | 7:   | 20. | 10.0      | 40        |
| Cercos transversales             | 8:   | 20. | 10.0      | 40        |

Verificación de la fisuración en pilotes

Acciones

Nk (kN): 7461.42  
Mk (mkN): -1734.64  
Mfis (mkN): -4717.68

Mk < Mfis: No hay fisuración

### 13 CÁLCULO DE LA INTERACCIÓN VÍA-ESTRUCTURA

En el presente apartado se realiza el cálculo de las tensiones en el carril y de las fuerzas horizontales en el punto fijo del tablero por la interacción vía-estructura, según la ficha 774-3 de la UIC.

Para la determinación de los valores referidos se realizó un modelo en el cual se simuló la unión de los carriles a la estructura y al suelo por muelles bi-lineales. En este modelo se han introducido las cargas de frenado, temperatura (en carril y tablero) y los trenes de cargas LM-71 y SW/2 para determinar el giro máximo del tablero. Se ha realizado un cálculo no-lineal teniendo en cuenta cada una de las acciones por separado y posteriormente se efectuó uno con la acción simultánea de frenado, temperatura y tren tipo (para la determinación del giro del tablero).

En los cálculos se ha supuesto carril continuo en el estribo fijo y la utilización de un aparato de dilatación de vía en el estribo móvil.

Los criterios a verificar (teniendo en cuenta la utilización de un aparato de dilatación de vía) son:

- Desplazamiento relativo máximo entre carril y tablero debido al frenado,  $\delta_{rel} \leq 4 \text{ mm}$
- Desplazamiento absoluto máximo del tablero debido al frenado,  $\delta_{abs} \leq 5 \text{ mm}$
- Desplazamiento máximo debido al giro de tablero,  $\delta_{(0H)} \leq 8 \text{ mm}$

A continuación se expone el cálculo de reacciones en el apoyo fijo (estribo 1) y las tensiones en el carril para las condiciones referidas.

Nudos

|                     |                                                                                                    |
|---------------------|----------------------------------------------------------------------------------------------------|
| Filtrar             | Nudo                                                                                               |
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860                                              |
| Selección           | 1A188 193A240 300A322 1000A1251 17603A17658 401A17201CA1200 801A17601CA1200 2401A16801CA1200 17860 |
| Número total        | 790                                                                                                |
| Número seleccionado | 611                                                                                                |

| Nudo | X (m) | Y (m) | Z (m) | Apoyo - código | Apoyo |
|------|-------|-------|-------|----------------|-------|
| 1    | 0.13  | 4.00  | -2.00 |                |       |
| 2    | 1.80  | -0.06 | 0.0   |                |       |
| 3    | 3.60  | -0.12 | 0.0   |                |       |
| 4    | 5.40  | -0.17 | 0.0   |                |       |
| 5    | 7.20  | -0.23 | 0.0   |                |       |
| 6    | 9.00  | -0.29 | 0.0   |                |       |
| 7    | 10.79 | -0.34 | 0.0   |                |       |
| 8    | 12.59 | -0.40 | 0.0   |                |       |
| 9    | 14.39 | -0.45 | 0.0   |                |       |
| 10   | 16.19 | -0.51 | 0.0   |                |       |
| 11   | 17.99 | -0.56 | 0.0   |                |       |
| 12   | 19.79 | -0.62 | 0.0   |                |       |
| 13   | 21.59 | -0.67 | 0.0   |                |       |
| 14   | 23.39 | -0.72 | 0.0   |                |       |
| 15   | 25.19 | -0.77 | 0.0   |                |       |
| 16   | 26.99 | -0.83 | 0.0   |                |       |
| 17   | 28.79 | -0.88 | 0.0   |                |       |
| 18   | 30.59 | -0.93 | 0.0   |                |       |
| 19   | 32.38 | -0.98 | 0.0   |                |       |
| 20   | 34.18 | -1.03 | 0.0   |                |       |
| 21   | 35.98 | -1.08 | 0.0   |                |       |
| 22   | 38.23 | -1.14 | 0.0   |                |       |
| 23   | 40.48 | -1.20 | 0.0   |                |       |
| 24   | 42.73 | -1.26 | 0.0   |                |       |
| 25   | 44.98 | -1.32 | 0.0   |                |       |
| 26   | 47.23 | -1.38 | 0.0   |                |       |
| 27   | 49.48 | -1.44 | 0.0   |                |       |
| 28   | 51.73 | -1.49 | 0.0   |                |       |
| 29   | 53.98 | -1.55 | 0.0   |                |       |
| 30   | 56.23 | -1.61 | 0.0   |                |       |
| 31   | 58.48 | -1.66 | 0.0   |                |       |
| 32   | 60.73 | -1.72 | 0.0   |                |       |
| 33   | 62.97 | -1.77 | 0.0   |                |       |
| 34   | 65.22 | -1.82 | 0.0   |                |       |
| 35   | 67.47 | -1.87 | 0.0   |                |       |

|    |        |       |     |  |  |
|----|--------|-------|-----|--|--|
| 36 | 69.72  | -1.93 | 0.0 |  |  |
| 37 | 71.97  | -1.98 | 0.0 |  |  |
| 38 | 74.22  | -2.03 | 0.0 |  |  |
| 39 | 76.47  | -2.08 | 0.0 |  |  |
| 40 | 78.72  | -2.13 | 0.0 |  |  |
| 41 | 80.97  | -2.17 | 0.0 |  |  |
| 42 | 83.22  | -2.22 | 0.0 |  |  |
| 43 | 85.47  | -2.27 | 0.0 |  |  |
| 44 | 87.72  | -2.32 | 0.0 |  |  |
| 45 | 89.97  | -2.36 | 0.0 |  |  |
| 46 | 92.22  | -2.41 | 0.0 |  |  |
| 47 | 94.47  | -2.45 | 0.0 |  |  |
| 48 | 96.72  | -2.49 | 0.0 |  |  |
| 49 | 98.97  | -2.54 | 0.0 |  |  |
| 50 | 101.22 | -2.58 | 0.0 |  |  |
| 51 | 103.47 | -2.62 | 0.0 |  |  |
| 52 | 105.72 | -2.66 | 0.0 |  |  |
| 53 | 107.97 | -2.70 | 0.0 |  |  |
| 54 | 110.21 | -2.74 | 0.0 |  |  |
| 55 | 112.46 | -2.78 | 0.0 |  |  |
| 56 | 114.71 | -2.81 | 0.0 |  |  |
| 57 | 116.96 | -2.85 | 0.0 |  |  |
| 58 | 119.21 | -2.89 | 0.0 |  |  |
| 59 | 121.46 | -2.92 | 0.0 |  |  |
| 60 | 123.71 | -2.96 | 0.0 |  |  |
| 61 | 125.96 | -2.99 | 0.0 |  |  |
| 62 | 128.21 | -3.03 | 0.0 |  |  |
| 63 | 130.46 | -3.06 | 0.0 |  |  |
| 64 | 132.71 | -3.09 | 0.0 |  |  |
| 65 | 134.96 | -3.12 | 0.0 |  |  |
| 66 | 137.21 | -3.15 | 0.0 |  |  |
| 67 | 139.46 | -3.18 | 0.0 |  |  |
| 68 | 141.71 | -3.21 | 0.0 |  |  |
| 69 | 143.96 | -3.24 | 0.0 |  |  |
| 70 | 146.21 | -3.27 | 0.0 |  |  |
| 71 | 148.46 | -3.30 | 0.0 |  |  |
| 72 | 150.71 | -3.32 | 0.0 |  |  |
| 73 | 152.96 | -3.35 | 0.0 |  |  |
| 74 | 155.21 | -3.37 | 0.0 |  |  |
| 75 | 157.46 | -3.40 | 0.0 |  |  |
| 76 | 159.71 | -3.42 | 0.0 |  |  |
| 77 | 161.96 | -3.44 | 0.0 |  |  |
| 78 | 164.21 | -3.47 | 0.0 |  |  |
| 79 | 166.46 | -3.49 | 0.0 |  |  |
| 80 | 168.71 | -3.51 | 0.0 |  |  |
| 81 | 170.96 | -3.53 | 0.0 |  |  |
| 82 | 173.21 | -3.55 | 0.0 |  |  |
| 83 | 175.46 | -3.57 | 0.0 |  |  |
| 84 | 177.71 | -3.59 | 0.0 |  |  |
| 85 | 179.96 | -3.60 | 0.0 |  |  |
| 86 | 182.21 | -3.62 | 0.0 |  |  |
| 87 | 184.46 | -3.64 | 0.0 |  |  |
| 88 | 186.71 | -3.65 | 0.0 |  |  |
| 89 | 188.96 | -3.67 | 0.0 |  |  |
| 90 | 191.21 | -3.68 | 0.0 |  |  |
| 91 | 193.46 | -3.69 | 0.0 |  |  |
| 92 | 195.71 | -3.71 | 0.0 |  |  |
| 93 | 197.96 | -3.72 | 0.0 |  |  |
| 94 | 200.21 | -3.73 | 0.0 |  |  |
| 95 | 202.46 | -3.74 | 0.0 |  |  |

|     |        |       |     |
|-----|--------|-------|-----|
| 96  | 204.71 | -3.75 | 0.0 |
| 97  | 206.96 | -3.76 | 0.0 |
| 98  | 209.21 | -3.77 | 0.0 |
| 99  | 211.46 | -3.77 | 0.0 |
| 100 | 213.71 | -3.78 | 0.0 |
| 101 | 215.96 | -3.79 | 0.0 |
| 102 | 218.21 | -3.79 | 0.0 |
| 103 | 220.46 | -3.80 | 0.0 |
| 104 | 222.71 | -3.80 | 0.0 |
| 105 | 224.96 | -3.81 | 0.0 |
| 106 | 227.21 | -3.81 | 0.0 |
| 107 | 229.46 | -3.81 | 0.0 |
| 108 | 231.71 | -3.81 | 0.0 |
| 109 | 233.96 | -3.81 | 0.0 |
| 110 | 236.21 | -3.81 | 0.0 |
| 111 | 238.46 | -3.81 | 0.0 |
| 112 | 240.71 | -3.81 | 0.0 |
| 113 | 242.96 | -3.81 | 0.0 |
| 114 | 245.21 | -3.81 | 0.0 |
| 115 | 247.46 | -3.80 | 0.0 |
| 116 | 249.71 | -3.80 | 0.0 |
| 117 | 251.96 | -3.79 | 0.0 |
| 118 | 254.21 | -3.79 | 0.0 |
| 119 | 256.46 | -3.78 | 0.0 |
| 120 | 258.71 | -3.77 | 0.0 |
| 121 | 260.96 | -3.77 | 0.0 |
| 122 | 263.21 | -3.76 | 0.0 |
| 123 | 265.46 | -3.75 | 0.0 |
| 124 | 267.71 | -3.74 | 0.0 |
| 125 | 269.96 | -3.73 | 0.0 |
| 126 | 272.21 | -3.72 | 0.0 |
| 127 | 274.46 | -3.71 | 0.0 |
| 128 | 276.71 | -3.69 | 0.0 |
| 129 | 278.96 | -3.68 | 0.0 |
| 130 | 281.21 | -3.67 | 0.0 |
| 131 | 283.46 | -3.65 | 0.0 |
| 132 | 285.71 | -3.64 | 0.0 |
| 133 | 287.96 | -3.62 | 0.0 |
| 134 | 290.21 | -3.60 | 0.0 |
| 135 | 292.46 | -3.59 | 0.0 |
| 136 | 294.71 | -3.57 | 0.0 |
| 137 | 296.96 | -3.55 | 0.0 |
| 138 | 299.21 | -3.53 | 0.0 |
| 139 | 301.46 | -3.51 | 0.0 |
| 140 | 303.71 | -3.49 | 0.0 |
| 141 | 305.96 | -3.47 | 0.0 |
| 142 | 307.76 | -3.45 | 0.0 |
| 143 | 309.56 | -3.43 | 0.0 |
| 144 | 311.36 | -3.41 | 0.0 |
| 145 | 313.16 | -3.39 | 0.0 |
| 146 | 314.96 | -3.37 | 0.0 |
| 147 | 316.76 | -3.35 | 0.0 |
| 148 | 318.56 | -3.33 | 0.0 |
| 149 | 320.36 | -3.31 | 0.0 |
| 150 | 322.16 | -3.29 | 0.0 |
| 151 | 323.96 | -3.27 | 0.0 |
| 152 | 325.76 | -3.25 | 0.0 |
| 153 | 327.56 | -3.22 | 0.0 |
| 154 | 329.36 | -3.20 | 0.0 |
| 155 | 331.16 | -3.18 | 0.0 |

|     |        |       |        |
|-----|--------|-------|--------|
| 156 | 332.96 | -3.15 | 0.0    |
| 157 | 334.76 | -3.13 | 0.0    |
| 158 | 336.56 | -3.10 | 0.0    |
| 159 | 338.36 | -3.08 | 0.0    |
| 160 | 340.16 | -3.05 | 0.0    |
| 161 | 341.95 | -3.03 | 0.0    |
| 162 | 0.13   | 4.00  | 0.0    |
| 163 | -0.13  | -4.00 | 0.0    |
| 164 | 36.03  | 0.72  | 0.0    |
| 165 | 35.93  | -2.88 | 0.0    |
| 166 | 81.01  | -0.38 | 0.0    |
| 167 | 80.93  | -3.97 | 0.0    |
| 168 | 125.99 | -1.19 | 0.0    |
| 169 | 125.94 | -4.79 | 0.0    |
| 170 | 170.98 | -1.73 | 0.0    |
| 171 | 170.94 | -5.33 | 0.0    |
| 172 | 215.96 | -1.99 | 0.0    |
| 173 | 215.95 | -5.59 | 0.0    |
| 174 | 260.95 | -1.97 | 0.0    |
| 175 | 260.96 | -5.57 | 0.0    |
| 176 | 305.94 | -1.67 | 0.0    |
| 177 | 305.98 | -5.27 | 0.0    |
| 178 | 341.90 | 0.97  | 0.0    |
| 179 | 342.01 | -7.03 | 0.0    |
| 180 | 0.0    | 0.0   | 0.0    |
| 181 | 38.23  | 1.17  | -22.20 |
| 182 | 38.23  | -3.83 | -22.20 |
| 183 | 33.23  | -3.83 | -22.20 |
| 184 | 33.23  | 1.17  | -22.20 |
| 185 | 38.23  | 1.17  | -27.20 |
| 186 | 38.23  | -3.83 | -27.20 |
| 187 | 33.23  | -3.83 | -27.20 |
| 188 | 33.23  | 1.17  | -27.20 |
| 193 | 83.22  | 0.08  | -26.96 |
| 194 | 83.22  | -4.92 | -26.96 |
| 195 | 78.22  | -4.92 | -26.96 |
| 196 | 78.22  | 0.08  | -26.96 |
| 197 | 83.22  | 0.08  | -29.96 |
| 198 | 83.22  | -4.92 | -29.96 |
| 199 | 78.22  | -4.92 | -29.96 |
| 200 | 78.22  | 0.08  | -29.96 |
| 201 | 128.21 | -0.74 | -27.80 |
| 202 | 128.21 | -5.74 | -27.80 |
| 203 | 123.21 | -5.74 | -27.80 |
| 204 | 123.21 | -0.74 | -27.80 |
| 205 | 128.21 | -0.74 | -30.80 |
| 206 | 128.21 | -5.74 | -30.80 |
| 207 | 123.21 | -5.74 | -30.80 |
| 208 | 123.21 | -0.74 | -30.80 |
| 209 | 174.71 | 0.22  | -33.20 |
| 210 | 174.71 | -7.78 | -33.20 |
| 211 | 166.71 | -7.78 | -33.20 |
| 212 | 166.71 | 0.22  | -33.20 |
| 213 | 174.71 | 0.22  | -41.20 |
| 214 | 174.71 | -7.78 | -41.20 |
| 215 | 166.71 | -7.78 | -41.20 |
| 216 | 166.71 | 0.22  | -41.20 |
| 217 | 219.71 | -0.04 | -31.70 |
| 218 | 219.71 | -8.04 | -31.70 |
| 219 | 211.71 | -8.04 | -31.70 |



|      |        |       |        |       |           |
|------|--------|-------|--------|-------|-----------|
| 220  | 211.71 | -0.04 | -31.70 |       |           |
| 221  | 219.71 | -0.04 | -39.20 |       |           |
| 222  | 219.71 | -8.04 | -39.20 |       |           |
| 223  | 211.71 | -8.04 | -39.20 |       |           |
| 224  | 211.71 | -0.04 | -39.20 |       |           |
| 225  | 263.21 | -1.52 | -25.90 |       |           |
| 226  | 263.21 | -6.52 | -25.90 |       |           |
| 227  | 258.21 | -6.52 | -25.90 |       |           |
| 228  | 258.21 | -1.52 | -25.90 |       |           |
| 229  | 263.21 | -1.52 | -28.90 |       |           |
| 230  | 263.21 | -6.52 | -28.90 |       |           |
| 231  | 258.21 | -6.52 | -28.90 |       |           |
| 232  | 258.21 | -1.52 | -28.90 |       |           |
| 233  | 308.21 | -1.22 | -23.65 |       |           |
| 234  | 308.21 | -6.22 | -23.65 |       |           |
| 235  | 303.21 | -6.22 | -23.65 |       |           |
| 236  | 303.21 | -1.22 | -23.65 |       |           |
| 237  | 308.21 | -1.22 | -41.65 |       |           |
| 238  | 308.21 | -6.22 | -41.65 |       |           |
| 239  | 303.21 | -6.22 | -41.65 |       |           |
| 240  | 303.21 | -1.22 | -41.65 |       |           |
| 300  | 0.0    | 0.0   | -13.35 | fffff | Empotrado |
| 301  | 35.98  | -1.08 | -17.20 |       |           |
| 302  | 80.97  | -2.17 | -18.96 |       |           |
| 303  | 125.96 | -2.99 | -19.80 |       |           |
| 304  | 170.96 | -3.53 | -23.20 |       |           |
| 305  | 215.96 | -3.79 | -23.20 |       |           |
| 306  | 260.96 | -3.77 | -19.30 |       |           |
| 307  | 305.96 | -3.47 | -18.95 |       |           |
| 308  | 341.95 | -3.03 | -11.12 | fffff | Empotrado |
| 309  | 35.98  | -1.08 | -8.00  |       |           |
| 310  | 35.98  | -1.08 | -11.00 |       |           |
| 311  | 80.97  | -2.17 | -8.00  |       |           |
| 312  | 80.97  | -2.17 | -11.00 |       |           |
| 313  | 125.96 | -2.99 | -8.00  |       |           |
| 314  | 125.96 | -2.99 | -11.00 |       |           |
| 315  | 170.96 | -3.53 | -8.00  |       |           |
| 316  | 170.96 | -3.53 | -11.00 |       |           |
| 317  | 215.96 | -3.79 | -8.00  |       |           |
| 318  | 215.96 | -3.79 | -11.00 |       |           |
| 319  | 260.96 | -3.77 | -8.00  |       |           |
| 320  | 260.96 | -3.77 | -11.00 |       |           |
| 321  | 305.96 | -3.47 | -8.00  |       |           |
| 322  | 305.96 | -3.47 | -11.00 |       |           |
| 401  | 0.0    | 0.0   | -2.00  |       |           |
| 801  | -0.13  | -4.00 | -2.00  |       |           |
| 1000 | 0.0    | 0.0   | 1.91   |       |           |
| 1001 | 1.80   | -0.06 | 1.91   |       |           |
| 1002 | 3.60   | -0.12 | 1.91   |       |           |
| 1003 | 5.40   | -0.17 | 1.91   |       |           |
| 1004 | 7.20   | -0.23 | 1.91   |       |           |
| 1005 | 9.00   | -0.29 | 1.91   |       |           |
| 1006 | 10.79  | -0.34 | 1.91   |       |           |
| 1007 | 12.59  | -0.40 | 1.91   |       |           |
| 1008 | 14.39  | -0.45 | 1.91   |       |           |
| 1009 | 16.19  | -0.51 | 1.91   |       |           |
| 1010 | 17.99  | -0.56 | 1.91   |       |           |
| 1011 | 19.79  | -0.62 | 1.91   |       |           |
| 1012 | 21.59  | -0.67 | 1.91   |       |           |
| 1013 | 23.39  | -0.72 | 1.91   |       |           |

|      |        |       |      |  |  |
|------|--------|-------|------|--|--|
| 1014 | 25.19  | -0.77 | 1.91 |  |  |
| 1015 | 26.99  | -0.83 | 1.91 |  |  |
| 1016 | 28.79  | -0.88 | 1.91 |  |  |
| 1017 | 30.59  | -0.93 | 1.91 |  |  |
| 1018 | 32.38  | -0.98 | 1.91 |  |  |
| 1019 | 34.18  | -1.03 | 1.91 |  |  |
| 1020 | 35.98  | -1.08 | 1.91 |  |  |
| 1021 | 38.23  | -1.14 | 1.91 |  |  |
| 1022 | 40.48  | -1.20 | 1.91 |  |  |
| 1023 | 42.73  | -1.26 | 1.91 |  |  |
| 1024 | 44.98  | -1.32 | 1.91 |  |  |
| 1025 | 47.23  | -1.38 | 1.91 |  |  |
| 1026 | 49.48  | -1.44 | 1.91 |  |  |
| 1027 | 51.73  | -1.49 | 1.91 |  |  |
| 1028 | 53.98  | -1.55 | 1.91 |  |  |
| 1029 | 56.23  | -1.61 | 1.91 |  |  |
| 1030 | 58.48  | -1.66 | 1.91 |  |  |
| 1031 | 60.73  | -1.72 | 1.91 |  |  |
| 1032 | 62.97  | -1.77 | 1.91 |  |  |
| 1033 | 65.22  | -1.82 | 1.91 |  |  |
| 1034 | 67.47  | -1.87 | 1.91 |  |  |
| 1035 | 69.72  | -1.93 | 1.91 |  |  |
| 1036 | 71.97  | -1.98 | 1.91 |  |  |
| 1037 | 74.22  | -2.03 | 1.91 |  |  |
| 1038 | 76.47  | -2.08 | 1.91 |  |  |
| 1039 | 78.72  | -2.13 | 1.91 |  |  |
| 1040 | 80.97  | -2.17 | 1.91 |  |  |
| 1041 | 83.22  | -2.22 | 1.91 |  |  |
| 1042 | 85.47  | -2.27 | 1.91 |  |  |
| 1043 | 87.72  | -2.32 | 1.91 |  |  |
| 1044 | 89.97  | -2.36 | 1.91 |  |  |
| 1045 | 92.22  | -2.41 | 1.91 |  |  |
| 1046 | 94.47  | -2.45 | 1.91 |  |  |
| 1047 | 96.72  | -2.49 | 1.91 |  |  |
| 1048 | 98.97  | -2.54 | 1.91 |  |  |
| 1049 | 101.22 | -2.58 | 1.91 |  |  |
| 1050 | 103.47 | -2.62 | 1.91 |  |  |
| 1051 | 105.72 | -2.66 | 1.91 |  |  |
| 1052 | 107.97 | -2.70 | 1.91 |  |  |
| 1053 | 110.21 | -2.74 | 1.91 |  |  |
| 1054 | 112.46 | -2.78 | 1.91 |  |  |
| 1055 | 114.71 | -2.81 | 1.91 |  |  |
| 1056 | 116.96 | -2.85 | 1.91 |  |  |
| 1057 | 119.21 | -2.89 | 1.91 |  |  |
| 1058 | 121.46 | -2.92 | 1.91 |  |  |
| 1059 | 123.71 | -2.96 | 1.91 |  |  |
| 1060 | 125.96 | -2.99 | 1.91 |  |  |
| 1061 | 128.21 | -3.03 | 1.91 |  |  |
| 1062 | 130.46 | -3.06 | 1.91 |  |  |
| 1063 | 132.71 | -3.09 | 1.91 |  |  |
| 1064 | 134.96 | -3.12 | 1.91 |  |  |
| 1065 | 137.21 | -3.15 | 1.91 |  |  |
| 1066 | 139.46 | -3.18 | 1.91 |  |  |
| 1067 | 141.71 | -3.21 | 1.91 |  |  |
| 1068 | 143.96 | -3.24 | 1.91 |  |  |
| 1069 | 146.21 | -3.27 | 1.91 |  |  |
| 1070 | 148.46 | -3.30 | 1.91 |  |  |
| 1071 | 150.71 | -3.32 | 1.91 |  |  |
| 1072 | 152.96 | -3.35 | 1.91 |  |  |
| 1073 | 155.21 | -3.37 | 1.91 |  |  |

|      |        |       |      |  |  |
|------|--------|-------|------|--|--|
| 1074 | 157.46 | -3.40 | 1.91 |  |  |
| 1075 | 159.71 | -3.42 | 1.91 |  |  |
| 1076 | 161.96 | -3.44 | 1.91 |  |  |
| 1077 | 164.21 | -3.47 | 1.91 |  |  |
| 1078 | 166.46 | -3.49 | 1.91 |  |  |
| 1079 | 168.71 | -3.51 | 1.91 |  |  |
| 1080 | 170.96 | -3.53 | 1.91 |  |  |
| 1081 | 173.21 | -3.55 | 1.91 |  |  |
| 1082 | 175.46 | -3.57 | 1.91 |  |  |
| 1083 | 177.71 | -3.59 | 1.91 |  |  |
| 1084 | 179.96 | -3.60 | 1.91 |  |  |
| 1085 | 182.21 | -3.62 | 1.91 |  |  |
| 1086 | 184.46 | -3.64 | 1.91 |  |  |
| 1087 | 186.71 | -3.65 | 1.91 |  |  |
| 1088 | 188.96 | -3.67 | 1.91 |  |  |
| 1089 | 191.21 | -3.68 | 1.91 |  |  |
| 1090 | 193.46 | -3.69 | 1.91 |  |  |
| 1091 | 195.71 | -3.71 | 1.91 |  |  |
| 1092 | 197.96 | -3.72 | 1.91 |  |  |
| 1093 | 200.21 | -3.73 | 1.91 |  |  |
| 1094 | 202.46 | -3.74 | 1.91 |  |  |
| 1095 | 204.71 | -3.75 | 1.91 |  |  |
| 1096 | 206.96 | -3.76 | 1.91 |  |  |
| 1097 | 209.21 | -3.77 | 1.91 |  |  |
| 1098 | 211.46 | -3.77 | 1.91 |  |  |
| 1099 | 213.71 | -3.78 | 1.91 |  |  |
| 1100 | 215.96 | -3.79 | 1.91 |  |  |
| 1101 | 218.21 | -3.79 | 1.91 |  |  |
| 1102 | 220.46 | -3.80 | 1.91 |  |  |
| 1103 | 222.71 | -3.80 | 1.91 |  |  |
| 1104 | 224.96 | -3.81 | 1.91 |  |  |
| 1105 | 227.21 | -3.81 | 1.91 |  |  |
| 1106 | 229.46 | -3.81 | 1.91 |  |  |
| 1107 | 231.71 | -3.81 | 1.91 |  |  |
| 1108 | 233.96 | -3.81 | 1.91 |  |  |
| 1109 | 236.21 | -3.81 | 1.91 |  |  |
| 1110 | 238.46 | -3.81 | 1.91 |  |  |
| 1111 | 240.71 | -3.81 | 1.91 |  |  |
| 1112 | 242.96 | -3.81 | 1.91 |  |  |
| 1113 | 245.21 | -3.81 | 1.91 |  |  |
| 1114 | 247.46 | -3.80 | 1.91 |  |  |
| 1115 | 249.71 | -3.80 | 1.91 |  |  |
| 1116 | 251.96 | -3.79 | 1.91 |  |  |
| 1117 | 254.21 | -3.79 | 1.91 |  |  |
| 1118 | 256.46 | -3.78 | 1.91 |  |  |
| 1119 | 258.71 | -3.77 | 1.91 |  |  |
| 1120 | 260.96 | -3.77 | 1.91 |  |  |
| 1121 | 263.21 | -3.76 | 1.91 |  |  |
| 1122 | 265.46 | -3.75 | 1.91 |  |  |
| 1123 | 267.71 | -3.74 | 1.91 |  |  |
| 1124 | 269.96 | -3.73 | 1.91 |  |  |
| 1125 | 272.21 | -3.72 | 1.91 |  |  |
| 1126 | 274.46 | -3.71 | 1.91 |  |  |
| 1127 | 276.71 | -3.69 | 1.91 |  |  |
| 1128 | 278.96 | -3.68 | 1.91 |  |  |
| 1129 | 281.21 | -3.67 | 1.91 |  |  |
| 1130 | 283.46 | -3.65 | 1.91 |  |  |
| 1131 | 285.71 | -3.64 | 1.91 |  |  |
| 1132 | 287.96 | -3.62 | 1.91 |  |  |
| 1133 | 290.21 | -3.60 | 1.91 |  |  |

|      |         |       |      |       |         |
|------|---------|-------|------|-------|---------|
| 1134 | 292.46  | -3.59 | 1.91 |       |         |
| 1135 | 294.71  | -3.57 | 1.91 |       |         |
| 1136 | 296.96  | -3.55 | 1.91 |       |         |
| 1137 | 299.21  | -3.53 | 1.91 |       |         |
| 1138 | 301.46  | -3.51 | 1.91 |       |         |
| 1139 | 303.71  | -3.49 | 1.91 |       |         |
| 1140 | 305.96  | -3.47 | 1.91 |       |         |
| 1141 | 307.76  | -3.45 | 1.91 |       |         |
| 1142 | 309.56  | -3.43 | 1.91 |       |         |
| 1143 | 311.36  | -3.41 | 1.91 |       |         |
| 1144 | 313.16  | -3.39 | 1.91 |       |         |
| 1145 | 314.96  | -3.37 | 1.91 |       |         |
| 1146 | 316.76  | -3.35 | 1.91 |       |         |
| 1147 | 318.56  | -3.33 | 1.91 |       |         |
| 1148 | 320.36  | -3.31 | 1.91 |       |         |
| 1149 | 322.16  | -3.29 | 1.91 |       |         |
| 1150 | 323.96  | -3.27 | 1.91 |       |         |
| 1151 | 325.76  | -3.25 | 1.91 |       |         |
| 1152 | 327.56  | -3.22 | 1.91 |       |         |
| 1153 | 329.36  | -3.20 | 1.91 |       |         |
| 1154 | 331.16  | -3.18 | 1.91 |       |         |
| 1155 | 332.96  | -3.15 | 1.91 |       |         |
| 1156 | 334.76  | -3.13 | 1.91 |       |         |
| 1157 | 336.56  | -3.10 | 1.91 |       |         |
| 1158 | 338.36  | -3.08 | 1.91 |       |         |
| 1159 | 340.16  | -3.05 | 1.91 |       |         |
| 1160 | 341.95  | -3.03 | 1.91 |       |         |
| 1161 | -196.16 | 3.66  | 1.91 | fffff | Cargado |
| 1162 | -194.36 | 3.60  | 1.91 | fffff | Cargado |
| 1163 | -192.56 | 3.54  | 1.91 | fffff | Cargado |
| 1164 | -190.76 | 3.49  | 1.91 | fffff | Cargado |
| 1165 | -188.96 | 3.43  | 1.91 | fffff | Cargado |
| 1166 | -187.16 | 3.38  | 1.91 | fffff | Cargado |
| 1167 | -185.36 | 3.32  | 1.91 | fffff | Cargado |
| 1168 | -183.57 | 3.27  | 1.91 | fffff | Cargado |
| 1169 | -181.77 | 3.21  | 1.91 | fffff | Cargado |
| 1170 | -179.97 | 3.16  | 1.91 | fffff | Cargado |
| 1171 | -178.17 | 3.10  | 1.91 | fffff | Cargado |
| 1172 | -176.37 | 3.05  | 1.91 | fffff | Cargado |
| 1173 | -174.57 | 3.00  | 1.91 | fffff | Cargado |
| 1174 | -172.77 | 2.94  | 1.91 | fffff | Cargado |
| 1175 | -170.97 | 2.89  | 1.91 | fffff | Cargado |
| 1176 | -169.17 | 2.84  | 1.91 | fffff | Cargado |
| 1177 | -167.37 | 2.79  | 1.91 | fffff | Cargado |
| 1178 | -165.57 | 2.74  | 1.91 | fffff | Cargado |
| 1179 | -163.77 | 2.69  | 1.91 | fffff | Cargado |
| 1180 | -161.98 | 2.64  | 1.91 | fffff | Cargado |
| 1181 | -159.73 | 2.58  | 1.91 | fffff | Cargado |
| 1182 | -157.48 | 2.52  | 1.91 | fffff | Cargado |
| 1183 | -155.23 | 2.46  | 1.91 | fffff | Cargado |
| 1184 | -152.98 | 2.40  | 1.91 | fffff | Cargado |
| 1185 | -150.73 | 2.34  | 1.91 | fffff | Cargado |
| 1186 | -148.48 | 2.28  | 1.91 | fffff | Cargado |
| 1187 | -146.23 | 2.22  | 1.91 | fffff | Cargado |
| 1188 | -143.98 | 2.17  | 1.91 | fffff | Cargado |
| 1189 | -141.73 | 2.11  | 1.91 | fffff | Cargado |
| 1190 | -139.48 | 2.06  | 1.91 | fffff | Cargado |
| 1191 | -137.23 | 2.00  | 1.91 | fffff | Cargado |
| 1192 | -134.98 | 1.95  | 1.91 | fffff | Cargado |
| 1193 | -132.73 | 1.90  | 1.91 | fffff | Cargado |



|      |         |       |       |       |         |
|------|---------|-------|-------|-------|---------|
| 1194 | -130.49 | 1.84  | 1.91  | nffff | Cargado |
| 1195 | -128.24 | 1.79  | 1.91  | nffff | Cargado |
| 1196 | -125.99 | 1.74  | 1.91  | nffff | Cargado |
| 1197 | -123.74 | 1.69  | 1.91  | nffff | Cargado |
| 1198 | -121.49 | 1.64  | 1.91  | nffff | Cargado |
| 1199 | -119.24 | 1.59  | 1.91  | nffff | Cargado |
| 1200 | -116.99 | 1.54  | 1.91  | nffff | Cargado |
| 1201 | -114.74 | 1.50  | 1.91  | nffff | Cargado |
| 1202 | -112.49 | 1.45  | 1.91  | nffff | Cargado |
| 1203 | -110.24 | 1.40  | 1.91  | nffff | Cargado |
| 1204 | -107.99 | 1.36  | 1.91  | nffff | Cargado |
| 1205 | -105.74 | 1.31  | 1.91  | nffff | Cargado |
| 1206 | -103.49 | 1.27  | 1.91  | nffff | Cargado |
| 1207 | -101.24 | 1.23  | 1.91  | nffff | Cargado |
| 1208 | -98.99  | 1.18  | 1.91  | nffff | Cargado |
| 1209 | -96.74  | 1.14  | 1.91  | nffff | Cargado |
| 1210 | -94.49  | 1.10  | 1.91  | nffff | Cargado |
| 1211 | -92.24  | 1.06  | 1.91  | nffff | Cargado |
| 1212 | -89.99  | 1.02  | 1.91  | nffff | Cargado |
| 1213 | -87.74  | 0.98  | 1.91  | nffff | Cargado |
| 1214 | -85.49  | 0.94  | 1.91  | nffff | Cargado |
| 1215 | -83.24  | 0.90  | 1.91  | nffff | Cargado |
| 1216 | -80.99  | 0.87  | 1.91  | nffff | Cargado |
| 1217 | -78.75  | 0.83  | 1.91  | nffff | Cargado |
| 1218 | -76.50  | 0.80  | 1.91  | nffff | Cargado |
| 1219 | -74.25  | 0.76  | 1.91  | nffff | Cargado |
| 1220 | -72.00  | 0.73  | 1.91  | nffff | Cargado |
| 1221 | -69.75  | 0.69  | 1.91  | nffff | Cargado |
| 1222 | -67.50  | 0.66  | 1.91  | nffff | Cargado |
| 1223 | -65.25  | 0.63  | 1.91  | nffff | Cargado |
| 1224 | -63.00  | 0.60  | 1.91  | nffff | Cargado |
| 1225 | -60.75  | 0.57  | 1.91  | nffff | Cargado |
| 1226 | -58.50  | 0.54  | 1.91  | nffff | Cargado |
| 1227 | -56.25  | 0.51  | 1.91  | nffff | Cargado |
| 1228 | -54.00  | 0.48  | 1.91  | nffff | Cargado |
| 1229 | -51.75  | 0.45  | 1.91  | nffff | Cargado |
| 1230 | -49.50  | 0.42  | 1.91  | nffff | Cargado |
| 1231 | -47.25  | 0.40  | 1.91  | nffff | Cargado |
| 1232 | -45.00  | 0.37  | 1.91  | nffff | Cargado |
| 1233 | -42.75  | 0.34  | 1.91  | nffff | Cargado |
| 1234 | -40.50  | 0.32  | 1.91  | nffff | Cargado |
| 1235 | -38.25  | 0.30  | 1.91  | nffff | Cargado |
| 1236 | -36.00  | 0.27  | 1.91  | nffff | Cargado |
| 1237 | -33.75  | 0.25  | 1.91  | nffff | Cargado |
| 1238 | -31.50  | 0.23  | 1.91  | nffff | Cargado |
| 1239 | -29.25  | 0.21  | 1.91  | nffff | Cargado |
| 1240 | -27.00  | 0.19  | 1.91  | nffff | Cargado |
| 1241 | -24.75  | 0.17  | 1.91  | nffff | Cargado |
| 1242 | -22.50  | 0.15  | 1.91  | nffff | Cargado |
| 1243 | -20.25  | 0.13  | 1.91  | nffff | Cargado |
| 1244 | -18.00  | 0.11  | 1.91  | nffff | Cargado |
| 1245 | -15.75  | 0.10  | 1.91  | nffff | Cargado |
| 1246 | -13.50  | 0.08  | 1.91  | nffff | Cargado |
| 1247 | -11.25  | 0.07  | 1.91  | nffff | Cargado |
| 1248 | -9.00   | 0.05  | 1.91  | nffff | Cargado |
| 1249 | -6.75   | 0.04  | 1.91  | nffff | Cargado |
| 1250 | -4.50   | 0.02  | 1.91  | nffff | Cargado |
| 1251 | -2.25   | 0.01  | 1.91  | nffff | Cargado |
| 1601 | 35.98   | -1.08 | -2.00 |       |         |
| 2001 | 35.93   | -2.88 | -2.00 |       |         |

|       |        |       |        |       |           |
|-------|--------|-------|--------|-------|-----------|
| 2401  | 81.01  | -0.38 | -2.00  |       |           |
| 2801  | 80.97  | -2.17 | -2.00  |       |           |
| 3201  | 80.93  | -3.97 | -2.00  |       |           |
| 3601  | 125.99 | -1.19 | -2.00  |       |           |
| 4001  | 125.96 | -2.99 | -2.00  |       |           |
| 4401  | 125.94 | -4.79 | -2.00  |       |           |
| 4801  | 170.98 | -1.73 | -2.00  |       |           |
| 5201  | 170.96 | -3.53 | -2.00  |       |           |
| 5601  | 170.94 | -5.33 | -2.00  |       |           |
| 6001  | 215.96 | -1.99 | -2.00  |       |           |
| 6401  | 215.96 | -3.79 | -2.00  |       |           |
| 6801  | 215.95 | -5.59 | -2.00  |       |           |
| 7201  | 260.95 | -1.97 | -2.00  |       |           |
| 7601  | 260.96 | -3.77 | -2.00  |       |           |
| 8001  | 260.96 | -5.57 | -2.00  |       |           |
| 8401  | 305.94 | -1.67 | -2.00  |       |           |
| 8801  | 305.96 | -3.47 | -2.00  |       |           |
| 9201  | 305.98 | -5.27 | -2.00  |       |           |
| 9601  | 341.90 | 0.97  | -2.00  |       |           |
| 10001 | 341.95 | -3.03 | -2.00  |       |           |
| 10401 | 342.01 | -7.03 | -2.00  |       |           |
| 10801 | 0.13   | 4.00  | -1.85  |       |           |
| 11201 | -0.13  | -4.00 | -1.85  |       |           |
| 11601 | 36.03  | 0.72  | -1.85  |       |           |
| 12001 | 35.93  | -2.88 | -1.85  |       |           |
| 12401 | 81.01  | -0.38 | -1.85  |       |           |
| 12801 | 80.93  | -3.97 | -1.85  |       |           |
| 13201 | 125.99 | -1.19 | -1.85  |       |           |
| 13601 | 125.94 | -4.79 | -1.85  |       |           |
| 14001 | 170.98 | -1.73 | -1.85  |       |           |
| 14401 | 170.94 | -5.33 | -1.85  |       |           |
| 14801 | 215.96 | -1.99 | -1.85  |       |           |
| 15201 | 215.95 | -5.59 | -1.85  |       |           |
| 15601 | 260.95 | -1.97 | -1.85  |       |           |
| 16001 | 260.96 | -5.57 | -1.85  |       |           |
| 16401 | 305.94 | -1.67 | -1.85  |       |           |
| 16801 | 305.98 | -5.27 | -1.85  |       |           |
| 17201 | 341.90 | 0.97  | -1.85  |       |           |
| 17601 | 342.01 | -7.03 | -1.85  |       |           |
| 17603 | 38.23  | 1.17  | -20.20 | fffff | Empotrado |
| 17604 | 38.23  | 1.17  | -42.20 | fffff |           |
| 17605 | 38.23  | -3.83 | -20.20 | fffff |           |
| 17606 | 38.23  | -3.83 | -42.20 | fffff | Empotrado |
| 17607 | 33.23  | -3.83 | -20.20 | fffff |           |
| 17608 | 33.23  | -3.83 | -42.20 | fffff | Empotrado |
| 17609 | 33.23  | 1.17  | -20.20 | fffff |           |
| 17610 | 33.23  | 1.17  | -42.20 | fffff | Empotrado |
| 17611 | 83.22  | 0.08  | -21.96 | fffff |           |
| 17612 | 83.22  | 0.08  | -46.96 | fffff | Empotrado |
| 17613 | 83.22  | -4.92 | -21.96 | fffff |           |
| 17614 | 83.22  | -4.92 | -46.96 | fffff | Empotrado |
| 17615 | 78.22  | -4.92 | -21.96 | fffff |           |
| 17616 | 78.22  | -4.92 | -46.96 | fffff | Empotrado |
| 17617 | 78.22  | 0.08  | -21.96 | fffff |           |
| 17618 | 78.22  | 0.08  | -46.96 | fffff | Empotrado |
| 17619 | 128.21 | -0.74 | -22.80 | fffff |           |
| 17620 | 128.21 | -0.74 | -48.30 | fffff | Empotrado |
| 17621 | 128.21 | -5.74 | -22.80 | fffff |           |
| 17622 | 128.21 | -5.74 | -48.30 | fffff | Empotrado |
| 17623 | 123.21 | -5.74 | -22.80 | fffff |           |

|       |        |       |        |       |           |
|-------|--------|-------|--------|-------|-----------|
| 17624 | 123.21 | -5.74 | -48.30 | fffff | Empotrado |
| 17625 | 123.21 | -0.74 | -22.80 |       |           |
| 17626 | 123.21 | -0.74 | -48.30 | fffff | Empotrado |
| 17627 | 174.71 | 0.22  | -26.20 |       |           |
| 17628 | 174.71 | 0.22  | -58.70 | fffff | Empotrado |
| 17629 | 174.71 | -7.78 | -26.20 |       |           |
| 17630 | 174.71 | -7.78 | -58.70 | fffff | Empotrado |
| 17631 | 166.71 | -7.78 | -26.20 |       |           |
| 17632 | 166.71 | -7.78 | -58.70 | fffff | Empotrado |
| 17633 | 166.71 | 0.22  | -26.20 |       |           |
| 17634 | 166.71 | 0.22  | -58.70 | fffff | Empotrado |
| 17635 | 219.71 | -0.04 | -26.20 |       |           |
| 17636 | 219.71 | -0.04 | -79.70 | fffff | Empotrado |
| 17637 | 219.71 | -8.04 | -26.20 |       |           |
| 17638 | 219.71 | -8.04 | -79.70 | fffff | Empotrado |
| 17639 | 211.71 | -8.04 | -26.20 |       |           |
| 17640 | 211.71 | -8.04 | -79.70 | fffff | Empotrado |
| 17641 | 211.71 | -0.04 | -26.20 |       |           |
| 17642 | 211.71 | -0.04 | -79.70 | fffff | Empotrado |
| 17643 | 263.21 | -1.52 | -22.30 |       |           |
| 17644 | 263.21 | -1.52 | -47.80 | fffff | Empotrado |
| 17645 | 263.21 | -6.52 | -22.30 |       |           |
| 17646 | 263.21 | -6.52 | -47.80 | fffff | Empotrado |
| 17647 | 258.21 | -6.52 | -22.30 |       |           |
| 17648 | 258.21 | -6.52 | -47.80 | fffff | Empotrado |
| 17649 | 258.21 | -1.52 | -22.30 |       |           |
| 17650 | 258.21 | -1.52 | -47.80 | fffff | Empotrado |
| 17651 | 308.21 | -1.22 | -21.95 |       |           |
| 17652 | 308.21 | -1.22 | -56.95 | fffff | Empotrado |
| 17653 | 308.21 | -6.22 | -21.95 |       |           |
| 17654 | 308.21 | -6.22 | -56.95 | fffff | Empotrado |
| 17655 | 303.21 | -6.22 | -21.95 |       |           |
| 17656 | 303.21 | -6.22 | -56.95 | fffff | Empotrado |
| 17657 | 303.21 | -1.22 | -21.95 |       |           |
| 17658 | 303.21 | -1.22 | -56.95 | fffff | Empotrado |
| 17860 | 36.03  | 0.72  | -2.00  |       |           |

Barras

| Filtrar              | Barra                                                                              | Elemento                                    |
|----------------------|------------------------------------------------------------------------------------|---------------------------------------------|
| Lista completa       | 1A233 235A245 247A255 259A266 300A322 400A453 257<br>1001A1091 1160A1319 1500A1660 | 1A241 243A275CA2 277A609 619 720<br>773A930 |
| Selección            | 1A233 235A245 247A255 259A266 300A322 400A453 257<br>1001A1091 1160A1319 1500A1660 | 1A241 243A275CA2 277A609 619 720<br>773A930 |
| Número total         | 751                                                                                | 751                                         |
| Número selecciona do | 751                                                                                | 751                                         |

| Barra | Nudos | Nudo 2 | Sección   | Material              | Longitud (m) | Gama (Deg) | Tipo      |
|-------|-------|--------|-----------|-----------------------|--------------|------------|-----------|
| 1     | 180   | 2      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 2     | 2     | 3      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 3     | 3     | 4      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 4     | 4     | 5      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 5     | 5     | 6      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 6     | 6     | 7      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 7     | 7     | 8      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 8     | 8     | 9      | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 9     | 9     | 10     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 10    | 10    | 11     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 11    | 11    | 12     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 12    | 12    | 13     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 13    | 13    | 14     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 14    | 14    | 15     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 15    | 15    | 16     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 16    | 16    | 17     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 17    | 17    | 18     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 18    | 18    | 19     | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 19    | 19    | 20     | SECCIÓN B | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 20    | 20    | 21     | SECCIÓN B | HORMIGON DINAMICO H40 | 1.80         | 0.0        | No existe |
| 21    | 21    | 22     | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 22    | 22    | 23     | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 23    | 23    | 24     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 24    | 24    | 25     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 25    | 25    | 26     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 26    | 26    | 27     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 27    | 27    | 28     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 28    | 28    | 29     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 29    | 29    | 30     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 30    | 30    | 31     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 31    | 31    | 32     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 32    | 32    | 33     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 33    | 33    | 34     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 34    | 34    | 35     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 35    | 35    | 36     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 36    | 36    | 37     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |
| 37    | 37    | 38     | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25         | 0.0        | No existe |

|    |    |    |           |                       |      |     |           |
|----|----|----|-----------|-----------------------|------|-----|-----------|
| 38 | 38 | 39 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 39 | 39 | 40 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 40 | 40 | 41 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 41 | 41 | 42 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 42 | 42 | 43 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 43 | 43 | 44 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 44 | 44 | 45 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 45 | 45 | 46 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 46 | 46 | 47 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 47 | 47 | 48 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 48 | 48 | 49 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 49 | 49 | 50 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 50 | 50 | 51 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 51 | 51 | 52 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 52 | 52 | 53 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 53 | 53 | 54 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 54 | 54 | 55 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 55 | 55 | 56 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 56 | 56 | 57 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 57 | 57 | 58 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 58 | 58 | 59 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 59 | 59 | 60 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 60 | 60 | 61 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 61 | 61 | 62 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 62 | 62 | 63 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 63 | 63 | 64 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 64 | 64 | 65 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 65 | 65 | 66 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 66 | 66 | 67 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 67 | 67 | 68 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 68 | 68 | 69 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 69 | 69 | 70 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 70 | 70 | 71 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 71 | 71 | 72 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 72 | 72 | 73 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 73 | 73 | 74 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 74 | 74 | 75 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 75 | 75 | 76 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 76 | 76 | 77 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 77 | 77 | 78 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 78 | 78 | 79 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 79 | 79 | 80 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 80 | 80 | 81 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 81 | 81 | 82 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 82 | 82 | 83 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 83 | 83 | 84 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 84 | 84 | 85 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 85 | 85 | 86 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 86 | 86 | 87 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 87 | 87 | 88 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 88 | 88 | 89 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 89 | 89 | 90 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 90 | 90 | 91 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 91 | 91 | 92 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 92 | 92 | 93 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 93 | 93 | 94 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 94 | 94 | 95 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 95 | 95 | 96 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 96 | 96 | 97 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 97 | 97 | 98 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |

|     |     |     |           |                       |      |     |           |
|-----|-----|-----|-----------|-----------------------|------|-----|-----------|
| 98  | 98  | 99  | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 99  | 99  | 100 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 100 | 100 | 101 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 101 | 101 | 102 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 102 | 102 | 103 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 103 | 103 | 104 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 104 | 104 | 105 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 105 | 105 | 106 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 106 | 106 | 107 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 107 | 107 | 108 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 108 | 108 | 109 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 109 | 109 | 110 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 110 | 110 | 111 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 111 | 111 | 112 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 112 | 112 | 113 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 113 | 113 | 114 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 114 | 114 | 115 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 115 | 115 | 116 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 116 | 116 | 117 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 117 | 117 | 118 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 118 | 118 | 119 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 119 | 119 | 120 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 120 | 120 | 121 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 121 | 121 | 122 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 122 | 122 | 123 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 123 | 123 | 124 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 124 | 124 | 125 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 125 | 125 | 126 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 126 | 126 | 127 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 127 | 127 | 128 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 128 | 128 | 129 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 129 | 129 | 130 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 130 | 130 | 131 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 131 | 131 | 132 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 132 | 132 | 133 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 133 | 133 | 134 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 134 | 134 | 135 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 135 | 135 | 136 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 136 | 136 | 137 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 137 | 137 | 138 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 138 | 138 | 139 | SECCIÓN A | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 139 | 139 | 140 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 140 | 140 | 141 | SECCIÓN B | HORMIGON DINAMICO H40 | 2.25 | 0.0 | No existe |
| 141 | 141 | 142 | SECCIÓN B | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 142 | 142 | 143 | SECCIÓN B | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 143 | 143 | 144 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 144 | 144 | 145 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 145 | 145 | 146 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 146 | 146 | 147 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 147 | 147 | 148 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 148 | 148 | 149 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 149 | 149 | 150 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 150 | 150 | 151 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 151 | 151 | 152 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 152 | 152 | 153 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 153 | 153 | 154 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 154 | 154 | 155 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 155 | 155 | 156 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 156 | 156 | 157 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |
| 157 | 157 | 158 | SECCIÓN A | HORMIGON DINAMICO H40 | 1.80 | 0.0 | No existe |

|     |       |       |            |                       |       |     |           |
|-----|-------|-------|------------|-----------------------|-------|-----|-----------|
| 158 | 158   | 159   | SECCIÓN A  | HORMIGON DINAMICO H40 | 1.80  | 0.0 | No existe |
| 159 | 159   | 160   | SECCIÓN A  | HORMIGON DINAMICO H40 | 1.80  | 0.0 | No existe |
| 160 | 160   | 161   | SECCIÓN A  | HORMIGON DINAMICO H40 | 1.80  | 0.0 | No existe |
| 161 | 162   | 180   | INF RIGIDA | H.SIN PESO            | 4.00  | 0.0 | No existe |
| 162 | 180   | 163   | INF RIGIDA | H.SIN PESO            | 4.00  | 0.0 | No existe |
| 163 | 164   | 21    | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 164 | 21    | 165   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 165 | 166   | 41    | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 166 | 41    | 167   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 167 | 168   | 61    | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 168 | 61    | 169   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 169 | 170   | 81    | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 170 | 81    | 171   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 171 | 172   | 101   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 172 | 101   | 173   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 173 | 174   | 121   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 174 | 121   | 175   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 175 | 176   | 141   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 176 | 141   | 177   | INF RIGIDA | H.SIN PESO            | 1.80  | 0.0 | No existe |
| 177 | 178   | 161   | INF RIGIDA | H.SIN PESO            | 4.00  | 0.0 | No existe |
| 178 | 161   | 179   | INF RIGIDA | H.SIN PESO            | 4.00  | 0.0 | No existe |
| 179 | 17603 | 181   | Pilote     | HORMIGON              | 2.00  | 0.0 | Barra     |
| 180 | 17611 | 193   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 181 | 17605 | 182   | Pilote     | HORMIGON              | 2.00  | 0.0 | Barra     |
| 182 | 17619 | 201   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 183 | 17607 | 183   | Pilote     | HORMIGON              | 2.00  | 0.0 | Barra     |
| 184 | 17613 | 194   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 185 | 17609 | 184   | Pilote     | HORMIGON              | 2.00  | 0.0 | Barra     |
| 186 | 17627 | 209   | Pilote     | HORMIGON              | 7.00  | 0.0 | Barra     |
| 187 | 181   | 185   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 188 | 185   | 17604 | Pilote     | HORMIGON              | 15.00 | 0.0 | Barra     |
| 189 | 182   | 186   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 190 | 186   | 17606 | Pilote     | HORMIGON              | 15.00 | 0.0 | Barra     |
| 191 | 183   | 187   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 192 | 187   | 17608 | Pilote     | HORMIGON              | 15.00 | 0.0 | Barra     |
| 193 | 184   | 188   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 194 | 188   | 17610 | Pilote     | HORMIGON              | 15.00 | 0.0 | Barra     |
| 195 | 17615 | 195   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 196 | 17621 | 202   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 197 | 17617 | 196   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 198 | 17635 | 217   | Pilote     | HORMIGON              | 5.50  | 0.0 | Barra     |
| 199 | 193   | 197   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 200 | 197   | 17612 | Pilote     | HORMIGON              | 17.00 | 0.0 | Barra     |
| 201 | 194   | 198   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 202 | 198   | 17614 | Pilote     | HORMIGON              | 17.00 | 0.0 | Barra     |
| 203 | 195   | 199   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 204 | 199   | 17616 | Pilote     | HORMIGON              | 17.00 | 0.0 | Barra     |
| 205 | 196   | 200   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 206 | 200   | 17618 | Pilote     | HORMIGON              | 17.00 | 0.0 | Barra     |
| 207 | 17623 | 203   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 208 | 17629 | 210   | Pilote     | HORMIGON              | 7.00  | 0.0 | Barra     |
| 209 | 17625 | 204   | Pilote     | HORMIGON              | 5.00  | 0.0 | Barra     |
| 210 | 17643 | 225   | Pilote     | HORMIGON              | 3.60  | 0.0 | Barra     |
| 211 | 201   | 205   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 212 | 205   | 17620 | Pilote     | HORMIGON              | 17.50 | 0.0 | Barra     |
| 213 | 202   | 206   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 214 | 206   | 17622 | Pilote     | HORMIGON              | 17.50 | 0.0 | Barra     |
| 215 | 203   | 207   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |
| 216 | 207   | 17624 | Pilote     | HORMIGON              | 17.50 | 0.0 | Barra     |
| 217 | 204   | 208   | Pilote     | HORMIGON              | 3.00  | 0.0 | Barra     |

|     |       |       |         |          |       |       |       |
|-----|-------|-------|---------|----------|-------|-------|-------|
| 218 | 208   | 17626 | Pilote  | HORMIGON | 17.50 | 0.0   | Barra |
| 219 | 17631 | 211   | Pilote  | HORMIGON | 7.00  | 0.0   | Barra |
| 220 | 17637 | 218   | Pilote  | HORMIGON | 5.50  | -0.0  | Barra |
| 221 | 17633 | 212   | Pilote  | HORMIGON | 7.00  | 0.0   | Barra |
| 222 | 17651 | 233   | Pilote  | HORMIGON | 1.70  | 0.0   | Barra |
| 223 | 209   | 213   | Pilote  | HORMIGON | 8.00  | 0.0   | Barra |
| 224 | 213   | 17628 | Pilote  | HORMIGON | 17.50 | 0.0   | Barra |
| 225 | 210   | 214   | Pilote  | HORMIGON | 8.00  | 0.0   | Barra |
| 226 | 214   | 17630 | Pilote  | HORMIGON | 17.50 | 0.0   | Barra |
| 227 | 211   | 215   | Pilote  | HORMIGON | 8.00  | 0.0   | Barra |
| 228 | 215   | 17632 | Pilote  | HORMIGON | 17.50 | 0.0   | Barra |
| 229 | 212   | 216   | Pilote  | HORMIGON | 8.00  | 0.0   | Barra |
| 230 | 216   | 17634 | Pilote  | HORMIGON | 17.50 | 0.0   | Barra |
| 231 | 17639 | 219   | Pilote  | HORMIGON | 5.50  | -0.0  | Barra |
| 232 | 17645 | 226   | Pilote  | HORMIGON | 3.60  | 0.0   | Barra |
| 233 | 17641 | 220   | Pilote  | HORMIGON | 5.50  | 0.0   | Barra |
| 235 | 217   | 221   | Pilote  | HORMIGON | 7.50  | 0.0   | Barra |
| 236 | 221   | 17636 | Pilote  | HORMIGON | 40.50 | 0.0   | Barra |
| 237 | 218   | 222   | Pilote  | HORMIGON | 7.50  | -0.0  | Barra |
| 238 | 222   | 17638 | Pilote  | HORMIGON | 40.50 | -0.0  | Barra |
| 239 | 219   | 223   | Pilote  | HORMIGON | 7.50  | -0.0  | Barra |
| 240 | 223   | 17640 | Pilote  | HORMIGON | 40.50 | -0.0  | Barra |
| 241 | 220   | 224   | Pilote  | HORMIGON | 7.50  | 0.0   | Barra |
| 242 | 224   | 17642 | Pilote  | HORMIGON | 40.50 | 0.0   | Barra |
| 243 | 17647 | 227   | Pilote  | HORMIGON | 3.60  | 0.0   | Barra |
| 244 | 17653 | 234   | Pilote  | HORMIGON | 1.70  | 0.0   | Barra |
| 245 | 17649 | 228   | Pilote  | HORMIGON | 3.60  | 0.0   | Barra |
| 247 | 225   | 229   | Pilote  | HORMIGON | 3.00  | 0.0   | Barra |
| 248 | 229   | 17644 | Pilote  | HORMIGON | 18.90 | 0.0   | Barra |
| 249 | 226   | 230   | Pilote  | HORMIGON | 3.00  | 0.0   | Barra |
| 250 | 230   | 17646 | Pilote  | HORMIGON | 18.90 | 0.0   | Barra |
| 251 | 227   | 231   | Pilote  | HORMIGON | 3.00  | 0.0   | Barra |
| 252 | 231   | 17648 | Pilote  | HORMIGON | 18.90 | 0.0   | Barra |
| 253 | 228   | 232   | Pilote  | HORMIGON | 3.00  | 0.0   | Barra |
| 254 | 232   | 17650 | Pilote  | HORMIGON | 18.90 | 0.0   | Barra |
| 255 | 17655 | 235   | Pilote  | HORMIGON | 1.70  | 0.0   | Barra |
| 257 | 17657 | 236   | Pilote  | HORMIGON | 1.70  | 0.0   | Barra |
| 259 | 233   | 237   | Pilote  | HORMIGON | 18.00 | 0.0   | Barra |
| 260 | 237   | 17652 | Pilote  | HORMIGON | 15.30 | 0.0   | Barra |
| 261 | 234   | 238   | Pilote  | HORMIGON | 18.00 | 0.0   | Barra |
| 262 | 238   | 17654 | Pilote  | HORMIGON | 15.30 | 0.0   | Barra |
| 263 | 235   | 239   | Pilote  | HORMIGON | 18.00 | 0.0   | Barra |
| 264 | 239   | 17656 | Pilote  | HORMIGON | 15.30 | 0.0   | Barra |
| 265 | 236   | 240   | Pilote  | HORMIGON | 18.00 | 0.0   | Barra |
| 266 | 240   | 17658 | Pilote  | HORMIGON | 15.30 | 0.0   | Barra |
| 300 | 309   | 1601  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 301 | 311   | 2801  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 302 | 310   | 309   | PILAMAZ | HORMIGON | 3.00  | -90.0 | Barra |
| 303 | 301   | 310   | FUSTE 1 | HORMIGON | 6.20  | -90.0 | Barra |
| 304 | 313   | 4001  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 305 | 312   | 311   | PILAMAZ | HORMIGON | 3.00  | -90.0 | Barra |
| 306 | 302   | 312   | FUSTE 2 | HORMIGON | 7.96  | -90.0 | Barra |
| 307 | 315   | 5201  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 308 | 314   | 313   | PILAMAZ | HORMIGON | 3.00  | -90.0 | Barra |
| 309 | 303   | 314   | FUSTE 3 | HORMIGON | 8.80  | -90.0 | Barra |
| 310 | 317   | 6401  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 311 | 316   | 315   | PILAMAZ | HORMIGON | 3.00  | -90.0 | Barra |
| 312 | 304   | 316   | FUSTE 4 | HORMIGON | 12.20 | -90.0 | Barra |
| 313 | 319   | 7601  | CAPITEL | HORMIGON | 6.00  | -90.0 | Barra |
| 314 | 318   | 317   | PILAMAZ | HORMIGON | 3.00  | -90.0 | Barra |

|     |       |       |            |            |       |       |           |
|-----|-------|-------|------------|------------|-------|-------|-----------|
| 315 | 305   | 318   | FUSTE 5    | HORMIGON   | 12.20 | -90.0 | Barra     |
| 316 | 321   | 8801  | CAPITEL    | HORMIGON   | 6.00  | -90.0 | Barra     |
| 317 | 320   | 319   | PILAMAZ    | HORMIGON   | 3.00  | -90.0 | Barra     |
| 318 | 306   | 320   | FUSTE 6    | HORMIGON   | 8.30  | -90.0 | Barra     |
| 319 | 322   | 321   | PILAMAZ    | HORMIGON   | 3.00  | -90.0 | Barra     |
| 320 | 307   | 322   | FUSTE 7    | HORMIGON   | 7.95  | -90.0 | Barra     |
| 321 | 300   | 401   | ESTRIBO 1  | HORMIGON   | 11.35 | 0.0   | Barra     |
| 322 | 308   | 10001 | ESTRIBO 2  | HORMIGON   | 9.12  | 0.0   | Barra     |
| 400 | 1     | 401   | INF RIGIDA | H.SIN PESO | 4.00  | 0.0   | No existe |
| 401 | 401   | 801   | INF RIGIDA | H.SIN PESO | 4.00  | 0.0   | No existe |
| 402 | 17860 | 1601  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 403 | 1601  | 2001  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 404 | 2401  | 2801  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 405 | 2801  | 3201  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 406 | 3601  | 4001  | INF RIGIDA | H.SIN PESO | 1.80  | -0.0  | No existe |
| 407 | 4001  | 4401  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 408 | 4801  | 5201  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 409 | 5201  | 5601  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 410 | 6001  | 6401  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 411 | 6401  | 6801  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 412 | 7201  | 7601  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 413 | 7601  | 8001  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 414 | 8401  | 8801  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 415 | 8801  | 9201  | INF RIGIDA | H.SIN PESO | 1.80  | 0.0   | No existe |
| 416 | 9601  | 10001 | INF RIGIDA | H.SIN PESO | 4.00  | 0.0   | No existe |
| 417 | 10001 | 10401 | INF RIGIDA | H.SIN PESO | 4.00  | 0.0   | No existe |
| 418 | 801   | 11201 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 419 | 11201 | 163   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 420 | 1     | 10801 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 421 | 10801 | 162   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 422 | 2001  | 12001 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 423 | 12001 | 165   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 424 | 17860 | 11601 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 425 | 11601 | 164   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 426 | 3201  | 12801 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 427 | 12801 | 167   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 428 | 2401  | 12401 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 429 | 12401 | 166   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 430 | 4401  | 13601 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 431 | 13601 | 169   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 432 | 3601  | 13201 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 433 | 13201 | 168   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 434 | 5601  | 14401 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 435 | 14401 | 171   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 436 | 4801  | 14001 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 437 | 14001 | 170   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 438 | 6801  | 15201 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 439 | 15201 | 173   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 440 | 6001  | 14801 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 441 | 14801 | 172   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 442 | 8001  | 16001 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 443 | 16001 | 175   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 444 | 7201  | 15601 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 445 | 15601 | 174   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 446 | 9201  | 16801 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 447 | 16801 | 177   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 448 | 8401  | 16401 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 449 | 16401 | 176   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |
| 450 | 10401 | 17601 | INF RIGIDA | H.SIN PESO | 0.15  | 0.0   | Barra     |
| 451 | 17601 | 179   | INF RIGIDA | H.SIN PESO | 1.85  | 0.0   | Barra     |



|      |       |       |            |            |      |     |           |
|------|-------|-------|------------|------------|------|-----|-----------|
| 452  | 9601  | 17201 | INF RIGIDA | H.SIN PESO | 0.15 | 0.0 | Barra     |
| 453  | 17201 | 178   | INF RIGIDA | H.SIN PESO | 1.85 | 0.0 | Barra     |
| 1001 | 1161  | 1162  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1002 | 1162  | 1163  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1003 | 1163  | 1164  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1004 | 1164  | 1165  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1005 | 1165  | 1166  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1006 | 1166  | 1167  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1007 | 1167  | 1168  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1008 | 1168  | 1169  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1009 | 1169  | 1170  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1010 | 1170  | 1171  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1011 | 1171  | 1172  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1012 | 1172  | 1173  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1013 | 1173  | 1174  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1014 | 1174  | 1175  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1015 | 1175  | 1176  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1016 | 1176  | 1177  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1017 | 1177  | 1178  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1018 | 1178  | 1179  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1019 | 1179  | 1180  | Carril     | ACERO      | 1.80 | 0.0 | No existe |
| 1020 | 1180  | 1181  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1021 | 1181  | 1182  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1022 | 1182  | 1183  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1023 | 1183  | 1184  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1024 | 1184  | 1185  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1025 | 1185  | 1186  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1026 | 1186  | 1187  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1027 | 1187  | 1188  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1028 | 1188  | 1189  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1029 | 1189  | 1190  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1030 | 1190  | 1191  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1031 | 1191  | 1192  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1032 | 1192  | 1193  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1033 | 1193  | 1194  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1034 | 1194  | 1195  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1035 | 1195  | 1196  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1036 | 1196  | 1197  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1037 | 1197  | 1198  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1038 | 1198  | 1199  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1039 | 1199  | 1200  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1040 | 1200  | 1201  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1041 | 1201  | 1202  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1042 | 1202  | 1203  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1043 | 1203  | 1204  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1044 | 1204  | 1205  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1045 | 1205  | 1206  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1046 | 1206  | 1207  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1047 | 1207  | 1208  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1048 | 1208  | 1209  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1049 | 1209  | 1210  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1050 | 1210  | 1211  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1051 | 1211  | 1212  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1052 | 1212  | 1213  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1053 | 1213  | 1214  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1054 | 1214  | 1215  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1055 | 1215  | 1216  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1056 | 1216  | 1217  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1057 | 1217  | 1218  | Carril     | ACERO      | 2.25 | 0.0 | No existe |
| 1058 | 1218  | 1219  | Carril     | ACERO      | 2.25 | 0.0 | No existe |

|      |      |      |        |       |      |      |           |
|------|------|------|--------|-------|------|------|-----------|
| 1059 | 1219 | 1220 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1060 | 1220 | 1221 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1061 | 1221 | 1222 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1062 | 1222 | 1223 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1063 | 1223 | 1224 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1064 | 1224 | 1225 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1065 | 1225 | 1226 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1066 | 1226 | 1227 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1067 | 1227 | 1228 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1068 | 1228 | 1229 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1069 | 1229 | 1230 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1070 | 1230 | 1231 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1071 | 1231 | 1232 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1072 | 1232 | 1233 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1073 | 1233 | 1234 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1074 | 1234 | 1235 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1075 | 1235 | 1236 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1076 | 1236 | 1237 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1077 | 1237 | 1238 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1078 | 1238 | 1239 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1079 | 1239 | 1240 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1080 | 1240 | 1241 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1081 | 1241 | 1242 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1082 | 1242 | 1243 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1083 | 1243 | 1244 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1084 | 1244 | 1245 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1085 | 1245 | 1246 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1086 | 1246 | 1247 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1087 | 1247 | 1248 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1088 | 1248 | 1249 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1089 | 1249 | 1250 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1090 | 1250 | 1251 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1091 | 1251 | 1000 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1160 | 1000 | 1001 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1161 | 1001 | 1002 | Carril | ACERO | 1.80 | -0.0 | No existe |
| 1162 | 1002 | 1003 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1163 | 1003 | 1004 | Carril | ACERO | 1.80 | -0.0 | No existe |
| 1164 | 1004 | 1005 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1165 | 1005 | 1006 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1166 | 1006 | 1007 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1167 | 1007 | 1008 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1168 | 1008 | 1009 | Carril | ACERO | 1.80 | -0.0 | No existe |
| 1169 | 1009 | 1010 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1170 | 1010 | 1011 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1171 | 1011 | 1012 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1172 | 1012 | 1013 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1173 | 1013 | 1014 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1174 | 1014 | 1015 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1175 | 1015 | 1016 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1176 | 1016 | 1017 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1177 | 1017 | 1018 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1178 | 1018 | 1019 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1179 | 1019 | 1020 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1180 | 1020 | 1021 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1181 | 1021 | 1022 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1182 | 1022 | 1023 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1183 | 1023 | 1024 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1184 | 1024 | 1025 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1185 | 1025 | 1026 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1186 | 1026 | 1027 | Carril | ACERO | 2.25 | 0.0  | No existe |

|      |      |      |        |       |      |      |           |
|------|------|------|--------|-------|------|------|-----------|
| 1187 | 1027 | 1028 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1188 | 1028 | 1029 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1189 | 1029 | 1030 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1190 | 1030 | 1031 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1191 | 1031 | 1032 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1192 | 1032 | 1033 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1193 | 1033 | 1034 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1194 | 1034 | 1035 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1195 | 1035 | 1036 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1196 | 1036 | 1037 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1197 | 1037 | 1038 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1198 | 1038 | 1039 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1199 | 1039 | 1040 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1200 | 1040 | 1041 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1201 | 1041 | 1042 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1202 | 1042 | 1043 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1203 | 1043 | 1044 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1204 | 1044 | 1045 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1205 | 1045 | 1046 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1206 | 1046 | 1047 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1207 | 1047 | 1048 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1208 | 1048 | 1049 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1209 | 1049 | 1050 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1210 | 1050 | 1051 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1211 | 1051 | 1052 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1212 | 1052 | 1053 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1213 | 1053 | 1054 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1214 | 1054 | 1055 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1215 | 1055 | 1056 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1216 | 1056 | 1057 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1217 | 1057 | 1058 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1218 | 1058 | 1059 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1219 | 1059 | 1060 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1220 | 1060 | 1061 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1221 | 1061 | 1062 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1222 | 1062 | 1063 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1223 | 1063 | 1064 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1224 | 1064 | 1065 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1225 | 1065 | 1066 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1226 | 1066 | 1067 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1227 | 1067 | 1068 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1228 | 1068 | 1069 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1229 | 1069 | 1070 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1230 | 1070 | 1071 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1231 | 1071 | 1072 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1232 | 1072 | 1073 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1233 | 1073 | 1074 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1234 | 1074 | 1075 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1235 | 1075 | 1076 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1236 | 1076 | 1077 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1237 | 1077 | 1078 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1238 | 1078 | 1079 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1239 | 1079 | 1080 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1240 | 1080 | 1081 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1241 | 1081 | 1082 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1242 | 1082 | 1083 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1243 | 1083 | 1084 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1244 | 1084 | 1085 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1245 | 1085 | 1086 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1246 | 1086 | 1087 | Carril | ACERO | 2.25 | -0.0 | No existe |

|      |      |      |        |       |      |      |           |
|------|------|------|--------|-------|------|------|-----------|
| 1247 | 1087 | 1088 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1248 | 1088 | 1089 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1249 | 1089 | 1090 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1250 | 1090 | 1091 | Carril | ACERO | 2.25 | -0.0 | No existe |
| 1251 | 1091 | 1092 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1252 | 1092 | 1093 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1253 | 1093 | 1094 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1254 | 1094 | 1095 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1255 | 1095 | 1096 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1256 | 1096 | 1097 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1257 | 1097 | 1098 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1258 | 1098 | 1099 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1259 | 1099 | 1100 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1260 | 1100 | 1101 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1261 | 1101 | 1102 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1262 | 1102 | 1103 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1263 | 1103 | 1104 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1264 | 1104 | 1105 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1265 | 1105 | 1106 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1266 | 1106 | 1107 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1267 | 1107 | 1108 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1268 | 1108 | 1109 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1269 | 1109 | 1110 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1270 | 1110 | 1111 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1271 | 1111 | 1112 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1272 | 1112 | 1113 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1273 | 1113 | 1114 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1274 | 1114 | 1115 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1275 | 1115 | 1116 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1276 | 1116 | 1117 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1277 | 1117 | 1118 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1278 | 1118 | 1119 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1279 | 1119 | 1120 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1280 | 1120 | 1121 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1281 | 1121 | 1122 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1282 | 1122 | 1123 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1283 | 1123 | 1124 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1284 | 1124 | 1125 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1285 | 1125 | 1126 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1286 | 1126 | 1127 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1287 | 1127 | 1128 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1288 | 1128 | 1129 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1289 | 1129 | 1130 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1290 | 1130 | 1131 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1291 | 1131 | 1132 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1292 | 1132 | 1133 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1293 | 1133 | 1134 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1294 | 1134 | 1135 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1295 | 1135 | 1136 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1296 | 1136 | 1137 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1297 | 1137 | 1138 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1298 | 1138 | 1139 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1299 | 1139 | 1140 | Carril | ACERO | 2.25 | 0.0  | No existe |
| 1300 | 1140 | 1141 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1301 | 1141 | 1142 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1302 | 1142 | 1143 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1303 | 1143 | 1144 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1304 | 1144 | 1145 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1305 | 1145 | 1146 | Carril | ACERO | 1.80 | 0.0  | No existe |
| 1306 | 1146 | 1147 | Carril | ACERO | 1.80 | 0.0  | No existe |

|      |      |      |                   |       |      |     |           |
|------|------|------|-------------------|-------|------|-----|-----------|
| 1307 | 1147 | 1148 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1308 | 1148 | 1149 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1309 | 1149 | 1150 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1310 | 1150 | 1151 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1311 | 1151 | 1152 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1312 | 1152 | 1153 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1313 | 1153 | 1154 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1314 | 1154 | 1155 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1315 | 1155 | 1156 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1316 | 1156 | 1157 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1317 | 1157 | 1158 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1318 | 1158 | 1159 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1319 | 1159 | 1160 | Carril            | ACERO | 1.80 | 0.0 | No existe |
| 1500 | 180  | 1000 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1501 | 2    | 1001 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1502 | 3    | 1002 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1503 | 4    | 1003 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1504 | 5    | 1004 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1505 | 6    | 1005 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1506 | 7    | 1006 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1507 | 8    | 1007 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1508 | 9    | 1008 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1509 | 10   | 1009 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1510 | 11   | 1010 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1511 | 12   | 1011 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1512 | 13   | 1012 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1513 | 14   | 1013 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1514 | 15   | 1014 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1515 | 16   | 1015 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1516 | 17   | 1016 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1517 | 18   | 1017 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1518 | 19   | 1018 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1519 | 20   | 1019 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1520 | 21   | 1020 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1521 | 22   | 1021 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1522 | 23   | 1022 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1523 | 24   | 1023 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1524 | 25   | 1024 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1525 | 26   | 1025 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1526 | 27   | 1026 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1527 | 28   | 1027 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1528 | 29   | 1028 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1529 | 30   | 1029 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1530 | 31   | 1030 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1531 | 32   | 1031 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1532 | 33   | 1032 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1533 | 34   | 1033 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1534 | 35   | 1034 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1535 | 36   | 1035 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1536 | 37   | 1036 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1537 | 38   | 1037 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1538 | 39   | 1038 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1539 | 40   | 1039 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1540 | 41   | 1040 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1541 | 42   | 1041 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1542 | 43   | 1042 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1543 | 44   | 1043 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1544 | 45   | 1044 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1545 | 46   | 1045 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |
| 1546 | 47   | 1046 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra     |

|      |     |      |                   |       |      |     |       |
|------|-----|------|-------------------|-------|------|-----|-------|
| 1547 | 48  | 1047 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1548 | 49  | 1048 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1549 | 50  | 1049 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1550 | 51  | 1050 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1551 | 52  | 1051 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1552 | 53  | 1052 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1553 | 54  | 1053 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1554 | 55  | 1054 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1555 | 56  | 1055 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1556 | 57  | 1056 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1557 | 58  | 1057 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1558 | 59  | 1058 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1559 | 60  | 1059 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1560 | 61  | 1060 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1561 | 62  | 1061 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1562 | 63  | 1062 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1563 | 64  | 1063 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1564 | 65  | 1064 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1565 | 66  | 1065 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1566 | 67  | 1066 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1567 | 68  | 1067 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1568 | 69  | 1068 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1569 | 70  | 1069 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1570 | 71  | 1070 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1571 | 72  | 1071 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1572 | 73  | 1072 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1573 | 74  | 1073 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1574 | 75  | 1074 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1575 | 76  | 1075 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1576 | 77  | 1076 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1577 | 78  | 1077 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1578 | 79  | 1078 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1579 | 80  | 1079 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1580 | 81  | 1080 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1581 | 82  | 1081 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1582 | 83  | 1082 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1583 | 84  | 1083 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1584 | 85  | 1084 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1585 | 86  | 1085 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1586 | 87  | 1086 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1587 | 88  | 1087 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1588 | 89  | 1088 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1589 | 90  | 1089 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1590 | 91  | 1090 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1591 | 92  | 1091 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1592 | 93  | 1092 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1593 | 94  | 1093 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1594 | 95  | 1094 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1595 | 96  | 1095 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1596 | 97  | 1096 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1597 | 98  | 1097 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1598 | 99  | 1098 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1599 | 100 | 1099 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1600 | 101 | 1100 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1601 | 102 | 1101 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1602 | 103 | 1102 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1603 | 104 | 1103 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1604 | 105 | 1104 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1605 | 106 | 1105 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |
| 1606 | 107 | 1106 | Unión Vega-Carril | Unión | 1.91 | 0.0 | Barra |



|      |     |      |                   |       |      |     |       |
|------|-----|------|-------------------|-------|------|-----|-------|
| 1607 | 108 | 1107 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1608 | 109 | 1108 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1609 | 110 | 1109 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1610 | 111 | 1110 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1611 | 112 | 1111 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1612 | 113 | 1112 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1613 | 114 | 1113 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1614 | 115 | 1114 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1615 | 116 | 1115 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1616 | 117 | 1116 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1617 | 118 | 1117 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1618 | 119 | 1118 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1619 | 120 | 1119 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1620 | 121 | 1120 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1621 | 122 | 1121 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1622 | 123 | 1122 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1623 | 124 | 1123 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1624 | 125 | 1124 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1625 | 126 | 1125 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1626 | 127 | 1126 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1627 | 128 | 1127 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1628 | 129 | 1128 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1629 | 130 | 1129 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1630 | 131 | 1130 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1631 | 132 | 1131 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1632 | 133 | 1132 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1633 | 134 | 1133 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1634 | 135 | 1134 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1635 | 136 | 1135 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1636 | 137 | 1136 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1637 | 138 | 1137 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1638 | 139 | 1138 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1639 | 140 | 1139 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1640 | 141 | 1140 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1641 | 142 | 1141 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1642 | 143 | 1142 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1643 | 144 | 1143 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1644 | 145 | 1144 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1645 | 146 | 1145 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1646 | 147 | 1146 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1647 | 148 | 1147 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1648 | 149 | 1148 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1649 | 150 | 1149 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1650 | 151 | 1150 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1651 | 152 | 1151 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1652 | 153 | 1152 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1653 | 154 | 1153 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1654 | 155 | 1154 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1655 | 156 | 1155 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1656 | 157 | 1156 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1657 | 158 | 1157 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1658 | 159 | 1158 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1659 | 160 | 1159 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |
| 1660 | 161 | 1160 | Unión Viga-Carril | Unión | 1.91 | 0.0 | Barra |

Características

| Nombre de la sección | Lista de barras                                         | SX (m^2)    | SY (m^2) | SZ (m^2) | IX (m^4)        | IY (m^4)        | IZ (m^4)        |
|----------------------|---------------------------------------------------------|-------------|----------|----------|-----------------|-----------------|-----------------|
| CAPITEL              | 300 301A316CA3                                          | 13.650      | 11.375   | 11.375   | 24.220          | 23.549          | 10.237          |
| Carril               | 1001A109I 1160A1319                                     | 0.031       | 0.0      | 0.0      | 10.000          | 0.000           | 1.000           |
| ESTRIBO 1            | 321                                                     | 47.600      | 39.667   | 39.667   | 155.345         | 45.855          | 777.467         |
| ESTRIBO 2            | 322                                                     | 21.000      | 17.500   | 17.500   | 14.686          | 3.938           | 343.000         |
| FUSTE 1              | 303                                                     | 4.804       | 4.003    | 4.003    | 11.971          | 8.797           | 5.895           |
| FUSTE 2              | 306                                                     | 4.839       | 4.033    | 4.033    | 12.191          | 9.059           | 5.955           |
| FUSTE 3              | 309                                                     | 4.856       | 4.047    | 4.047    | 12.296          | 9.186           | 5.983           |
| FUSTE 4              | 312                                                     | 4.924       | 4.103    | 4.103    | 12.725          | 9.708           | 6.099           |
| FUSTE 5              | 315                                                     | 4.924       | 4.103    | 4.103    | 12.725          | 9.708           | 6.099           |
| FUSTE 6              | 318                                                     | 4.846       | 4.038    | 4.038    | 12.234          | 9.110           | 5.966           |
| FUSTE 7              | 320                                                     | 4.839       | 4.033    | 4.033    | 12.191          | 9.059           | 5.955           |
| INF_RIGIDA           | 161A178 400A453                                         | 100.00<br>0 | 0.0      | 0.0      | 1000.00<br>0    | 1000.00<br>0    | 1000.00<br>0    |
| PILAMAZ              | 302A317CA3 319                                          | 10.725      | 8.938    | 8.938    | 15.942          | 11.423          | 8.044           |
| Pilote               | 179A233 235A245 247A255 257 259A266                     | 3.142       | 2.651    | 2.651    | 1.571           | 0.785           | 0.785           |
| SECCIÓN A            | 1A18 23A38 43A58 63A78 83A98 103A118<br>123A138 143A160 | 9.674       | 0.0      | 0.0      | 37.970          | 11.328          | 104.118         |
| SECCIÓN B            | 19A22 39A42 59A62 79A82 99A102<br>119A122 139A142       | 10.975      | 0.0      | 0.0      | 43.853          | 13.572          | 106.197         |
| Unión Viga-Carril    | 1500A1660                                               | 100.00<br>0 | 0.0      | 0.0      | 1000000<br>.000 | 1000000<br>.000 | 1000000<br>.000 |

Uniones rígidas

| Nombre de la unión | Nudo principal | Lista de los nudos secundarios | Condiciones de la unión |
|--------------------|----------------|--------------------------------|-------------------------|
| Unión Rígida       | 301            | 17603A17609CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 302            | 17611A17617CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 303            | 17619A17625CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 304            | 17627A17633CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 305            | 17635A17641CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 306            | 17643A17649CA2                 | UX UY UZ RX RY RZ       |
| Unión Rígida       | 307            | 17651A17657CA2                 | UX UY UZ RX RY RZ       |

Cargas

| Caso | Nombre del caso         | Naturaleza | tipo de análisis |
|------|-------------------------|------------|------------------|
| 1    | Peso Propio             | permanente | Estático N-L     |
| 2    | Carga Permanente        | permanente | Estático N-L     |
| 3    | SW/2 - Hacia derecha    | permanente | Estático N-L     |
| 4    | LM 71 - Hacia derecha   | permanente | Estático N-L     |
| 5    | SW/2 - Hacia izquierda  | permanente | Estático N-L     |
| 6    | LM 71 - Hacia izquierda | permanente | Estático N-L     |
| 7    | Temperatura (+)         | permanente | Estático N-L     |
| 8    | Temperatura (-)         | permanente | Estático N-L     |
| 100  | Combinación 1           |            | Combinación N-L  |
| 101  | Combinación 2           |            | Combinación N-L  |
| 102  | Combinación 3           |            | Combinación N-L  |
| 103  | Combinación 4           |            | Combinación N-L  |
| 104  | Combinación 5           |            | Combinación N-L  |
| 105  | Combinación 6           |            | Combinación N-L  |
| 106  | Combinación 7           |            | Combinación N-L  |
| 107  | Combinación 8           |            | Combinación N-L  |

| Caso | Tipo de carga       | Lista                                                                              | Valores de carga                                                                         |
|------|---------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1    | peso propio         | 1A233 235A245 247A255 259A266 300A322<br>400A453 257 1001A1091 1160A1319 1500A1660 | PZ Menos                                                                                 |
| 3    | sobrecarga uniforme | 1160A1172                                                                          | PZ=-30.00(T/m)                                                                           |
| 3    | carga trapezoidal   | 1173                                                                               | PZ2=-30.00(T/m) PZ1=-30.00(T/m) X2=0.88<br>X1=0.0 global no proyectadas relativa         |
| 3    | carga trapezoidal   | 1177                                                                               | PZ2=-30.00(T/m) PZ1=-30.00(T/m) X2=1.00<br>X1=0.78 global no proyectadas relativa        |
| 3    | sobrecarga uniforme | 1178 1179                                                                          | PZ=-30.00(T/m)                                                                           |
| 3    | sobrecarga uniforme | 1160A1175                                                                          | PX=3.30(T/m)                                                                             |
| 3    | carga trapezoidal   | 1176                                                                               | PX2=3.30(T/m) PX1=3.30(T/m) X2=0.67<br>X1=0.0 global no proyectadas relativa             |
| 3    | sobrecarga uniforme | 1160A1179                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1240A1259                                                                          | PZ=-16.00(T/m)                                                                           |
| 4    | sobrecarga uniforme | 1280A1299                                                                          | PZ=-16.00(T/m)                                                                           |
| 4    | sobrecarga uniforme | 1160A1175                                                                          | PX=3.30(T/m)                                                                             |
| 4    | carga trapezoidal   | 1176                                                                               | PX2=3.30(T/m) PX1=3.30(T/m) X2=1.20(m)<br>X1=0.0(m) global no proyectadas absolutos      |
| 4    | sobrecarga uniforme | 1160A1179                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1200A1219                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1240A1259                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1280A1299                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1035A1091                                                                          | PX=2.00(T/m)                                                                             |
| 4    | sobrecarga uniforme | 1200A1219                                                                          | PZ=-16.00(T/m)                                                                           |
| 4    | sobrecarga uniforme | 1172A1179                                                                          | PZ=-16.00(T/m)                                                                           |
| 4    | sobrecarga uniforme | 1001A1091 1160A1167                                                                | PZ=-16.00(T/m)                                                                           |
| 4    | carga trapezoidal   | 1168                                                                               | PZ2=-16.00(T/m) PZ1=-16.00(T/m)<br>X2=0.40(m) X1=0.0(m) global no proyectadas absolutos  |
| 4    | carga trapezoidal   | 1171                                                                               | PZ2=-16.00(T/m) PZ1=-16.00(T/m)<br>X2=1.80(m) X1=1.40(m) global no proyectadas absolutos |
| 4    | fuerza sobre barra  | 1168                                                                               | FZ=-50.00(T) X=1.20(m)                                                                   |

|   |                     |                     |                                                                                          |
|---|---------------------|---------------------|------------------------------------------------------------------------------------------|
| 4 | fuerza sobre barra  | 1171                | FZ=-50.00(T) X=0.60(m)                                                                   |
| 4 | fuerza sobre barra  | 1170                | FZ=-50.00(T) X=0.80(m)                                                                   |
| 4 | fuerza sobre barra  | 1169                | FZ=-50.00(T) X=1.00(m)                                                                   |
| 5 | sobrecarga uniforme | 1160A1179           | PX=-2.00(T/m)                                                                            |
| 5 | carga trapezoidal   | 1176                | PX2=-3.30(T/m) PX1=-3.30(T/m) X2=0.67<br>X1=0.0 global no proyectadas relativa           |
| 5 | sobrecarga uniforme | 1160A1175           | PX=-3.30(T/m)                                                                            |
| 5 | sobrecarga uniforme | 1178 1179           | PZ=-30.00(T/m)                                                                           |
| 5 | carga trapezoidal   | 1177                | PZ2=-30.00(T/m) PZ1=-30.00(T/m) X2=1.00<br>X1=0.78 global no proyectadas relativa        |
| 5 | carga trapezoidal   | 1173                | PZ2=-30.00(T/m) PZ1=-30.00(T/m) X2=0.88<br>X1=0.0 global no proyectadas relativa         |
| 5 | sobrecarga uniforme | 1160A1172           | PZ=-30.00(T/m)                                                                           |
| 6 | sobrecarga uniforme | 1035A1091           | PX=-2.00(T/m)                                                                            |
| 6 | sobrecarga uniforme | 1280A1299           | PX=-2.00(T/m)                                                                            |
| 6 | sobrecarga uniforme | 1240A1259           | PX=-2.00(T/m)                                                                            |
| 6 | sobrecarga uniforme | 1200A1219           | PX=-2.00(T/m)                                                                            |
| 6 | sobrecarga uniforme | 1160A1179           | PX=-2.00(T/m)                                                                            |
| 6 | carga trapezoidal   | 1176                | PX2=-3.30(T/m) PX1=-3.30(T/m) X2=1.20(m)<br>X1=0.0(m) global no proyectadas absolutos    |
| 6 | sobrecarga uniforme | 1160A1175           | PX=-3.30(T/m)                                                                            |
| 6 | sobrecarga uniforme | 1280A1299           | PZ=-16.00(T/m)                                                                           |
| 6 | sobrecarga uniforme | 1240A1259           | PZ=-16.00(T/m)                                                                           |
| 6 | sobrecarga uniforme | 1200A1219           | PZ=-16.00(T/m)                                                                           |
| 6 | sobrecarga uniforme | 1172A1179           | PZ=-16.00(T/m)                                                                           |
| 6 | sobrecarga uniforme | 1001A1091 1160A1167 | PZ=-16.00(T/m)                                                                           |
| 6 | carga trapezoidal   | 1168                | PZ2=-16.00(T/m) PZ1=-16.00(T/m)<br>X2=0.40(m) X1=0.0(m) global no proyectadas absolutos  |
| 6 | carga trapezoidal   | 1171                | PZ2=-16.00(T/m) PZ1=-16.00(T/m)<br>X2=1.80(m) X1=1.40(m) global no proyectadas absolutos |
| 6 | fuerza sobre barra  | 1168                | FZ=-50.00(T) X=1.20(m)                                                                   |
| 6 | fuerza sobre barra  | 1171                | FZ=-50.00(T) X=0.60(m)                                                                   |
| 6 | fuerza sobre barra  | 1170                | FZ=-50.00(T) X=0.80(m)                                                                   |
| 6 | fuerza sobre barra  | 1169                | FZ=-50.00(T) X=1.00(m)                                                                   |
| 7 | temperatura         | 1A160               | TX=30.00(°C)                                                                             |
| 7 | temperatura         | 1001A1091 1160A1319 | TX=50.00(°C)                                                                             |
| 7 | dilatación          | 1A160               | Dilatación=-0.00(m) relativa                                                             |
| 8 | temperatura         | 1A160               | TX=-30.00(°C)                                                                            |
| 8 | temperatura         | 1001A1091 1160A1319 | TX=-50.00(°C)                                                                            |
| 8 | dilatación          | 1A160               | relativa                                                                                 |

Combinaciones de casos

| Filtrar             | Combinación |
|---------------------|-------------|
| Lista completa      | 100A107     |
| Selección           | 100A107     |
|                     |             |
| Número total        | 8           |
| Número seleccionado | 8           |

| Combinación | Nombre        | Tipo de análisis | Definición |
|-------------|---------------|------------------|------------|
| 100         | Combinación 1 | Combinación N-L  | (3+7)*1.00 |
| 101         | Combinación 2 | Combinación N-L  | (4+7)*1.00 |
| 102         | Combinación 3 | Combinación N-L  | (5+7)*1.00 |
| 103         | Combinación 4 | Combinación N-L  | (6+7)*1.00 |
| 104         | Combinación 5 | Combinación N-L  | (3+8)*1.00 |
| 105         | Combinación 6 | Combinación N-L  | (4+8)*1.00 |
| 106         | Combinación 7 | Combinación N-L  | (5+8)*1.00 |
| 107         | Combinación 8 | Combinación N-L  | (6+8)*1.00 |

Reacciones

| Filtrar             | Nudo                                                  | Caso        |
|---------------------|-------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección           | 300 308 1161A1251 17604A17658CA2                      | 1A8 100A107 |
|                     |                                                       |             |
| Número total        | 790                                                   | 16          |
| Número seleccionado | 121                                                   | 16          |

|      | FX (T)  | FY (T)  | FZ (T)  | MX (Tm) | MY (Tm)   | MZ (Tm) |
|------|---------|---------|---------|---------|-----------|---------|
| MAX  | 336.02  | 1231.11 | 1683.88 | 2346.66 | 3836.539  | 2177.91 |
| Nudo | 300     | 1161    | 300     | 300     | 300       | 1162    |
| Caso | 6       | 107     | 1       | 5       | 6         | 107     |
|      |         |         |         |         |           |         |
| MIN  | 1402.83 | 1231.10 | 285.89  | 595.972 | 16185.706 | 2177.91 |
| Nudo | 300     | 1161    | 17614   | 300     | 300       | 1162    |
| Caso | 101     | 7       | 100     | 7       | 101       | 7       |
|      |         |         |         |         |           |         |

Desplazamientos

| Filtrar             | Nudo                                                                                               | Caso        |
|---------------------|----------------------------------------------------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860                                              | 1A8 100A107 |
| Selección           | 1A188 193A240 300A322 1000A1251 17603A17658 401A17201CA1200 801A17601CA1200 2401A16801CA1200 17860 | 1A8 100A107 |
|                     |                                                                                                    |             |
| Número total        | 790                                                                                                | 16          |
| Número seleccionado | 611                                                                                                | 16          |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 12.0392 | 0.1406  | 0.8145  | 0.0001672 | 0.0014896 | 0.0000396 |
| Nudo | 1160    | 1067    | 1030    | 92        | 10801     | 307       |
| Caso | 101     | 105     | 101     | 101       | 100       | 101       |
|      |         |         |         |           |           |           |
| MIN  | 14.4943 | 0.2440  | 1.3003  | 0.0000540 | 0.0018542 | 0.0000292 |
| Nudo | 17201   | 1106    | 1009    | 4801      | 6801      | 18        |
| Caso | 103     | 101     | 100     | 105       | 100       | 103       |
|      |         |         |         |           |           |           |

Desplazamientos tablero - SW/2 I

| Filtrar             | Nudo                                                  | Caso        |
|---------------------|-------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección           | 2A161 180                                             | 3           |
| Número total        | 790                                                   | 16          |
| Número seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.1728  | 0.0027  | 0.3783  | 0.0000214 | 0.0009121 | 0.0000008 |
| Nudo | 10      | 180     | 29      | 4         | 180       | 157       |
| Caso | 3       | 3       | 3       | 3         | 3         | 3         |
| MIN  | 0.1251  | 0.0104  | 0.9524  | 0.0000012 | 0.0006296 | 0.0000032 |
| Nudo | 161     | 50      | 10      | 21        | 18        | 180       |
| Caso | 3       | 3       | 3       | 3         | 3         | 3         |

$\delta_{abs} < 50 \text{ mm}$  CUMPLE  $\delta_{rel} = 3.333 - 1.251 = 2.082 \text{ mm}$  CUMPLE

Desplazamientos tablero - LM 71 I

| Filtrar             | Nudo                                                  | Caso        |
|---------------------|-------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección           | 2A161 180                                             | 4           |
| Número total        | 790                                                   | 16          |
| Número seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.3520  | 0.0345  | 0.7367  | 0.0000170 | 0.0008872 | 0.0000043 |
| Nudo | 133     | 75      | 71      | 3         | 180       | 31        |
| Caso | 4       | 4       | 4       | 4         | 4         | 4         |
| MIN  | 0.2750  | 0.0004  | 1.2784  | 0.0000197 | 0.0007536 | 0.0000043 |
| Nudo | 180     | 161     | 91      | 61        | 99        | 156       |
| Caso | 4       | 4       | 4       | 4         | 4         | 4         |

$\delta_{abs} < 50 \text{ mm}$  CUMPLE  $\delta_{rel} = 5.229 - 2.750 = 2.479 \text{ mm}$  CUMPLE

Desplazamientos tablero - SW/2 II

| Filtrar             | Nudo                                                  | Caso        |
|---------------------|-------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección           | 2A161 180                                             | 5           |
| Número total        | 790                                                   | 16          |
| Número seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.0791  | 0.0027  | 0.3664  | 0.0000201 | 0.0008360 | 0.0000010 |
| Nudo | 180     | 180     | 29      | 180       | 180       | 76        |
| Caso | 5       | 5       | 5       | 5         | 5         | 5         |
| MIN  | 0.0452  | 0.0186  | 0.9080  | 0.0000041 | 0.0006048 | 0.0000055 |
| Nudo | 161     | 44      | 10      | 15        | 18        | 180       |
| Caso | 5       | 5       | 5       | 5         | 5         | 5         |

$\delta_{abs} < 50 \text{ mm}$  CUMPLE  $\delta_{rel} = 0.529 - 0.452 = 0.077 \text{ mm}$  CUMPLE

Desplazamientos tablero - LM 71 II

| Filtrar             | Nudo                                                  | Caso        |
|---------------------|-------------------------------------------------------|-------------|
| Lista completa      | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección           | 2A161 180                                             | 6           |
| Número total        | 790                                                   | 16          |
| Número seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.0310  | 0.0177  | 0.7343  | 0.0000237 | 0.0007635 | 0.0000025 |
| Nudo | 180     | 129     | 71      | 41        | 83        | 95        |
| Caso | 6       | 6       | 6       | 6         | 6         | 6         |
| MIN  | 0.1308  | 0.0167  | 1.2756  | 0.0000059 | 0.0007536 | 0.0000057 |
| Nudo | 128     | 33      | 91      | 161       | 99        | 4         |
| Caso | 6       | 6       | 6       | 6         | 6         | 6         |

$\delta_{abs} < 50 \text{ mm}$  CUMPLE  $\delta_{rel} = 3.224 - 1.308 = 1.916 \text{ mm}$  CUMPLE

Desplazamientos carriles - SW/2 I

| Filtrar                | Nudo                                                  | Caso        |
|------------------------|-------------------------------------------------------|-------------|
| Lista completa         | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección              | 1000A1160                                             | 3           |
|                        |                                                       |             |
| Número total           | 790                                                   | 16          |
| Número<br>seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.3333  | 0.0009  | 0.3783  | 0.0000214 | 0.0010393 | 0.0000008 |
| Nudo | 1008    | 1160    | 1028    | 1003      | 1000      | 1156      |
| Caso | 3       | 3       | 3       | 3         | 3         | 3         |
| MIN  | 0.1290  | 0.0110  | 0.9524  | 0.0000012 | 0.0007221 | 0.0000032 |
| Nudo | 1160    | 1045    | 1009    | 1020      | 1020      | 1000      |
| Caso | 3       | 3       | 3       | 3         | 3         | 3         |

Desplazamientos carriles - LM 71 I

| Filtrar                | Nudo                                                  | Caso        |
|------------------------|-------------------------------------------------------|-------------|
| Lista completa         | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección              | 1000A1160                                             | 4           |
|                        |                                                       |             |
| Número total           | 790                                                   | 16          |
| Número<br>seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.5229  | 0.0373  | 0.7367  | 0.0000170 | 0.0013992 | 0.0000043 |
| Nudo | 1008    | 1060    | 1070    | 1002      | 1120      | 1030      |
| Caso | 4       | 4       | 4       | 4         | 4         | 4         |
| MIN  | 0.3930  | 0.0010  | 1.2784  | 0.0000197 | 0.0014770 | 0.0000043 |
| Nudo | 1154    | 1002    | 1090    | 1060      | 1100      | 1155      |
| Caso | 4       | 4       | 4       | 4         | 4         | 4         |

Desplazamientos carriles - SW/2 II

| Filtrar                | Nudo                                                  | Caso        |
|------------------------|-------------------------------------------------------|-------------|
| Lista completa         | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección              | 1000A1160                                             | 5           |
|                        |                                                       |             |
| Número total           | 790                                                   | 16          |
| Número<br>seleccionado | 161                                                   | 1           |

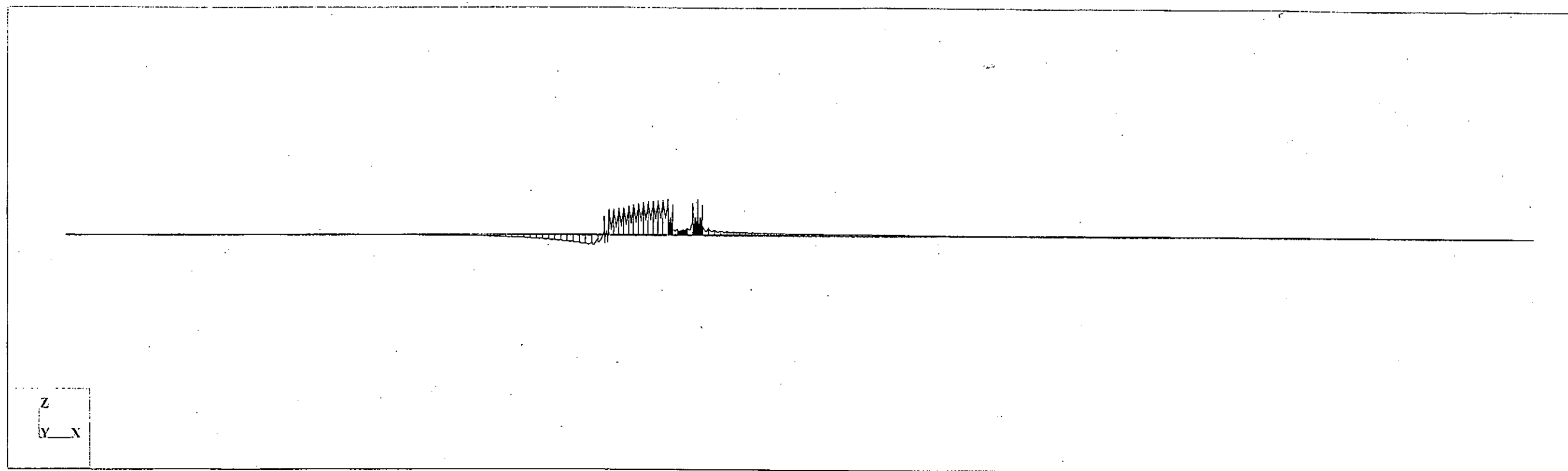
|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.0529  | 0.0004  | 0.3664  | 0.0000201 | 0.0011076 | 0.0000010 |
| Nudo | 1082    | 1160    | 1028    | 1000      | 1000      | 1075      |
| Caso | 5       | 5       | 5       | 5         | 5         | 5         |
| MIN  | 0.1703  | 0.0210  | 0.9080  | 0.0000041 | 0.0006819 | 0.0000055 |
| Nudo | 1011    | 1041    | 1009    | 1014      | 1020      | 1000      |
| Caso | 5       | 5       | 5       | 5         | 5         | 5         |

Desplazamientos carriles - LM 71 II

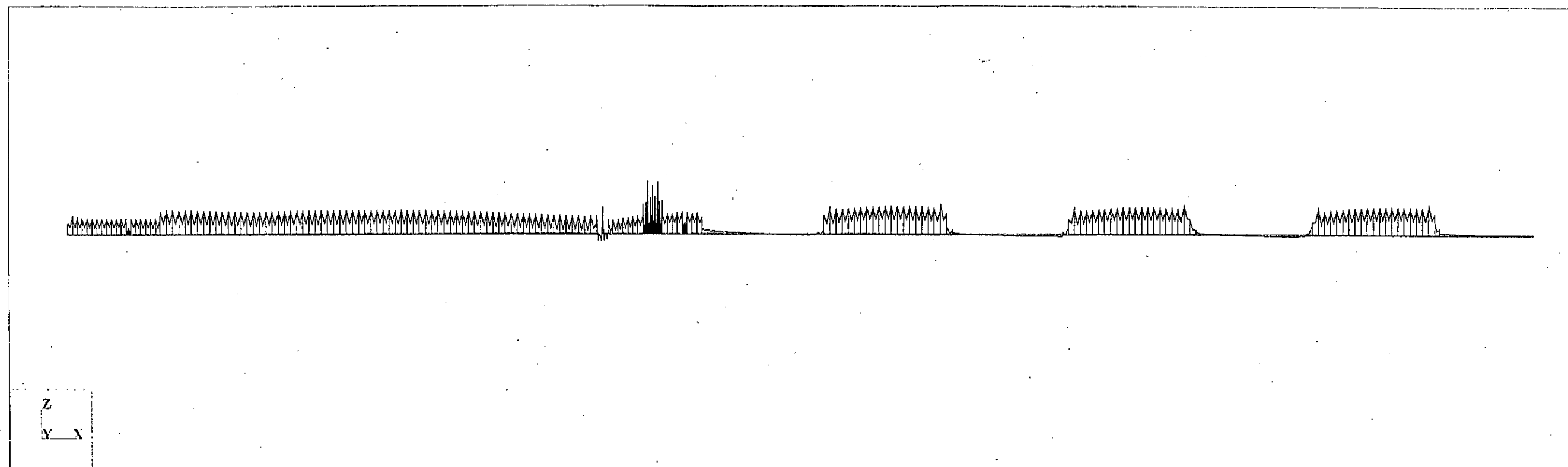
| Filtrar                | Nudo                                                  | Caso        |
|------------------------|-------------------------------------------------------|-------------|
| Lista completa         | 1A439 801 1000A1251 17603A17658 1601A17601CA400 17860 | 1A8 100A107 |
| Selección              | 1000A1160                                             | 6           |
|                        |                                                       |             |
| Número total           | 790                                                   | 16          |
| Número<br>seleccionado | 161                                                   | 1           |

|      | UX (cm) | UY (cm) | UZ (cm) | RX (Rad)  | RY (Rad)  | RZ (Rad)  |
|------|---------|---------|---------|-----------|-----------|-----------|
| MAX  | 0.1806  | 0.0181  | 0.7343  | 0.0000237 | 0.0013930 | 0.0000025 |
| Nudo | 1039    | 1126    | 1070    | 1040      | 1120      | 1094      |
| Caso | 6       | 6       | 6       | 6         | 6         | 6         |
| MIN  | 0.3224  | 0.0205  | 1.2756  | 0.0000059 | 0.0014773 | 0.0000057 |
| Nudo | 1010    | 1040    | 1090    | 1160      | 1100      | 1003      |
| Caso | 6       | 6       | 6       | 6         | 6         | 6         |



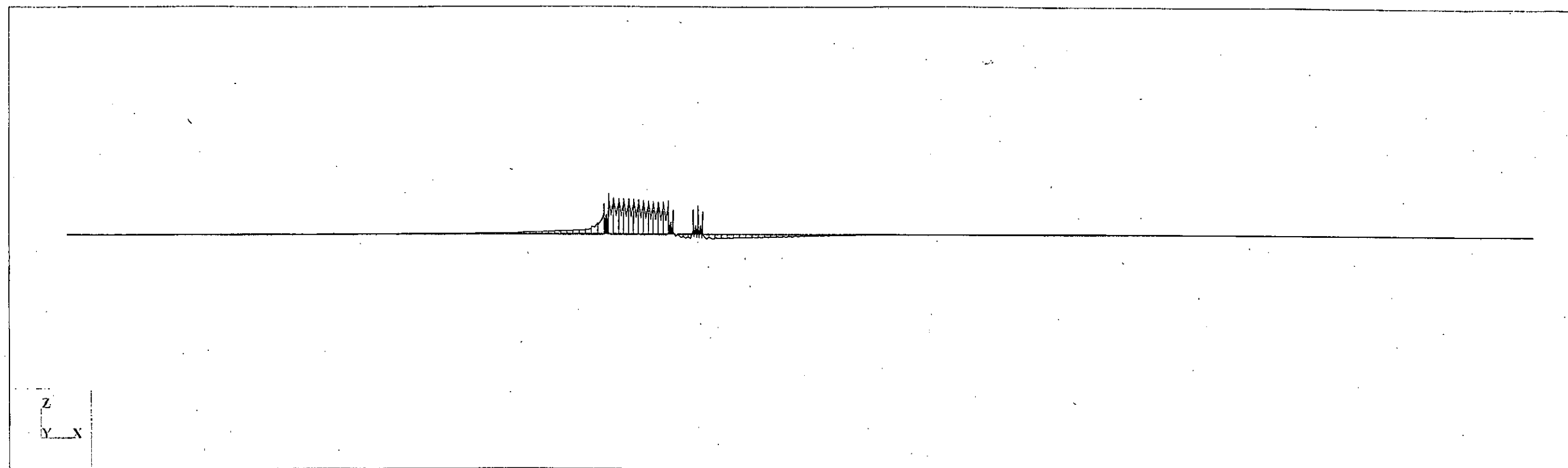
**Tensiones en carril - SW/2 - I**

|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 7380.75       |
| Barra                 | 1179          |
| Punto                 | x = 0.0000    |
| Caso                  | 3             |
| MIN                   | -2162.07      |
| Barra                 | 1090          |
| Punto                 | x = 0.3000    |
| Caso                  | 3             |

**Tensiones en carril - LM 71 I**

|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 10889.95      |
| Barra                 | 1168          |
| Punto                 | x = 1.0000    |
| Caso                  | 4             |
| MIN                   | -1473.03      |
| Barra                 | 1091          |
| Punto                 | x = 0.7000    |
| Caso                  | 4             |

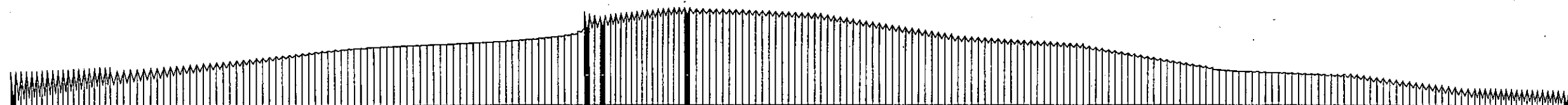


**Tensiones en carril - SW/2 II**

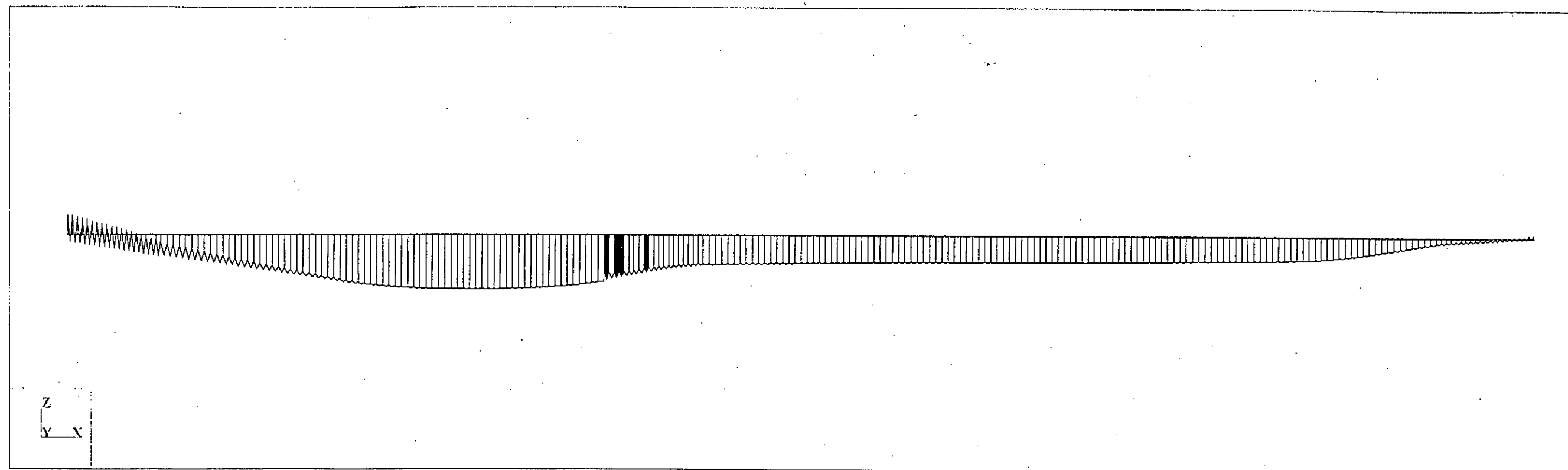
|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 8330.94       |
| Barra                 | 1160          |
| Punto                 | x = 1.0000    |
| Caso                  | 5             |
| MIN                   | -1022.15      |
| Barra                 | 1180          |
| Punto                 | x = 0.6200    |
| Caso                  | 5             |

**Tensiones en carril - LM 71 II**Z  
Y X

|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 10555.64      |
| Barra                 | 1171          |
| Punto                 | x = 0.0000    |
| Caso                  | 6             |
| MIN                   | 807.76        |
| Barra                 | 1181          |
| Punto                 | x = 0.7400    |
| Caso                  | 6             |

**Tensiones en carril - Temperatura (+) y retracción**

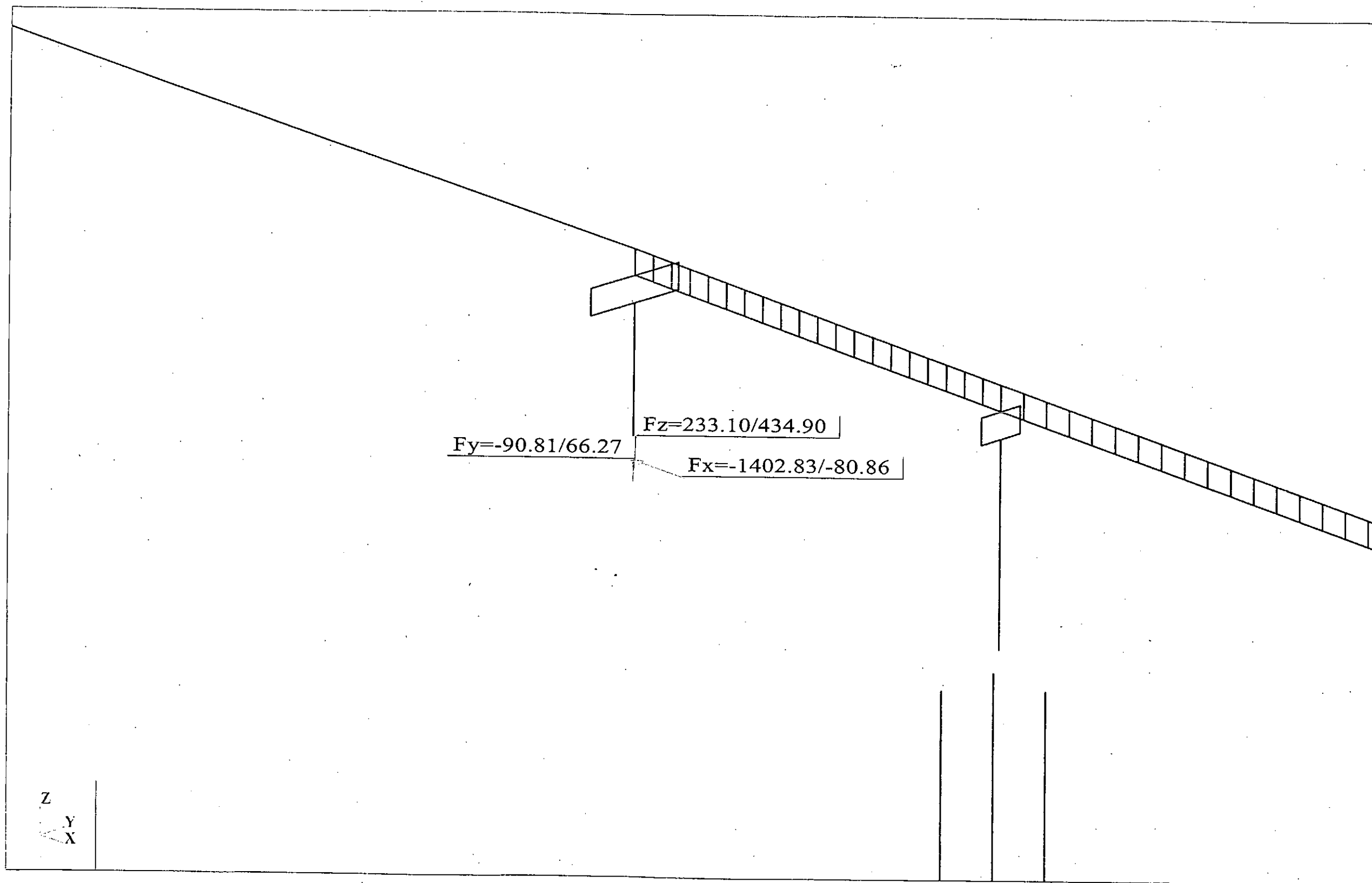
|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 18894.65      |
| Barra                 | 1179          |
| Punto                 | x = 1.0000    |
| Caso                  | 7             |
| MIN                   | 436.81        |
| Barra                 | 1318          |
| Punto                 | x = 0.5000    |
| Caso                  | 7             |

**Tensiones en carril - Temperatura (-) y retracción**

|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 10197.16      |
| MAX                   | 4044.91       |
| Barra                 | 1001          |
| Punto                 | x = 1.0000    |
| Caso                  | 8             |
| MIN                   | -11312.80     |
| Barra                 | 1070          |
| Punto                 | x = 0.5000    |
| Caso                  | 8             |

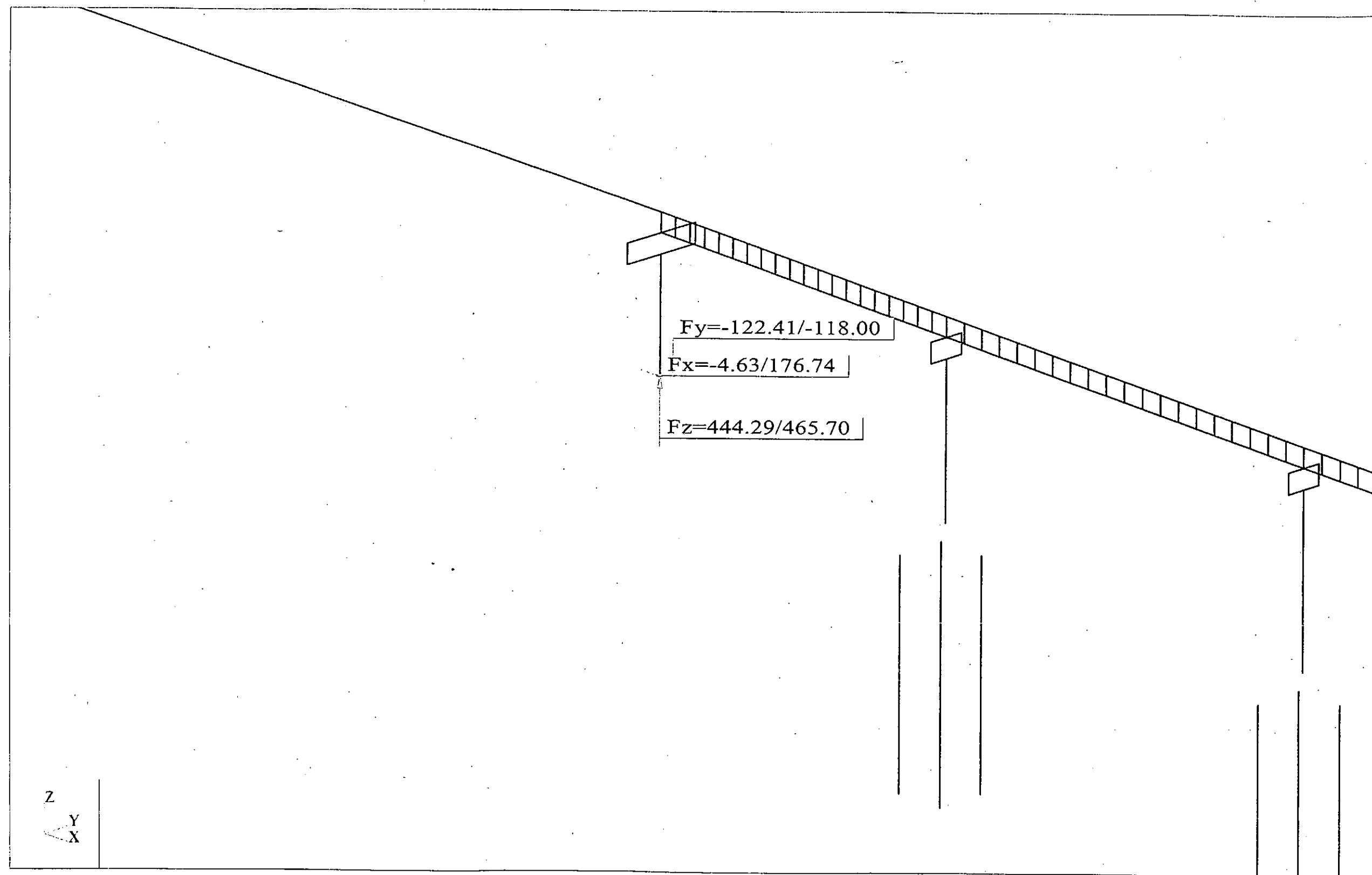


## Reacciones en estribo fijo - Combinaciones

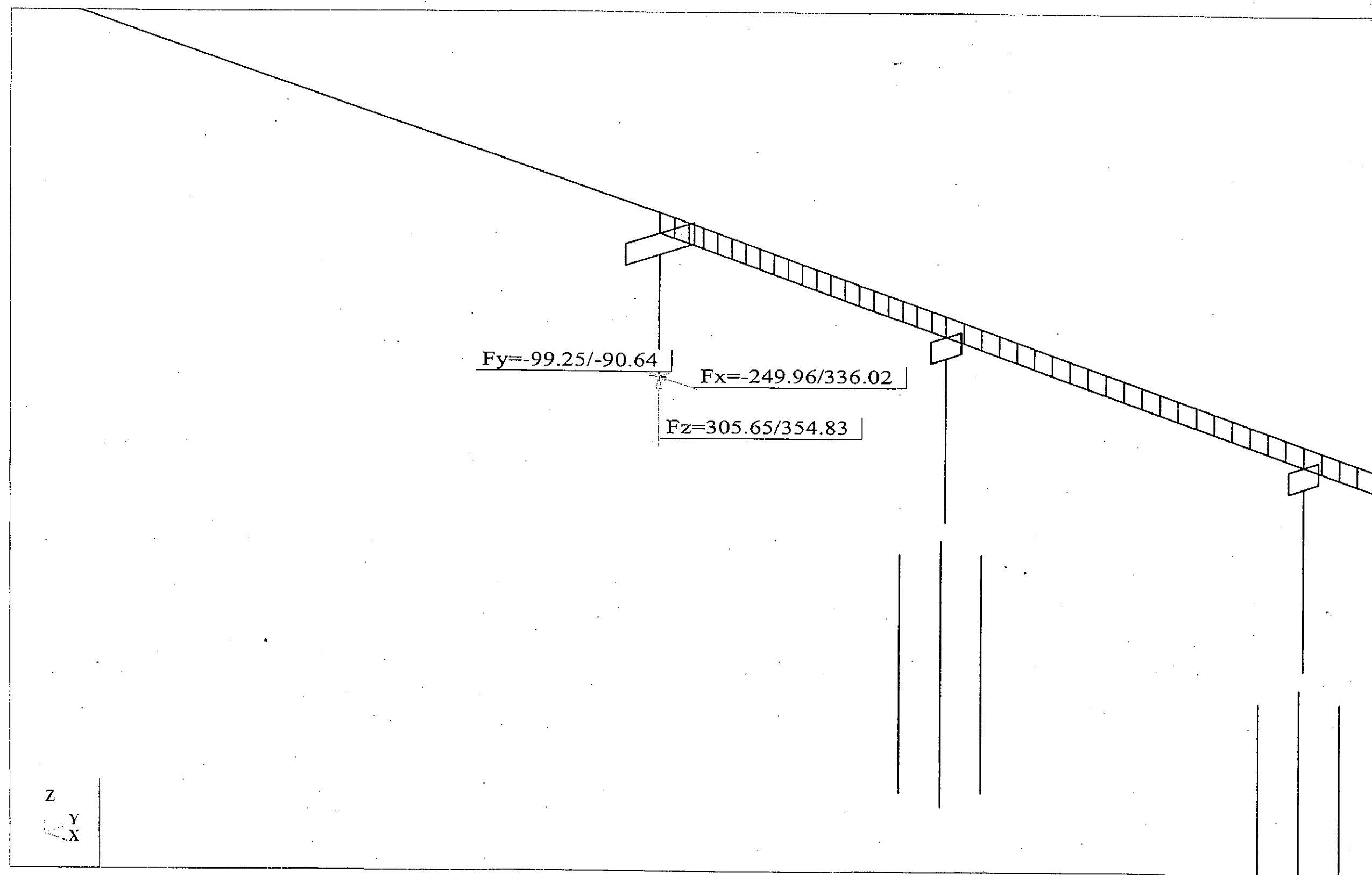


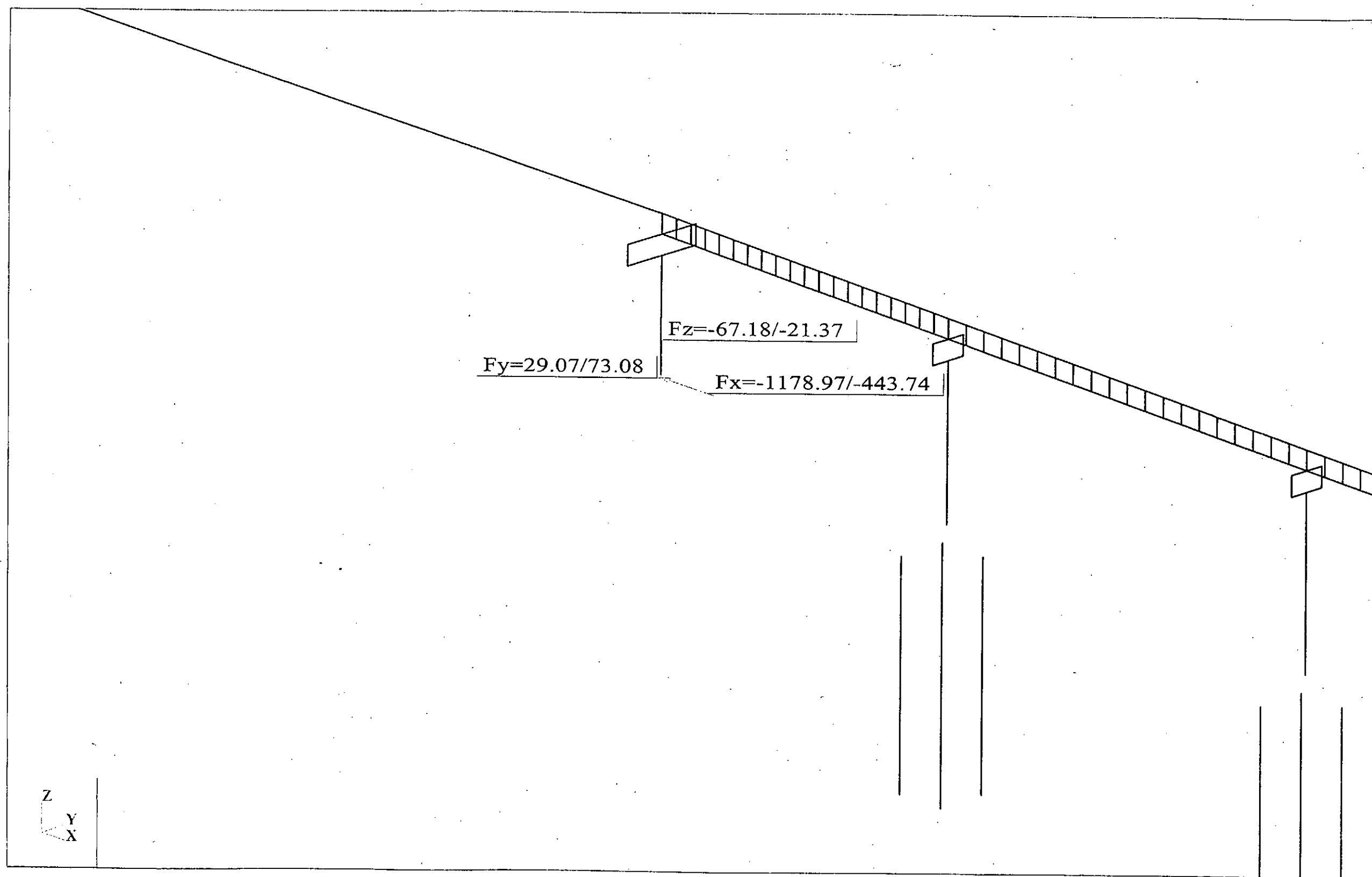


## Reacciones en estribo fijo - SW/2

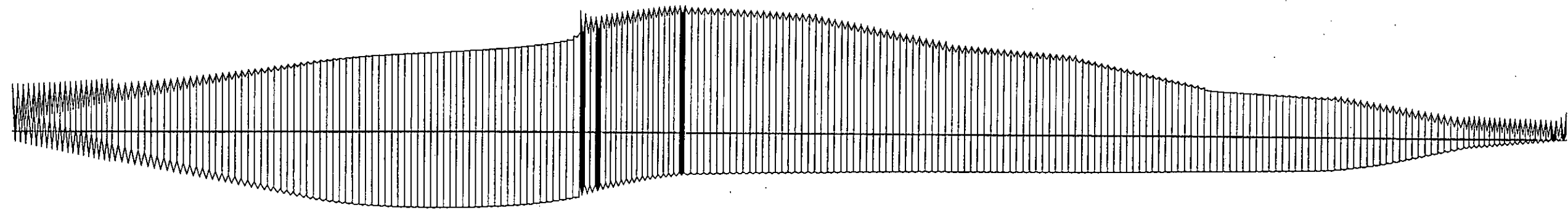




**Reacciones en estribo fijo - LM 71**

**Reacciones en estribo fijo - Temperatura**



**Tensiones en carril - Anoia**Z  
Y X

|                       | S max (T/m^2) |
|-----------------------|---------------|
| Tipo (color) de línea |               |
| Escala : (cm) =       | 7647.87       |
| MAX                   | 18894.65      |
| Barra                 | 1179          |
| Punto                 | x = 1.0000    |
| Caso                  | 7             |
| MIN                   | -11312.80     |
| Barra                 | 1070          |
| Punto                 | x = 0.5000    |
| Caso                  | 8             |

**Reacciones en estribo fijo - Anoia**

sistema de coordenadas global - Casos: 100A

| Filtrar          | Nudo           | Caso        |
|------------------|----------------|-------------|
| Lista completa   | 1A439 801 1000 | 1A8 100A107 |
| Selección        | 300            | 100A107     |
|                  |                |             |
| Número total     | 790            | 16          |
| Número seleccion | 1              | 8           |

sistema de coordenadas global - Casos: 100A107

|      | FX (T)   | FY (T) | FZ (T) | MX (Tm)  | MY (Tm)    | MZ (Tm)  |
|------|----------|--------|--------|----------|------------|----------|
| MAX  | -80.86   | 66.27  | 434.90 | 2129.429 | -963.419   | -220.390 |
| Nudo | 300      | 300    | 300    | 300      | 300        | 300      |
| Caso | 107      | 101    | 106    | 106      | 107        | 103      |
|      |          |        |        |          |            |          |
| MIN  | -1402.83 | -90.81 | 233.10 | 832.534  | -16185.706 | 17.053   |
| Nudo | 300      | 300    | 300    | 300      | 300        | 300      |
| Caso | 101      | 106    | 101    | 101      | 101        | 105      |

## ***5. Proceso Constructivo***

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## **ESTRUCTURAS**

### **PERFORACIÓN Y HORMIGONADO DE PILOTES**

#### **DEFINICIÓN Y CONDICIONES GENERALES**

##### **DEFINICIÓN:**

Se definen como cimentaciones por pilotes de hormigón armado moldeados "in situ", las realizadas mediante pilotes de hormigón armado cuya ejecución se efectúa perforando previamente el terreno y rellenando la excavación con hormigón fresco y las correspondientes armaduras.

Se define como diámetro del pilote construido "in situ", el diámetro interior de la excavación o, en su caso, de la entubación recuperable. El posible ensanchamiento del fuste del pilote, por apisonado o compresión del hormigonado, no se tendrá en cuenta para admitir un aumento de la carga admisible del mismo, considerado como elemento estructural.

La unidad de obra comprende, en el caso más general, las siguientes operaciones:

- Perforación del terreno.
- Entubación, si procede.
- Fabricación, manipulación y regeneración de los lodos.
- Suministro de hormigón.
- Colocación de armaduras.
- Hormigonado del pilote y extracción de los lodos o de la entubación.
- Descabezado del pilote.
- Retirada de las tierras de la excavación.
- Ensayo sónico en pilotes

Eventualmente, también las operaciones siguientes:

- Cesta de grava en punta de pilotes
- Perforación en punta de pilotes

#### **CONDICIONES GENERALES:**

##### **EQUIPO NECESARIO**

El equipo necesario para la fabricación, colocación del hormigón y ejecución de los pilotes, será el adecuado para el número, diámetro y longitud de pilotes que señalen los planos del Proyecto, y ofrecerá garantías suficientes en relación a la calidad del hormigón, precisión en la hincada de la entubación, mínima perturbación del terreno y, sobre todo, continuidad de los pilotes.

El Contratista someterá a la aprobación de la Dirección de Obra, con la antelación suficiente, el tipo de pilotaje, equipo y plan de trabajo que tenga previsto aplicar, modificando lo que la Dirección de Obra ordene hasta conseguir su aceptación, lo cual no exime al Contratista de su responsabilidad.

##### *Características del hormigón*

El hormigón tendrá la resistencia característica indicada en los planos. En el caso de hormigonado bajo el agua, la mezcla deberá contener no menos de cuatrocientos kilogramos de cemento por cada metro cúbico ( $400 \text{ Kg/m}^3$ ) de hormigón.

El cemento será del tipo I-32,5 con características sulforesistentes SR.

La consistencia del hormigón será de dieciséis a veinte centímetros (16 a 20 cm.) para pilotes hormigonados en agua o lodos, y de diez a quince centímetros (10 a 15 cm.) para el resto de los pilotes.

El recubrimiento mínimo de armaduras será de 4 cm, colocándose espaciadores que tengan una resistencia a la corrosión, al menos, igual a la del hormigón empleado.

##### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

Todos los días antes de empezar los trabajos se han de revisar los aparatos de elevación, los dispositivos de manejo y de perforación.

Para la construcción de la pantalla se dispondrá una superficie de trabajo sensiblemente horizontal, libre de obstáculos y de anchura suficiente para el trabajo de la maquinaria. El nivel freático deberá quedar a una profundidad del orden de un metro y medio (1,5 m) por debajo de la superficie del terreno. Si esta condición no se cumple, se construirá un terraplén, con un grado de compactación no inferior al del terreno natural. La superficie de trabajo estará convenientemente drenada para evitar encharcamientos en periodos lluviosos.

Antes de proceder a la perforación de la pantalla, deberán ser desviadas todas las conducciones aéreas que afecten al área de trabajo. Igualmente, deberán ser eliminados o modificados todos los elementos enterrados, tales como canalizaciones, raíces, restos de cimentaciones, etc., que interfieran directamente los trabajos, y también aquéllos que, por su proximidad, puedan afectar a la estabilidad del terreno durante la perforación de la pantalla. Asimismo, cuando dicha perforación pueda comprometer la estabilidad de estructuras contiguas, se efectuarán los oportunos apuntalamientos o recalces.

El material procedente de la perforación se ha de cargar y transportar a vertedero a medida que se extraiga, no estando permitida su colocación sobre la plataforma de trabajo.

En el caso de utilizar lodos tixotrópicos queda prohibido el vertido de los mismos a las cloacas y colectores.

El sistema de transporte que se utilice será el adecuado para no producir pérdidas ni suciedad en los viales del trayecto.

Si algún pilote perforado es desechado, deberá ser rellenado siempre con hormigón.

El pilote se empotrá en el terreno competente en la longitud indicada en los planos, medida a partir de la cota real de aparición de dicho sustrato portante.

Según la agresividad del terreno, la D.O. puede exigir la utilización de cementos puzolánicos o cementos pórtland con características especiales para la elaboración del hormigón.

El proceso de hormigonado no se puede suspender en ningún momento ni en ninguna circunstancia.

- Limpieza y tratamientos de fondo

Una vez terminada la excavación se procederá a la extracción del detritus que haya podido almacenarse en el fondo de la cavidad. En pilotes en seco de gran diámetro será conveniente el descenso de un operario para comprobar dicha limpieza.

Cuando no pueda garantizarse la eliminación de los detritus se preverán dispositivos para inyectar la punta del pilote, una vez terminado, eventualmente con lavado previo a presión.

En los casos de apoyo sobre terreno potencialmente karstificado se sondeará todo el pilote penetrando en el terreno un mínimo de 5 metros. Si se apreciaran indicios claros

de karstificación se procederá a inyectar el terreno en la longitud indicada y se revisará el diseño de los pilotes adyacentes para atravesar dicha zona.

- Colocación de armaduras

La colocación de la armadura debe efectuarse inmediatamente después de haber limpiado el fondo.

La armadura llevará los elementos necesarios para su izado y colocación, así como para evitar su movimiento durante el hormigonado.

Para pilotes profundos se podrá dividir la armadura vertical en dos o más partes que se introducirán en la perforación manteniéndolas suspendidas y centradas durante las operaciones de soldadura de todas las barras.

Las barras formarán una jaula de armadura, que se introducirá en la perforación de tal forma, que no se pueda mover durante el hormigonado ni podrá ser extraída al levantar la entubación. Las armaduras deberán quedar suspendidas durante todo el proceso de hormigonado, de forma que no se produzca pandeo de las barras ni abombamientos del conjunto de la jaula. Para ello, se fijarán de forma sólida a la coronación de la excavación.

La armadura se ajustará al tipo de acero y diámetro de barras indicados en los planos del Proyecto.

La armadura quedará a una distancia mínima de veinte centímetros (20 cm) en fondo de perforación y máxima de cincuenta centímetros (50 cm).

La longitud será tal que, después del descabezado, sobresalga la longitud de anclaje que figure en los planos, que como mínimo será de un (1) diámetro del pilote construido.

- Hormigonado

Antes de comenzar la excavación se verificará que el movimiento de tierras efectuado para la plataforma de trabajo no altera las hipótesis de cálculo del pilote.

No se permitirá la perforación de un pilote a menos de tres diámetros (3 Ø) de distancia del centro de otro pilote que lleve menos de cuarenta y ocho horas (48 h) hormigonado.

El tiempo transcurrido entre el inicio de colocación de armaduras y vertido de hormigón será el menor posible.

El hormigonado se realizará sin interrupción, mediante tubería cuyo diámetro estará comprendido entre quince y treinta centímetros (15 y 30 cm.) y que estará centrada en el pilote e introducida hasta el fondo de la perforación, de forma que no se produzcan disgregaciones ni huecos en su masa.

En el hormigonado de los pilotes se pondrá el mayor cuidado en conseguir que el pilote quede en toda su longitud con su sección completa, sin vacíos, bolsas de aire o agua, coque ni cortes o estrangulamientos. Tampoco se olvidará reducir al máximo el deslavado por segregación de los áridos. En ningún caso se admitirá la caída libre del hormigón.

Las armaduras, así como la fabricación, transporte y puesta en obra del hormigón, se ajustarán a lo prescrito en los Artículos correspondientes, del presente Pliego.

Se hormigonarán las cabezas hasta una altura superior a la teórica de Proyecto en 0,5 D (si es bajo el nivel freático 1,5 D) que se demolerán después. El Contratista no percibirá ninguna compensación por este exceso del hormigonado ni por su demolición posterior.

Si al efectuar la demolición se observa que el descabezado no ha sido suficiente para eliminar todo el hormigón deslavado y de mala calidad, se proseguirá la demolición reemplazando el hormigón demolido por hormigón nuevo bien adherido al anterior. Todas estas operaciones serán por cuenta del Contratista.

El hormigonado de un pilote se hará, en todo caso, sin interrupción, de modo que entre la introducción de dos masas sucesivas no pase tiempo suficiente para la iniciación del fraguado; si por alguna avería o accidente esta prescripción no se cumpliera, la Dirección de Obra decidirá si el pilote puede terminarse y considerarse válido o no. El pilote que haya sido rechazado por el motivo indicado habrá de ser rellenado, sin embargo, en toda su longitud abierta en el terreno, sin que el Contratista perciba pago alguno por ello. La parte de relleno, después de rechazado el pilote, podrá ejecutarse con hormigón pobre, pero su ejecución se hará con los mismos cuidados que si se tratara de un pilote que hubiera de ser sometido a cargas.

La posición de los pilotes en planta, después de contruidos, no deberá diferir en más del 10% del diámetro del pilote. La desviación respecto a la vertical no será superior al 1% de la longitud del pilote indicada en los Planos.

#### Perforación con entubación recuperable

Se tratará de conseguir una bajada de la entubación tan continua como sea posible y llevada a la par con la extracción de la tierra; en ningún caso, la extracción debe adelantarse sobre la bajada del tubo.

En caso de penetrar por debajo de la capa freática, no se admitirá bombeo durante la ejecución del pilote.

En caso de encontrar afluencias de agua, se puede admitir un bombeo previo para limpiar el tubo, siempre que la afluencia de agua sea menor que una décima de litro por segundo (0,1 l/s); en caso contrario, se proscribire la aplicación de bombeo durante la ejecución del pilote.

En los casos en que exista riesgo importante de deslavado del hormigón (por ejemplo, gravas con flujo de agua) se colocará dentro de la entubación una camisa metálica que quedará perdida.

La entubación debe colocarse en la longitud adecuada para evitar desprendimientos, problemas de hormigonado, etc. . Las juntas serán roscadas o soldadas y habrán de ser impermeables.

El avance de la entubación se llevará a cabo de tal forma que el suelo por el que ésta atraviesa vaya desplazándose hacia los lados, compactándolo al mismo tiempo, sin que se produzca ninguna extracción de material. Si se encontraran obstáculos durante la hinca o perforación se podrá utilizar trépano guiado o técnicas especiales de excavación.

Tanto el tubo como las juntas han de poder resistir los esfuerzos que se producen al clavar el tubo, sin sufrir deformaciones.

Durante el hormigonado de los pilotes de entubación recuperable, se ha de ir elevando la citada entubación de forma que quede siempre un tapón de hormigón en el fondo de la misma, que impida la entrada del terreno circundante. Este tapón no será demasiado alto, ya que podría adherirse a la entubación, ocasionando el corte del pilote, por lo que su altura ha de estar comprendida entre dos veces y tres veces y media el diámetro del mismo.

La citada altura se habrá de comprobar continuamente, por medida directa y por comparación entre el volumen del hormigón colocado y el calculado para la altura hormigonada.



El hormigonado se hará en seco o bien con el tubo lleno de agua hasta el nivel freático debiendo elegirse uno u otro procedimiento según la naturaleza del terreno. Será preferible el hormigonado con tubo lleno de agua en cuanto haya capas de terrenos socavables, siendo necesario en este caso colocar el hormigón en obra por medio de una cuchara, tubo, bomba o cualquier artificio que dificulte su deslavado. Cuando no haya terrenos socavables será aconsejable el hormigonado en seco, que podrá conseguirse, aún en terrenos de cierta permeabilidad, sellando inicialmente el fondo de la excavación con un hormigón muy seco.

En terrenos muy blandos o susceptibles de sifonamiento, durante la excavación, se ha de mantener el nivel de agua en el interior de entubación.

En los pilotes con camisa perdida, realizada la excavación y antes del hormigonado, se ha de introducir la camisa en la entubación.

Se ha de mantener suspendida desde la boca de la perforación, hasta la finalización de las operaciones de hormigonado.

#### Perforación con lodos tixotrópicos:

En el caso de utilizar lodos tixotrópicos, se ha de sustituir el lodo y se ha de regenerar cuando su contenido en arena o cuando la viscosidad superen los valores especificados.

La tubería que coloca el hormigón ha de ir introducida siempre 5 m., como mínimo, dentro del hormigón anteriormente vertido.

A medida que se inyecta el hormigón se han de recuperar los lodos sobrantes.

El hormigonado se ha de realizar por sistema ascendente, es decir, de abajo hacia arriba desalojando el lodo a medida que penetra el hormigón.

#### Control de ejecución de los pilotes

El Contratista confeccionará un parte de trabajo de cada pilote en el que figurará, al menos: la fecha y la hora de comienzo y fin de la introducción de la tubería; la profundidad total alcanzada por la entubación, la descripción de los terrenos atravesados y el espesor de las distintas capas; la profundidad hasta la que se ha introducido la armadura y la longitud y constitución de la misma; la profundidad del nivel de la superficie del agua al comienzo del hormigonado; y la fecha y la hora del comienzo y terminación del hormigonado, así como el consumo real de hormigón, los

datos de las distintas capas de terrenos atravesados deberán contrastarse con los que sirvieron para el dimensionamiento de la cimentación.

Por cada cincuenta metros cúbicos ( $50 \text{ m}^3$ ) de hormigón, se tomarán dos (2) probetas que se curarán en cámara y se determinará su resistencia característica a siete (7) días, estimando la resistencia a los veintiocho (28) días para poder tomar las medidas necesarias en caso de que no se prevea alcanzar las resistencias de diseño.

Transcurridos siete (7) días después del hormigonado se realizarán, en aquellos casos que indique la D.O. las pruebas de integridad del pilote a través de los tubos dejados a tal efecto.

En cada pilote se habrán instalado cuatro tubos metálicos, de 100 mm. de diámetro interior, en toda la longitud de la perforación hasta 20 cm. por encima del fondo de la misma, para las comprobaciones de continuidad y bajo la punta del pilote. Se sujetarán con puntos de soldadura y estarán dispuestos según los vértices de un cuadrado inscrito en la armadura. Estarán obturados en su parte inferior.

Una vez fraguado el hormigón, se efectuarán en aquellos pilotes que designe el proyecto o la D.O. a través de algunos tubos mencionados, perforaciones verticales en el substrato, bajo el extremo inferior del pilote, con una longitud mínima tal que cada perforación alcance los cinco (5) metros por debajo del pilote. Si entre 4 y 5 metros, las referidas perforaciones detectaran intercalaciones blandas en el substrato, se prolongarán de modo que, el espesor de tierra firme atravesado bajo la última intercalación blanda no sea inferior a un (1) metro.

Al objeto de eliminar parcialmente el material blando intercalado entre estratos de consistencia firme, y sustituirlo por la inyección de mortero que ha de formar el puente resistente, o de rellenar una zona carstificada se seleccionarán dos perforaciones diagonalmente opuestas. Sucesiva o simultáneamente se inyectará agua a presión (quedando, específicamente prohibida la inyección de aire) a través de dichas perforaciones, obturando a nivel del hormigón del pilote, hasta alcanzar un máximo de 5 atmósferas de presión de agua a nivel de extremo inferior de pilote y 3 atmósferas a nivel de rasante, salvo que antes de alcanzar dicha presión ascendiera el agua por los otros dos taladros. La circulación en este caso, deberá mantenerse hasta que el agua salga prácticamente limpia.

Esta operación deberá repetirse de igual forma en las otras dos perforaciones diagonalmente opuestas.

A continuación se comenzará la inyección de mortero por uno de los tubos (previamente obturados con tubos pasantes dotados de llave de paso). Si se produjera ascensión de mortero por alguno de los restantes taladros se cerrará la llave de los correspondientes al mismo, continuándose la inyección. Deberá alcanzarse una presión de 2 atmósferas en boca superior del tubo de inyección (nivel de rasante) y mantener dicha presión durante un tiempo mínimo de 15 minutos.

Seguidamente, y previo cierre de la llave de paso del tubo inyectado, se desplazará la inyección a un tubo en que no se hubiera producido comunicación de lechada.

El proceso se repetirá sucesivamente (cambiando la inyección, si ello fuera posible, a tubos diagonalmente opuestos) hasta asegurar que el tratamiento a presión de los cuatro taladros de pié de pilote hubiera sido completado.

Se empleará mortero 1,5-2:1 (arena: cemento), con una relación agua/cemento de 0,35 y adicionándole 4,5 gr. de expansivo por kilogramo de cemento.

#### Ensayo sónico en pilotes

El control de la continuidad y compacidad de los pilotes se efectuará, a juicio de la D.O., mediante el procedimiento de "transparencia sónica" (diagrafia) que consiste en obtener perfiles transversales sónicos (entre parejas de tubos) del estado y continuidad del hormigón. Para ello se utilizarán 4 tubos embebidos en el hormigón, diametralmente opuestos, que se hacen solidarios a la armadura según se va bajando ésta en la perforación.

Se obtienen seis perfiles 1-2, 1-3, 1-4, 2-3, 2-4, 3-4 (ver planos), que permiten observar el estado del pilote hormigonado, asegurando su continuidad y detectando posibles defectos, para poder tratarlos en su caso (huecos, cavidades, zonas lavadas, etc.).

Respecto a los cuatro tubos que deben instalarse, su diámetro se adoptará al del instrumento a utilizar para la diagrafia previendo que se puedan utilizar los taladros la consolidación en punta del terreno, mediante la inyección de lechada de cemento en la jaula de grava.

La interpretación de los ensayos será competencia de la D.O. que en los pilotes diagradiados, si le ofrecieran dudas sobre la calidad portante de los pilotes, podrá ordenar las medidas de reparación de los pilotes defectuosos, pudiendo llegar incluso, al rechazo del pilote ejecutado.

#### Pruebas de carga

A efectos de ser ensayado independiente, se ejecutarán pilotes de prueba, si así lo decidiera la D.O. hasta la carga de servicio, o bien hasta su rotura o asentamiento.

En este caso, dicho pilote no podrá ejecutarse en la misma zona de cimentación, pero sí en sus proximidades, debiendo estar en iguales condiciones en lo que se refiere a características del suelo y de profundidad que los pilotes definitivos.

En todo caso, al efectuar los ensayos de carga sobre los pilotes de prueba y sobre los de trabajo, se seguirán las instrucciones de la Dirección de Obra, quién podrá variar el número y la forma de realizarlos.

Durante el tiempo que duren las pruebas de carga no podrá haber ninguna clase de trepidaciones, ni las producidas por tráfico, maquinaria o trabajos de hinca. No se realizará más de una prueba a la vez.

En la prueba habrá de tenerse muy en cuenta el que la sobrecarga coincida con el eje del pilote y que durante el asentamiento no oscile dicha carga para evitar que bascule.

Al tratarse de una prueba de carga con destino a comprobar hipótesis de proyecto, el programa de ensayo ha de adaptarse a las variaciones de carga previstas en servicio de la obra, tales como la reproducción de distintos ciclos de carga-descarga.

El sistema utilizado para conseguir la reacción necesaria, para la prueba de carga, debe ser tal que no influya en el pilote de prueba alterando su resultado.

Para la realización de pruebas de carga y el estudio de los resultados se podrá seguir la Norma DIN 1054.

En el caso de que las pruebas de carga sobre pilotes de trabajo produjesen asientos excesivos o cuando la ejecución de un pilote de trabajo fuese defectuosa por negligencia del Contratista, la Dirección de Obra podrá ordenar la ejecución de pruebas de carga suplementarias sobre pilotes, debiendo limitarse estas pruebas suplementarias a aplicar sobre el pilote una carga máxima del ciento treinta por ciento (130%) de la de trabajo. El coste de estas pruebas suplementarias, realizadas sobre pilotes de trabajo no será abonado al Contratista.



## HORMIGONADO DE ESTRUCTURAS Y OBRAS DE FÁBRICA

### DEFINICIÓN Y CONDICIONES GENERALES

#### Definición:

Ejecución del hormigonado en estructuras de hormigón en masa, armado o pretensado, comprendiendo las operaciones de vertido de hormigón para rellenar cualquier estructura, cimiento, muro, losa, etc., en la cual el hormigón quede contenido por el terreno y/o por encofrados.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Suministro del hormigón
- Comprobación de la plasticidad del hormigón
- Preparación de los juntas de hormigonado con los materiales que se hayan de utilizar.
- Vertido y compactación del hormigón.
- Curado del hormigón

Se entiende por hormigón la mezcla de cemento, agua, árido grueso, árido fino y, eventualmente, productos de adición, que al fraguar y endurecer adquiere la resistencia deseada.

#### Condiciones generales:

##### **Materiales**

- **Cemento**

En vigas y elementos pretensados se usará cemento tipo CEM I o CEM II/A-D de la clase 42,5 o 42,5R. En zapatas, pilotes, cimientos y, en general, elementos enterrados se utilizará cemento puzolánico CEM II/A-P con características sulforresistentes, SR. Los restantes hormigones se realizarán con cemento CEM I 32,5 o 32,5R.

- **Agua**

Si el hormigonado se realizara en ambiente frío, con riesgo de heladas, podrá utilizarse para el amasado, sin necesidad de adoptar precaución especial alguna, agua calentada hasta una temperatura de cuarenta grados centígrados (40° C).

- **Aditivos**

Podrá autorizarse el empleo de todo tipo de aditivos siempre que se justifique, al Director de la Obra, que la sustancia agregada en las proporciones previstas produce el efecto deseado sin perturbar excesivamente las demás características del hormigón, ni representar peligro para su durabilidad ni para la corrosión de armaduras.

En los hormigones armados o pretensados no podrán utilizarse, como aditivos, el cloruro cálcico, cualquier otro tipo de cloruro ni, en general, acelerantes en cuya composición intervengan dichos cloruros u otros compuestos químicos que puedan ocasionar o favorecer la corrosión de las armaduras.

#### ***Tipos de hormigón***

De acuerdo con su resistencia característica y empleo se establecen los siguientes tipos de hormigones, de acuerdo con las definiciones de la EHE:

- |                  |                                                                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • HM-15          | Rellenos. Regularización y limpieza de cimientos. Capas de nivelación.                                                                                                                                                                                    |
| • HM-20          | Cimientos de pequeñas obras de fábrica, protección de tubos de hormigón y de taludes de estructuras, cunetas revestidas, canalizaciones para cables, arquetas, pozos, rasanteo de tableros, hitos y cimentación de señales, valla de cerramiento, aceras. |
| • HA-25/B/20/IIa | Cimentaciones, soleras, pantallas y encepados.<br><br>Marcos, pórticos, estribos, embocaduras, aletas y muros.                                                                                                                                            |

- HA-30/B/20IIa Losas de compresión y aceras de estructuras. Impostas y defensas rígidas.  
Alzados de pilas, cabeceros y riostras. Tableros armados.
- HP-50/B/20IIa Tableros "in situ" para pretensar.

### **Dosificación del Hormigón**

La dosificación de los diferentes materiales destinados a la fabricación del hormigón se hará siempre por peso.

Para establecer las dosificaciones se deberá recurrir a ensayos previos de laboratorio, con objeto de conseguir que el hormigón resultante satisfaga las condiciones exigidas.

Las operaciones a realizar para la determinación de estas cuantías serán las siguientes:

a) **Áridos.** Con muestras representativas de los áridos que vayan a ser empleados en el hormigón se harán las siguientes operaciones:

1. Se determinará la curva granulométrica de las diferentes fracciones de áridos finos y gruesos.
2. Se mezclarán diversas proporciones de los distintos tipos de áridos que entran en cada tipo de hormigón, para obtener, por tanteos, las preparaciones de cada uno de ellos que den la máxima compacidad a la mezcla.
3. Con el fin de facilitar los tanteos se puede empezar con las proporciones, cuya curva granulométrica resultante se ajuste mejor a la curva de Fuller.
4. Con los resultados obtenidos se fijarán las proporciones de los distintos tipos de áridos que deben entrar a formar parte de cada hormigón y se tomará la curva granulométrica empleada como curva "inicial".

b) **Agua cemento**

Su proporción exacta se determinará mediante la ejecución de diversas masas de hormigón de prueba, a fin de elegir aquella que proporcione a éste la máxima resistencia especificada sin perjudicar su facilidad de puesta en obra. Se fabricarán con dichas amasadas probetas de hormigón de las que se estudiarán las curvas de endurecimiento en función de la variación de sus componentes. Es aconsejable, dentro

de los criterios señalados, reducir lo mas posible la cantidad de agua, lo cual puede obligar al uso de plastificantes para facilitar la puesta en obra del hormigón. Estos se introducirán en las masas de prueba para asegurar que no alteran las demás condiciones del hormigón. Se prohíbe la utilización de aditivos que contengan cloruro cálcico y en general aquellos en cuya composición intervengan cloruros, sulfuros, sulfitos u otros productos químicos que pueden ocasionar o favorecer la corrosión de las armaduras.

Antes del comienzo del hormigonado definitivo se deberán realizar ensayos característicos que reproduzcan lo mas fielmente posible las condiciones de puesta en obra: empleo de aditivos, amasado, condiciones de transporte y vertido. Estos ensayos se podrán eliminar en el caso de emplear hormigón procedente de central o de que se posea experiencia con los mismos materiales y medios de ejecución.

Como resultado de los ensayos previos y característicos se elaborará un dossier que defina perfectamente las características fundamentales de cada hormigón. En particular, se deberán recoger los siguientes datos:

- Designación y ubicación de la planta.
- Procedencia y tipo de cemento.
- Procedencia y tipo de los áridos.
- Tamaño máximo de áridos.
- Huso granulométrico de cada fracción de áridos y de la dosificación conjunta.
- Tipo y cantidad de los aditivos. En particular, caso de usarse fluidificante o superfluidificante, o cualquier otro producto similar, se definirán las cantidades a añadir en central y en obra, con su rango de tolerancias.
- Relación agua/cemento.
- Tiempo máximo de uso del hormigón fresco.

La central deberá disponer de control de humedad de los áridos, de forma que se compense para mantener la relación agua/cemento de la dosificación establecida.

## CONDICIONES DEL PROCESO DE EJECUCIÓN

### Hormigonado

El contratista ha de presentar al inicio de los trabajos un plan de hormigonado para cada estructura, que ha de ser aprobado por la D.O.

El plan de hormigonado consiste en la explicitación de la forma, medios y proceso que el contratista ha de seguir para la buena colocación del hormigón.

En el plan ha de constar:

- Descomposición de la obra en unidades de hormigonado, indicando el volumen de hormigón a utilizar en cada unidad.
- Forma de tratamiento de las juntas de hormigonado.
- Para cada unidad ha de constar:
- Sistema de hormigonado (mediante bomba, con grúa y cubilote, canaleta, vertido directo,...).
- Características de los medios mecánicos.
- Personal.
- Vibradores (características y nombre de éstos, indicando los de recambio por posible avería).
- Secuencia de relleno de los moldes.
- Medios por evitar defectos de hormigonado por efecto del movimiento de las personas (pasarelas, andamios, tablonos u otros).
- Medidas que garanticen la seguridad de los operarios y personal de control.
- Sistema de curado del hormigón.

No se ha de hormigonar sin la conformidad de la D.O., una vez haya revisado la posición de las armaduras y demás elementos ya colocados, el encofrado, la limpieza de fondos y costeros, y haya aprobado la dosificación, método de transporte y puesta en obra del hormigón.

La compactación se ha de hacer por vibrado.

El vibrado ha de hacerse más intenso en las zonas de alta densidad de armaduras, en las esquinas y en los paramentos.

### Curado

Durante el fraguado y hasta conseguir el 70% de la resistencia prevista, se han de mantener húmedas las superficies del hormigón. Este proceso ha de ser como mínimo de:

- 7 días en tiempo húmedo y condiciones normales
- 15 días en tiempo caluroso y seco, o cuando la superficie del elemento esté en contacto con aguas o filtraciones agresivas

El curado con agua no se ha de ejecutar con riegos esporádicos del hormigón, sino que se ha de garantizar la constante humedad del elemento con recintos que mantengan una lámina de agua, materiales tipo arpillera o geotextil permanentemente empapados con agua, sistema de riego continuo o cubrición completa mediante plásticos.

En el caso de que se utilicen productos filmógenos, autorizados por la D.O., se han de cumplir las especificaciones de su pliego de condiciones.

Durante el fraguado se han de evitar sobrecargas y vibraciones que puedan provocar la fisuración del elemento.

### Control de calidad

El control de la calidad de los hormigones se llevará a cabo de acuerdo con los criterios que establece la Instrucción EHE, en su artículo nº 82.

En cuanto al control de la ejecución, en los planos se indica el nivel de control que debe aplicarse a cada elemento de obra.

En cuanto a la toma de muestras y fabricación de probetas de hormigón fresco queda prohibido el uso de morteros de azufre para refrentado de las probetas.

Cuando la resistencia característica estimada sea inferior a la resistencia característica prescrita, se procederá conforme se prescribe en el Artículo 88.5 de la Instrucción EHE.

En caso de resultados desfavorables en los ensayos de información complementaria, podrá el Director de las Obras ordenar pruebas de carga, por cuenta del Contratista, antes de decidir la demolición o aceptación.

Si decidiera la aceptación, quedará a juicio del Director de las Obras una penalización consistente en la reducción del precio de abono en porcentaje doble de la disminución de resistencia del hormigón.

Cualquier reparación necesaria del elemento será realizada sin percibir el Contratista ningún abono por ello.

## **ENCOFRADOS EN ESTRUCTURAS Y OBRAS DE FÁBRICA**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Elementos destinados al moldeo de los hormigones en las estructuras y obras de fábrica.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Montaje del encofrado, con preparación de superficie de apoyo, si es preciso
- Preparado de las superficies interiores del encofrado con desencofrante
- Tapado de juntas entre piezas
- Apuntalamiento del encofrado
- Desmontaje y retirada del encofrado y todo el material auxiliar, un vez la pieza estructural esté en disposición de soportar los esfuerzos previstos

#### **Condiciones generales:**

Los elementos que forman el encofrado y sus uniones han de ser suficientemente rígidos y resistentes para soportar, sin deformaciones superiores a las admisibles, las acciones estáticas y dinámicas que comporta su hormigonado. Adoptarán las formas, planas o curvas, de los elementos a hormigonar, de acuerdo con lo indicado en los Planos.

Cuando el acabado superficial es para dejar el hormigón visto:

- Las superficies del encofrado en contacto con las caras que han de quedar vistas, han de ser lisas, sin rebabas ni irregularidades.
- Se debe conseguir, mediante la colocación de angulares en las aristas exteriores del encofrado o cualquier otro procedimiento eficaz, que las aristas vivas del hormigón resulten bien acabadas.

En general, las superficies interiores habrán de ser suficientemente uniformes y lisas para conseguir que los paramentos de hormigón no presenten defectos, abombamientos, resaltes o rebabas de más de 5 milímetros. No se aceptarán en los aplomos y alineaciones errores mayores de un centímetro (1 cm).

Los encofrados de madera estarán formados por tablas, bien montadas "in situ" o bien formando paneles, si éstos dan una calidad análoga a la tarima hecha "in situ". Deberán ser desecadas al aire, sin presentar signos de putrefacción, carcoma o ataque de hongos.

Antes de proceder al vertido del hormigón se regarán suficientemente para evitar la absorción de agua contenida en el hormigón, y se limpiarán, especialmente los fondos, dejándose aberturas provisionales para facilitar esta labor.

En los encofrados metálicos se deberá cuidar que estén suficientemente arriostrados para impedir movimientos relativos entre distintos paneles de un elemento, que puedan ocasionar variaciones en los recubrimientos de las armaduras o desajustes en los espesores de paredes de las piezas a construir con los mismos.

Los enlaces entre los distintos elementos o paños de los moldes serán sólidos y sencillos, de modo que su montaje y desmontaje se realice con facilidad, sin requerir golpes ni tirones. Los moldes ya usados que hayan de servir para unidades repetidas serán cuidadosamente rectificadas y limpiados antes de cada empleo.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

Los encofrados, con sus ensambles, soportes o cimbras, tendrán la rigidez y resistencias necesarias para soportar el hormigonado sin movimientos de conjunto superiores a la milésima de la luz.

Los apoyos estarán dispuestos de modo que en ningún momento se produzcan sobre la parte de obra ya ejecutada esfuerzos superiores al tercio de su resistencia.

El Ingeniero Director podrá exigir del Constructor los croquis y cálculos de los encofrados y cimbras que aseguren el cumplimiento de estas condiciones.

El sistema de encofrado para pilas de viaductos y pasos superiores deberá ser previamente aprobado por la D.O.

Tanto las superficies de los encofrados, como los productos que a ellas se puedan aplicar, no deberán contener sustancias perjudiciales para el hormigón.

En el caso de hormigón pretensado, se pondrá especial cuidado en la rigidez de los encofrados junto a las zonas de anclaje, para que los ejes de los tendones sean exactamente normales a los anclajes.

Los encofrados de fondo de los elementos rectos o planos de más de seis metros (6 m) de luz libre, se dispondrán con la contraflecha necesaria para que, una vez desencofrado y cargado el elemento, éste conserve una ligera concavidad en el intradós.

Las juntas del encofrado no dejarán rendijas de más de dos milímetros (2 mm) para evitar la pérdida de lechada; pero deberán dejar el hueco necesario para evitar que por efecto de la humedad durante el hormigonado o durante el curado se compriman y deformen los tableros.

En el caso de las juntas verticales de construcción el cierre frontal de la misma se hará mediante un encofrado provisto de todos los taladros necesarios para el paso de las armaduras activas y pasivas.

El desencofrado deberá realizarse tan pronto como sea posible, sin peligro para el hormigón, y siempre informando al Director de las Obras.

Los productos utilizados para facilitar el desencofrado deberán estar aprobados por el Director de las Obras, sin que ello exima al Contratista de su responsabilidad.

Los dispositivos empleados para el anclaje del encofrado habrán de ser retirados inmediatamente después de efectuado el desencofrado.

Los alambres y anclajes del encofrado que no puedan quitarse fácilmente (será permitido únicamente en casos excepcionales y con la autorización del Director de las Obras) habrán de cortarse a golpe de cincel. No está permitido el empleo de soplete para cortar los salientes de los anclajes. Los agujeros de anclaje habrán de cincelarse limpiamente, o prever conos de material plástico o blando, que una vez efectuado el desencofrado, puedan quitarse fácilmente. Dichos agujeros se rellenarán con hormigón del mismo color que el empleado en la obra de fábrica. Es imprescindible, en todo caso, disponer los anclajes en líneas y equidistantes. Allí donde sea posible se emplearán apuntalamientos exteriores.

## **CIMBRAS PARA ENCOFRADOS DE LOSAS Y TABLEROS EN PUENTES**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Se define como cimbra la estructura provisional que tiene por objeto sustentar el peso propio de los encofrados y del hormigón fresco y las sobrecargas de construcción, ajustándose a la forma principal de la estructura, hasta que el proceso de endurecimiento del hormigón se haya desarrollado de forma tal que la estructura descimbrada sea capaz de resistir por sí misma las citadas acciones. También quedan incluidas en la definición las cimbras que actúen directamente de encofrados.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Proyecto de la cimbra y cálculos de su capacidad portante
- Preparación y ejecución del cimientado de la cimbra
- Montaje de apuntalamientos y cimbras
- Pintado de las superficies interiores del encofrado, con un producto desencofrante, cuando la cimbra actúe de encofrado
- Tapado de las juntas entre piezas, en su caso
- Nivelación de la cimbra
- Pruebas de carga de apuntalamientos y cimbras, cuando proceda
- Descimbrado y retirada de todos los elementos de la cimbra y de los elementos de cimientado que puedan perjudicar al resto de la obra

### Condiciones generales:

El proyecto de la cimbra ha de especificar la naturaleza, características, dimensiones y capacidad resistente de cada uno de sus elementos y del conjunto.

La D.O. ha de aprobar el proyecto de la cimbra.

Los elementos que forman la cimbra han de ser suficientemente rígidos y resistentes para soportar, sin deformaciones superiores a las admisibles, las acciones estáticas y dinámicas que comporta el hormigonado.

En las obras de hormigón pretensado, la disposición de la cimbra ha de permitir las deformaciones que se derivan del tesado de las armaduras activas y ha de resistir la subsiguiente redistribución del peso propio del elemento hormigonado.

Cuando la estructura de la cimbra sea metálica, sus diferentes elementos han de estar sujetos con tornillos o bien soldados.

Las presiones transmitidas al terreno no han de producir asentamientos perjudiciales para el sistema de hormigonado previsto.

Los arriostrados han de tener la menor rigidez posible, compatible con la estabilidad de la cimbra, y se han de retirar los que se puedan antes del tesado de las armaduras, si la estructura se ha de pretensar.

La cimbra ha de tener una carrera suficiente para poder realizar las operaciones del descimbrado.

Tolerancias de deformaciones para el hormigonado:

- Movimientos locales de la cimbra .....  $\leq 5 \text{ mm}$
- Movimientos del conjunto ( $L=\text{luz}$ ) .....  $\leq L/1000$

### CONDICIONES DEL PROCESO DE EJECUCIÓN

Si la estructura puede ser afectada por una corriente fluvial, se han de tomar las precauciones necesarias contra las avenidas.

El montaje de la cimbra se ha de efectuar por personal especializado. Una vez montada la cimbra, se ha de comprobar que los puntos de apoyo del encofrado de la cara inferior de la estructura se ajustan en cota a los cálculos con las tolerancias establecidas.

La D.O. puede ordenar, si lo considera necesario, una prueba de carga de la cimbra hasta un 20% superior al peso que habrá de soportar.

Las pruebas de sobrecarga de la cimbra se han de efectuar de manera uniforme y pausada. Se ha de observar el comportamiento general de la cimbra siguiendo sus deformaciones.

El descimbrado se hará de forma suave y uniforme sin producir golpes ni sacudidas.

No se ha de descimbrar sin la autorización de la D.O.

En los elementos que se hayan de hormigonar a contraflecha, se ha de tener en cuenta ésta en la ejecución de la cimbra.

El desmontaje se ha de efectuar de conformidad con el programa previsto en el Proyecto

Si no lo contraindica el sistema estático de la estructura, el descenso de la cimbra se ha de empezar para el centro del tramo y continuar hacia a los extremos.

El orden, el recorrido del descenso de los apoyos en cada fase del descimbrado, la forma de ejecución y los medios a utilizar en cada caso, se han de ajustar a lo indicado por la D.O.

No se ha de descimbrar hasta que el hormigón haya adquirido la resistencia adecuada. Para conocer el momento de desenganchado de la cimbra se han de realizar los ensayos informativos correspondientes sobre probetas de hormigón.

Cuando los elementos sean de cierta importancia, al descimbrar la cimbra es recomendable utilizar cuñas, cajas de arena, gatos u otros dispositivos similares.

Si la estructura es de cierta importancia y cuando la D.O. lo estime conveniente las cimbras se han de mantener despegadas dos o tres centímetros durante 12 horas, antes de retirarlas completamente.

En el caso de elementos pretensados, el proceso de desmontaje de la cimbra ha de tener en cuenta el tesado del elemento, evitando que la estructura queda sometida, aunque sólo sea temporalmente, a tensiones perjudiciales no previstas.



## ARMADURAS PASIVAS

### DEFINICIÓN Y CONDICIONES GENERALES

#### Definición:

Se definen como armaduras pasivas las utilizadas para armar el hormigón, formadas por barras de acero corrugadas y/o mallas electrosoldadas, cumpliendo lo especificado en el Pliego PG-3 y la Instrucción EHE.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Despiece de las armaduras
- Cortado y doblado de las armaduras
- Colocación de separadores
- Colocación de las armaduras
- Atado o soldado de las armaduras, en su caso

#### Condiciones generales:

Las armaduras se ajustarán a la designación y características mecánicas indicadas en los planos del Proyecto, y deben llevar grabadas las marcas de identificación definidas en la EHE.

El Contratista deberá aportar certificados del suministrador de cada partida que llegue a obra, en los que se garanticen las características del material.

Para el transporte de barras de diámetros hasta diez (10) milímetros, podrán utilizarse rollos de un diámetro mínimo interior igual a cincuenta (50) veces el diámetro de la barra.

Las barras de diámetros superiores, se suministrarán sin curvatura alguna, o bien dobladas ya en forma precisa para su colocación.

Para la puesta en obra, la forma y dimensiones de las armaduras serán las señaladas en los Planos. Cuando en éstos no aparezcan especificados los empalmes o solapes de algunas barras, su distribución se hará de forma que el número de empalmes o solapes sea mínimo,

debiendo el Contratista, en cualquier caso, realizar y entregar al Director de las obras los correspondientes esquemas de despiece.

Se almacenarán de forma que no estén expuestas a una oxidación excesiva, separados del suelo y de forma que no se manchen de grasa, ligante, aceite o cualquier otro producto que pueda perjudicar la adherencia de las barras al hormigón.

El doblado de las armaduras se realizará según lo especificado en el Artículo 600 del PG-3, así como en la EHE.

### 1. CONDICIONES DEL PROCESO DE EJECUCIÓN

El contratista ha de presentar a la D.O. para su aprobación, y con suficiente antelación, una propuesta de despiece de las armaduras de todos los elementos a hormigonar.

El despiece ha de contener la forma y medidas exactas de las armaduras definidas en el Proyecto.

Ha de indicar claramente el lugar donde se producen los empalmes y el número y longitud de éstos.

Ha de detallar y despiezar todas las armaduras auxiliares.

Todas y cada una de las figuras han de estar numeradas en la hoja de despiece, en correspondencia con el Proyecto.

En la hoja de despiece han de ser expresados los pesos totales de cada figura.

Las armaduras se colocarán limpias y exentas de toda suciedad y óxido adherente. Se dispondrán de acuerdo con las indicaciones de los Planos y se fijarán entre sí mediante las oportunas sujeciones, manteniéndose mediante piezas adecuadas la distancia al encofrado, de modo que quede impedido todo movimiento de las armaduras durante el vertido y compactación del hormigón.

El control de calidad se realizará a nivel normal. Se realizarán dos (2) ensayos de doblado-desdoblado cada veinte (20) t de acero colocado, verificándose asimismo la sección equivalente. Cada cincuenta (50) t se realizarán ensayos para determinar las características mecánicas (límite elástico y rotura).

Salvo otras instrucciones que consten en los Planos, el recubrimiento mínimo de las armaduras será el siguiente:

- Paramentos expuestos a la intemperie: 2,5 cm
- Paramentos en contacto con tierras, impermeabilizados: 3,5 cm
- Paramentos en contacto con tierras, sin impermeabilizar: 4,0 cm

Caso de tratar las superficies vistas del hormigón por abujardado o cincelado, el recubrimiento de la armadura se aumentará en un centímetro (1 cm). Este aumento se realizará en el espesor de hormigón sin variar la disposición de la armadura.

Los espaciadores entre las armaduras y los encofrados o moldes serán de hormigón suficientemente resistente con alambre de atadura empotrado en él, o bien de otro material adecuado. Las muestras de los mismos se someterán al Director de las Obras antes de su utilización, y su coste se incluye en los precios unitarios de la armadura.

En los cruces de barras y zonas críticas se prepararán con antelación, planos exactos a escala de las armaduras, detallando los distintos redondos que se entrecruzan.

Antes de comenzar las operaciones de hormigonado, el Contratista deberá obtener del Director de Obra o la persona en quien delegue la aprobación por escrito de las armaduras colocadas.

## **2. MEDICIÓN Y ABONO**

- Kg de acero en barras para armar tipo B500S, medidos de acuerdo con los despieces señalados en Planos o aprobados por la D.O. Precio: G3080001.

El precio incluye las pérdidas y los incrementos de material correspondientes a recortes, ataduras, empalmes, separadores, y todos los medios necesarios para llevar el hierro a corte de obra, así como la maquinaria necesaria.

## **BARRAS CORRUGADAS ESPECIALES TIPO GEWI PARA HORMIGÓN ARMADO**

### **Definición:**

Se trata de un acero corrugado de dureza natural con las mismas propiedades mecánicas, químicas, de soldabilidad y homologación que las establecidas para el acero para armar de hormigón armado. Art. 241 del PG-3.

La disposición de las corrugas deberá permitir el roscado de manguitos acopladores, tuercas o placas de anclaje que deben poseer unas resistencias mecánicas superiores a las de las barras que unen.

Las condiciones de almacenamiento y recepción serán idénticas a las establecidas en el art. 241 del PG-3.

## **ARMADURAS ACTIVAS PARA PRETENSADO**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Se definen como armaduras activas, las que están formadas por tendones (alambres o cordones) de acero de alta resistencia, mediante los cuales se introduce el esfuerzo de tesado, y cumplen lo especificado en el Pliego PG-3 y la Instrucción EHE.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Suministro de las armaduras
- Colocación y fijación de las vainas
- Colocación de los anclajes
- Enfilado de las armaduras
- Tesado de las armaduras
- Anclaje de las armaduras
- Inyección de la lechada de cemento dentro de las vainas



### **Condiciones generales:**

Las armaduras se ajustarán a la designación y características mecánicas indicadas en los planos del Proyecto. En cuanto a la relajación del acero a las 1.000 horas, en las condiciones especificadas por la EHE, no superará el 2% para los alambres y cordones, bajo garantía certificada por el fabricante.

El suministro y almacenamiento se podrá realizar en rollos de diámetro superior a seiscientos (600) mm.

El Contratista deberá presentar para cada partida recibida en obra, el certificado del fabricante que garantiza las características del material.

En el momento de colocarse en la obra, las armaduras han de estar limpias, sin grasa, aceite, polvo, pintura, tierra o cualquier otra materia perjudicial para su conservación y adherencia. No ha de presentar indicios de corrosión, defectos superficiales aparentes, puntos de soldadura, pliegues o doblamientos.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

No se permite dejar las vainas sobre el fondo del encofrado para levantarlas después, a medida que se hormigona la pieza, hasta situarlas en la posición requerida.

Una vez la D.O. haya comprobado la colocación y fijación de las vainas, se pueden iniciar las fases de colocación de anclajes y enfilado de armaduras.

El montaje de dispositivos de anclaje se ha de realizar siguiendo estrictamente las especificaciones propias del sistema utilizado.

Se han de adoptar las precauciones necesarias para evitar que las armaduras sufran daños al colocarlas, especialmente en cortaduras o calentamientos locales que pueden modificar sus características. En especial, se han de evitar las operaciones de soldadura en las proximidades de la zona activa de las armaduras.

Cualquier ajuste de longitud o arreglo de los extremos de la armadura se ha de hacer mecánicamente o por oxicorte y, en este último caso, la zona de acero afectada ha de quedar

fuera de la zona activa. En caso de utilizar el soplete, se ha de evitar que la llama afecte a otros tendones ya tesados.

Una vez colocados los tendones, y antes de autorizar el hormigonado, la D.O. ha de revisar tanto las armaduras como las vainas, anclajes y demás elementos ya dispuestos a su posición definitiva y constatar su concordancia con las indicadas en el Proyecto, así como su estanqueidad.

El contratista ha de presentar a la D.O. para su aprobación y con suficiente antelación, el sistema de pretensado.

El tesado no se ha de iniciar sin la autorización de la D.O., la cual ha de comprobar que el hormigón ha alcanzado la resistencia mínima para empezar la operación, según los resultados de la rotura de probetas de hormigón y lo establecido en el programa de tesado.

Antes de empezar las operaciones de tesado se ha de comprobar el calibrado de los gatos.

Se ha de comprobar el estado del equipo de tesado y se ha de realizar el tesado de acuerdo con las recomendaciones del fabricante del sistema utilizado. En particular, se ha de tener cuidado que el gato se coloque perpendicularmente y centrado respecto al anclaje.

No puede haber más personal que el que haya de tesar, en las proximidades de la zona. Por detrás de los gatos, se han de colocar protecciones resistentes y se prohibirá, durante el tesado, el paso entre estas protecciones y el gato.

Se ha de seguir el programa de tesado, de acuerdo con el proyecto, definiendo al menos: el orden de tesado; eventualmente, las sucesivas etapas parciales de pretensado; el valor de tensión en los anclajes, y los alargamientos que han de obtenerse.

El tesado se ha de efectuar por operarios cualificados.

El tesado, cuando la temperatura sea inferior a 2°C, requiere precauciones especiales, a definir por la Dirección de Obra.

Para poder tomar lectura de los alargamientos, la carga del tesado se ha de introducir por escalones. Como mínimo se han de hacer los dos siguientes: un primero, hasta conseguir un 10% de la fuerza máxima, y el segundo hasta la carga prevista.

Si los alargamientos medidos superan las tolerancias admitidas respecto a los previstos, se han de examinar las posibles causas de variación, como errores de lectura, de sección de las armaduras, de módulos de elasticidad o coeficientes de roce, rotura de algún elemento del tendón, tapones, u otros, y se ha de proceder a un retesado con nueva medición de alargamientos, previa aprobación de la D.O.

No se permite el corte de cables para proceder a la inyección, si no es con la autorización expresa de la D.O.

Antes de inyectar se ha de limpiar el conducto con aire a presión, observando si éste sale por el otro extremo de forma regular. En caso de haber algún tapón, se han de tomar las medidas oportunas para asegurar la inyección correcta.

Las conexiones de las bocas de inyección han de estar limpias de hormigón o cualquier otro material, y han de ser herméticas, para evitar posibles arrastres.

No se ha de inyectar si se prevén heladas en un plazo de 2 días, ni cuando la temperatura de la pieza sea inferior a 5°C; de no ser posible cumplir esta prescripción, se tomarán medidas como el calentamiento del elemento o de la lechada, siempre que sean aprobadas por la D.O.

Antes de iniciar la inyección se han de abrir todos los tubos de purga.

La inyección ha de hacerse desde el anclaje más bajo o desde el tubo de purga inferior del conducto.

No han de transcurrir más de 30 minutos desde el amasado hasta el inicio de la inyección, a menos que se utilicen retardadores.

La bomba ha de proporcionar una inyección continua y ininterrumpida de cada conducto, y con la uniformidad necesaria para no producir segregaciones.

A medida que la inyección vaya saliendo por los sucesivos tubos de purga más próximos al punto por donde se inyecta, se han de ir cerrando éstos, dejando que fluya previamente por ellos la lechada hasta que tenga la misma consistencia que la que se inyecta.

Cuando se inyecte en conductos largos y ondulados, donde se precise una presión elevada, se puede cerrar el extremo por el que se ha iniciado la inyección y continuarla por las sucesivos tubos de purga.

En conductos muy largos o de gran sección útil, puede ser necesaria la reinyección, después de 2 horas, para compensar la eventual reducción de volumen de la mezcla.

### **Control de calidad**

Para el control de calidad del acero, se tomarán dos probetas cada diez (10) t de armadura, verificándose la sección equivalente y realizándose ensayos de doblado-desdoblado. Cada cincuenta (50) t se realizarán ensayos de comprobación de límite elástico, carga de rotura y alargamiento bajo carga máxima.

El control de la fuerza de pretensado introducida se realizará midiendo simultáneamente el esfuerzo ejercido por el gato y el alargamiento experimentado por la armadura. Los valores se anotarán en la correspondiente tabla de tesado.

El control de los dispositivos de anclaje, de las vainas y accesorios, así como de los equipos de tesado y de los productos de inyección, se llevará a cabo de acuerdo con lo especificado en los artículos correspondientes de la EHE.

## **APOYOS DE NEOPRENO ZUNCHADO**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Se definen así los aparatos de apoyo constituidos por capas alternativas de material elastomérico y acero, capaces de absorber las deformaciones y giros impuestos por la estructura que soportan.

Sus formas y dimensiones varían según los esfuerzos que han de transmitir, tal como se define en los planos.

#### **Condiciones generales:**

#### ***Material elastomérico***

El material elastomérico estará constituido por caucho clorado completamente sintético (cloropreno, neopreno), cuyas características deberán cumplir las especificaciones siguientes:

- Dureza Shore a (ASTM D-676)..... 60 +/- 3
- Resistencia mínima a tracción ..... 170 kg/cm<sup>2</sup>
- Alargamiento en rotura..... 350 %

Las variaciones máximas admisibles de estos valores para probeta envejecida en estufa en setenta (70) horas y a cien (100 = grados centígrados con las siguientes):

- Cambio en dureza Shore a..... + 10 %
- Cambio en resistencia a tracción ..... ? 15 %
- Cambio en alargamiento ..... - 40 %
- Deformación remanente..... 35 %

El módulo de deformación transversal no será inferior a ciento diez kilogramos por centímetro cuadrado (110 kg/cm<sup>2</sup>).

#### **Zunchos de acero**

Las placas de acero empleadas en zunchos tendrán un límite elástico mínimo de dos mil cuatrocientos kilogramos centímetro cuadrado (2.400 kg/cm<sup>2</sup>) y una carga en rotura mínima de cuatro mil doscientos kilogramos por centímetro cuadrado (4.200 kg/cm<sup>2</sup>).

La carga tangencial mínima capaz de resistir la unión al material elastomérico será en servicio de ochenta kilogramos por centímetro cuadrado (80 kg/cm<sup>2</sup>), siendo la deformación tangencial correspondiente de siete décimas (0,7).

#### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

La base de nivelación para asiento del apoyo de neopreno zunchado se ejecutará al mismo tiempo que el hormigonado del dintel de la pila o estribo del puente, y tendrá unas dimensiones superiores a las del propio apoyo elastomérico entre 5 y 10 cm.

Del mismo modo deberá ejecutarse la cuña de nivelación correspondiente al elemento estructural (viga o tablero) que ha de asentarse sobre el apoyo. Cuando este elemento sea prefabricado, la cuña de nivelación se podrá adherir al mismo con resina epoxy.

No se hormigonará o colocará el elemento estructural superior, sin la aprobación por la D.O. del replanteo y cotas de las bases de nivelación. No deberá haber restos del encofrado que sirvió para hormigonar estas bases, y la superficie deberá estar perfectamente limpia.

Deberá quedar altura libre suficiente para la inspección y sustitución del apoyo, si llega el caso.

#### **APARATOS DE APOYO TIPO "POT"**

#### **DEFINICION Y CONDICIONES GENERALES**

##### **Definición:**

Los apoyos de neopreno confinado-teflón tipo "POT" son dispositivos de apoyo en estructuras, análogos a los de neopreno zunchado, pero en ellos la capacidad de desplazamiento horizontal está garantizada por la presencia de una placa de acero sobre la que se dispone una capa de teflón. Una placa de acero, dispuesta en la estructura, desliza en su contacto; con el teflón a través de una chapa de acero inoxidable. La capacidad de rotación se consigue mediante la plastificación dentro de un recinto de confinamiento de una pastilla de neopreno.

Los apoyos están caracterizados por su capacidad de carga vertical, el desplazamiento máximo admisible y el tipo de movimiento permitido.

##### **Condiciones generales:**

Podrán a tal fin emplearse apoyos de los tipos señalados en los planos o cualesquiera otros que cumplan las condiciones señaladas y no presenten contraindicaciones por dimensiones o cualquier otra característica opuesta a lo expresado en los planos contando en todo caso con el visto bueno de la Dirección de Obra.

CONDICIONES DEL PROCESO DE EJECUCIÓN

El material elastomérico y los zunchos de acero deberán cumplir las mismas condiciones establecidas en el Artículo relativo a los Apoyos de neopreno zunchado.

La chapa intermedia y la placa de deslizamiento serán de acero debidamente protegido contra la corrosión, mediante pintura o galvanización con espesores superiores a 150 micras.

La placa de deslizamiento deberá poseer una chapa de acero inoxidable perfectamente pulida de al menos 2 mm de espesor.

El teflón será puro y sin adición de productos regenerados. Deberá ser sintetizado libremente y enfriado sin presión. La lámina de teflón será del espesor necesario y dispondrá de los dispositivos precisos que permitan mantener sus propiedades de deslizamiento durante la vida útil de la obra.

El conjunto teflón acero inoxidable tendrá un coeficiente de rozamiento máximo del 3,0 % para una tensión media vertical de 100 Kp/cm<sup>2</sup>.

En los apoyos de mayor tamaño se podrá sustituir la lámina completa de teflón por una serie de bandas alojadas en cavidades talladas en la cara superior de la chapa intermedia. El área en planta de dichas cavidades y, por lo tanto, de la superficie de teflón, estará comprendida entre el diez (10) y el treinta (30) por ciento del total del área de contacto. La profundidad de las cavidades no excederá de la mitad del espesor de la lámina de teflón.

Los lubricantes y adhesivos que se empleen mantendrán sus propiedades frente a la acción de los agentes atmosféricos y biológicos y dentro del intervalo de temperaturas a que pueda estar sometida la estructura.

Los apoyos llegarán a la obra en dos piezas. Por una parte, la cazoleta de confinamiento (POT) con su pastilla de neopreno y la placa intermedia con el pistón. Por otra parte, la placa superior de deslizamiento. Ambos elementos llevan anclajes que quedarán embebidos en el hormigón de pilas o estribos en el primer caso y de tablero, en el segundo. La pieza inferior se colocará en obra antes del hormigonado de los anclajes perfectamente nivelada. Antes del hormigonado del tablero, se colocará la placa superior en la posición relativa indicada en los planos respecto a la placa inferior. El diseño de los anclajes, tanto superiores como inferiores, debe permitir la sustitución de los apoyos en caso necesario.

Control de calidad

El aparato de apoyo y la chapa de acero inoxidable de deslizamiento tendrán las dimensiones que se indican en Planos.

El fabricante deberá presentar certificado de haber efectuado en un Laboratorio Oficial un ensayo de resistencia de un apoyo completo de tipología similar a los que se utilizarán en obra. En dicho ensayo se habrá sometido al apoyo a la actuación del efecto de un mínimo de 2 millones de ciclos alternativos de carga. Las cargas de ensayo oscilarán entre 0,5 y 1,5 veces la carga nominal del apoyo, indicada por el fabricante.

El apoyo a la terminación del ensayo no deberá presentar ningún desprendimiento entre la chapa de acero y el caucho, ni agrietamiento de éste. Dada la tipología de este ensayo no se fija limitación en la fecha de ejecución, siendo suficiente el haberlo efectuado con resultados satisfactorios una vez.

Las dimensiones del diámetro de la caja, para los distintos tipos de apoyo son las siguientes:

|                |       |          |
|----------------|-------|----------|
| • POT. PL-800  | ..... | 654 mm.  |
| • POT. PU-800  | ..... | 697 mm.  |
| • POT. PL-1000 | ..... | 732 mm.  |
| • POT. PU-1000 | ..... | 782 mm.  |
| • POT. PL-1500 | ..... | 900 mm.  |
| • POT. PU-1500 | ..... | 963 mm.  |
| • POT. PL-1600 | ..... | 930 mm.  |
| • POT. PU-1600 | ..... | 996 mm.  |
| • POT. PL-2000 | ..... | 1039 mm. |
| • POT. PU-2000 | ..... | 1114 mm. |
| • POT. PL-2400 | ..... | 1139 mm. |
| • POT. PU-2400 | ..... | 1222 mm. |

Estas medidas son aproximadas, ya que pueden variar mínimamente, en función del suministrador.

La altura aproximada, se define en planos.

## **IMPOSTAS PREFABRICADAS DE HORMIGÓN**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Se refiere esta unidad a las piezas prefabricadas de hormigón que se colocan en el extremo lateral de los tableros de puentes y estructuras, y a las cuales se unen los montantes de las barandillas.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Replanteo previo
- Colocación de los anclajes antes del hormigonado del tablero
- Colocación de las piezas sobre el tablero y realización de los anclajes definitivos y su protección
- Rejuntado de piezas si es necesario
- Retirada de elementos auxiliares, apuntalamientos

#### **Condiciones generales:**

Las impostas se realizarán con hormigón HA-30/B/20/IIa, según la forma y dimensiones reflejadas en Planos, y las armaduras serán de acero B-500S.

Las piezas tendrán los taladros definidos en los Planos para su propio anclaje al tablero así como las placas de anclajes de los postes de la barandilla.

## CONDICIONES DEL PROCESO DE EJECUCIÓN

Se comprobará sobre la imposta colocada y antes de la realización de los anclajes definitivos que las aristas y elementos rectos no presentan curvaturas ni flechas superiores a un (1,0) cm medido con regla de cuatro (4,0) m. Las superficies no presentarán coqueras ni rebabas de lechada, debiendo tener el mismo tono que los elementos de la estructura hormigonados "in situ". Se rechazarán aquellas piezas sobre las que se aprecien fisuras o fracturas y las que no encajen correctamente con las piezas contiguas.

Cualquier daño que pueda producirse como consecuencia de la realización de las obras posteriores en la estructura, será reparado a su costa por el Contratista.

## JUNTAS DE DILATACION EN VIADUCTOS DE FERROCARRIL

### DEFINICION Y CONDICIONES GENERALES

#### Definición

Dispositivos que enlazan los bordes de los tableros contiguos o los del tablero y un estribo, de forma que permitan los movimientos originados por cambios de temperaturas y efectos reológicos. Al mismo tiempo dichos dispositivos deben presentar una superficie continua e impedir la entrada de balasto entre los elementos estructurales contiguos.

#### Condiciones generales

Este tipo de junta se empleará exclusivamente en puentes y viaductos de ferrocarril.

La junta de dilatación metálica está compuesta de dos angulares anclados en las esquinas de la losa de hormigón y cubierta por una chapa soldada a uno de los angulares. Las dimensiones se especifican en planos. Una banda de neopreno precomprimida se dispone en el hueco creado por la junta tablero-estribo no anclada.

El acero empleado será tipo A42-b, de acuerdo con las especificaciones del PG-3 Artículo 250, protegido por una capa de pintura anticorrosiva de minio de plomo de 35 micras y una segunda capa de pintura clorocaucho del mismo espesor.

## CONDICIONES DEL PROCESO DE EJECUCIÓN.

Las partes vistas llevarán una capa de pintura anticorrosiva de minio de plomo clorocaucho de 35 micras, con una segunda capa de pintura clorocaucho de 35 micras.

Las superficies se prepararán previamente con cepillado grado St-3.

El proceso de colocación se someterá a aprobación de la D.O., no producirá desperfectos, ni modificará las condiciones exigidas al material.

## IMPERMEABILIZACIÓN Y DRENAJE CON GEOTEXTIL DE TRASDÓS DE MUROS Y DE ESTRIBOS

### DEFINICIÓN Y CONDICIONES GENERALES

#### Definición

Consiste en la extensión y fijación al trasdós de los muros y estribos de una lámina drenante que, conectada a un sistema longitudinal constituido por un tubo también drenante, evacue las posibles aguas de filtración que puedan incidir sobre las obras a proteger.

La ejecución de unidad comprende las operaciones siguientes:

- Nivelación de la solera donde se colocará el tubo drenante
- Colocación y sujeción del tubo drenante
- Impermeabilización del muro
- Colocación y fijación al muro de la lámina drenante
- Relleno y compactación trasdós del muro

#### Condiciones generales

La impermeabilización estará constituida por una capa de producto asfáltico aplicada sobre la cara de trasdós del muro, previamente tratada con una imprimación también asfáltica.

La lámina drenante estará compuesta de dos telas filtrantes que cubren al núcleo drenante intermedio. Éste está formado por monofilamentos de poliamida con un índice de huecos del



orden del noventa y cinco por ciento (95%) ( $\pm 1\%$ ). Las dos telas filtrantes son de geotextil no tejido a base de hilos de poliéster recubiertos de poliamida unidos por soldadura.

Las telas filtrantes sobresalen, por cada lado del núcleo drenante para poder solapar la unión de una pieza con la contigua, recubriendo el muro en su totalidad.

El Director de Obra podrá autorizar la utilización de láminas filtrantes en la que una de las telas (la que queda adosada al muro) sea impermeable. En este caso podrá suprimirse la impermeabilización aplicada en el paramento del muro.

El espesor de la lámina filtrante será como mínimo de quince milímetros (15 mm.) y su peso por metro cuadrado no será inferior a seiscientos gramos por metro cuadrado (600 gr/m<sup>2</sup>). El geotextil en contacto con el terreno tendrá un peso mínimo de ciento cincuenta gramos por metro (150 gr/m<sup>2</sup>). La capacidad de evacuación de agua será superior a un litro por segundo y metro (1 l/s\*m).

El Director de Obra podrá autorizar el empleo de láminas filtrantes que utilicen otros procedimientos diferentes para mantener la separación entre láminas, previa acreditación por parte del Contratista de que el producto ha sido empleado, con resultados satisfactorios en obras similares.

El sistema descrito es de aplicación a los estribos de puentes y muros de contención de terraplenes. En las pequeñas obras de fábrica cubiertas por los rellenos, se aplicará un pintado con emulsión asfáltica sobre el paramento en contacto con las tierras.

#### CONDICIONES DEL PROCESO DE EJECUCIÓN

La colocación de la lámina drenante y su fijación al muro se hará de acuerdo con las instrucciones del fabricante del producto pero siguiendo las siguientes fases:

- Nivelación de la solera donde se colocará el tubo drenante.
- Colocación y sujeción del tubo drenante en la situación indicada en los planos.
- Impermeabilización del muro.
- Colocación y fijación al muro de la lámina drenante.

Las láminas de geotextil se protegerán del paso sobre ellas de personas, equipos o materiales.

### IMPERMEABILIZACIÓN Y PROTECCIÓN DE TABLEROS EN PUENTES DE FERROCARRIL

#### DEFINICIÓN Y CONDICIONES GENERALES

##### Definición

Impermeabilización y protección de los tableros de hormigón en puentes y viaductos para ferrocarril, mediante un sistema de membranas que impida la filtración del agua a través de la superficie sobre la que apoya el balasto.

##### Condiciones generales:

La membrana de impermeabilización debe adherirse perfectamente al tablero de hormigón y, por otro lado, debe incluir una protección eficaz frente al envejecimiento por la acción de los agentes atmosféricos y frente al punzonado y desgaste que produciría el contacto directo con el balasto.

Se utilizarán membranas prefabricadas a fin de asegurar una mayor garantía de regularidad y control de ejecución.

#### CONDICIONES DEL PROCESO DE EJECUCIÓN

La superficie del tablero debe ser objeto de una limpieza previa con chorro de arena a fin de eliminar cualquier elemento suelto o mal adherido. Las irregularidades superficiales de  $\pm 5$  mm en 2 metros de longitud serán eliminadas de forma que se obtenga un soporte uniforme antes de la aplicación de un riego de imprimación con emulsión bituminosa o producto recomendado por el fabricante en la membrana.

A continuación se colocará la membrana principal de impermeabilización, de base bituminosa mejorada con elastómero y armada con un geotextil protegido exteriormente. La adherencia de esta membrana termosoldable al soporte de hormigón debe ser perfecta a través del riego de imprimación.

Sobre la membrana de impermeabilización se soldarán dos membranas de protección también armadas con geotextil de gramaje no inferior a 250, recubierto superiormente con una capa adherida de arena gruesa de grano duro.

El espesor total de cada una de las membranas referidas debe ser próximo a 4 mm.

**IMPERMEABILIZACIÓN DE TABLEROS DE PASOS SUPERIORES DE CARRETERA**

**DEFINICIÓN Y CONDICIONES GENERALES**

**Definición**

Ejecución de una capa de impermeabilización en los tableros de hormigón en los Pasos Superiores para carretera, a fin de evitar la penetración del agua infiltrada a través del pavimento.

**Condiciones generales**

Se dispondrá una impermeabilización mediante mástic bituminoso, constituida por:

- Un riego de adherencia con emulsión ECR-1 y dotación de quinientos gramos por metro cuadro (0,5 kg/m²) de betún residual.
- Mástic bituminoso de un centímetro (1,0 cm), con la composición siguiente:

|                                          |        |
|------------------------------------------|--------|
| - Emulsión asfáltica .....               | 22-30% |
| - Arena, contenido 20/25 de filler ..... | 72-80% |
| - Polvo de amianto de fibra corta .....  | 2/4%   |

**CONDICIONES DEL PROCESO DE EJECUCIÓN**

La superficie del hormigón del tablero estará limpia y perfectamente seca, sin ningún elemento suelto.

No presentará huecos ni resaltes de más de 20 mm. En caso contrario, se corregirán las

irregularidades utilizando mortero epoxy para rellenar las cavidades.

Sobre el riego de adherencia ejecutado, se aplicará el mástic bituminoso en dos capas hasta alcanzar su espesor total.

**SUMIDERO EN TABLERO DE PUENTES**

**DEFINICION Y CONDICIONES GENERALES**

Se define como sumidero la boca de desagüe, generalmente protegido por una rejilla, que sirve para vaciar el agua de lluvia de los tableros de las obras de fábrica, y que se dispone de forma que la entrada del agua sea en sentido sensiblemente vertical.

Los desagües de tableros de estructuras y los dispuestos en sus estribos tendrán la forma, dimensiones y características definidas en los Planos.

**CONDICIONES DEL PROCESO DE EJECUCIÓN**

Después de la terminación de cada unidad se procederá a su limpieza total, eliminando todas las acumulaciones de limo, residuos o materias extrañas de cualquier tipo, debiendo mantenerse libres de tales acumulaciones hasta la recepción definitiva de las obras.

**BARANDILLAS DE ACERO**

**DEFINICIÓN Y CONDICIONES GENERALES**

**Definición:**

Barandillas unidas mediante soldadura, a las placas de anclaje sobre tableros de puentes y viaductos.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Replanteo y alineación de los elementos que forman la barandilla
- Suministro de la barandilla



- Suministro de la placa de anclaje, en su caso
- Ejecución de los dados de anclaje
- Montaje y colocación de la barandilla
- Limpieza y recogida de tierras y restos de obra.
- Pintura de la barandilla

#### **Condiciones generales:**

La barandilla tipo, que se representa en los Planos, está formada por montantes de perfiles laminados y elementos horizontales tubulares.

Los elementos que forman la barandilla cumplirán los Artículos 250, 251 y 640 del PG-3. Todas las secciones fijas de la barandilla se realizarán por soldadura continua, uniforme e impecable.

#### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

A excepción de aquellas partes de los postes que queden empotradas las demás superficies de las barandillas se suministrarán provistas de dos manos de pintura antioxidante (minio o cianamida de plomo).

Una vez instalada la barandilla y antes de su fijación definitiva, se procederá a una minuciosa alineación de la misma y aprobación del replanteo por la D.O.

El hueco de los cajetines se rellenará con mortero de cemento. Alrededor de los postes y placas de sujeción, se formará una junta de masilla bituminosa de dos por tres (2 x 3) cm.

La barandilla irá pintada en el color que ordene el Director de las Obras, con doble capa de pintura de primera calidad. En las proximidades de las juntas de construcción del tablero se dispondrán también en las barandillas juntas de dilatación.

## **BARRERAS DE SEGURIDAD CON PERFILES BIONDA EN PASOS SUPERIORES Y REPOSICIÓN DE CARRETERAS Y CAMINOS**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Consiste esta unidad en el suministro de los elementos y ejecución de las operaciones necesarias para instalar estos dispositivos de seguridad en los lugares y forma que indiquen los Planos o las instrucciones de la D.O.

La ejecución de la unidad de obra comprende las siguientes operaciones:

- Replanteo y colocación de los soportes
- Colocación de todos los elementos para sujeción del perfil bionda y terminales en cola de pez.

#### **Condiciones generales:**

El tipo de acero galvanizado empleado en la fabricación de elementos metálicos será el F-622 de la Norma UNE 36082.

Los elementos metálicos deberán cumplir, asimismo, las especificaciones de los Artículos 620 y siguientes del PG-3.

El hormigón a utilizar en las cimentaciones de piezas terminales que lo requieran, postes, etc., será del tipo HM-20. Todos los elementos metálicos que constituyen la barrera de seguridad serán galvanizados en caliente, satisfaciendo las condiciones especificadas por el PG-3.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

Los soportes estarán situados cada 4 m, en caso de estar anclados a dados de hormigón o clavados al terreno, y cada 2 m si están soldados o colocados sobre obra de fábrica.

La altura del soporte por encima del terreno permitirá la colocación de la banda o bandas a la altura sobre el firme o tablero de la estructura que indica el Proyecto

Las fijaciones se realizarán con tornillos y tuercas de acero galvanizado.

La ejecución de esta unidad se hará de acuerdo con las Normas para Barreras de Seguridad, de la Dirección General de Carreteras.

## **PUESTA A TIERRA DE ELEMENTOS METÁLICOS Y ARMADURAS EN VIADUCTOS Y PUENTES PARA FERROCARRIL Y PASOS INFERIORES**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición**

La puesta a tierra de las armaduras, barandillas, postes y todos los elementos metálicos en viaductos y puentes de los ferrocarriles, tiene por objeto proteger a las personas e instalaciones de los efectos derivados de la diferencia de potencial causados por el propio sistema de tracción eléctrica en condiciones normales y en condiciones anormales (fallos, cortocircuitos, descargas atmosféricas etc.).

Esta unidad consiste en la puesta a tierra de las partes metálicas y armaduras de acero (salvo los cables de tesado) de todos los puentes y viaductos para ferrocarril, a fin de conseguir que estos elementos se encuentren unidos equipotencialmente.

Todos los elementos metálicos (incluido señales, barandillas, postes, canalizaciones de acero, etc.), deben ponerse a tierra a través del sistema global que se describe.

#### **Condiciones generales**

Los cables para las conexiones a tierra deben ser, en todos los casos, resistentes a las intensidades de cortocircuito. La colocación de los cables y conexiones de puesta a tierra se realizará según el detalle que figura en Planos.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

En todos los pilares y estribos se realizará una puesta a tierra de las armaduras. La continuidad eléctrica se obtendrá conectando la armadura del tablero con la armadura del

pilar o estribo y con la de la cimentación, y ésta con una puesta a tierra, construida previamente mediante cables de cobre. Para poder realizar la medición de la tierra, se colocará 1 pica de acero-cobre unida al extremo del cable de toma de tierra, e irá alojada en una arqueta de 0,40 x 0,4 x 0,6 m. rellena de arena y registrable. En la cabeza de la pila o estribo se habrá dejado un terminal de conexión para su unión a la armadura del tablero.

Las puestas a tierra en la cimentación, tanto de pilares como de estribos, deberán tener una resistencia de difusión  $\leq 10 \Omega$ .

La armadura del tablero estará unida (salvo los cables de tesado), tanto transversal como longitudinalmente para conseguir la continuidad eléctrica, y se conectionará a los carriles exteriores en cada pila y estribo, con cable de cobre de 50 mm<sup>2</sup> como mínimo.

Se dejarán terminales en el tablero (a ambos lados de las vías), a la altura de cada pila y estribo, para las siguientes conexiones:

- Con el carril exterior
- Con el cable de retorno (a través del poste de electrificación)
- Con la armadura de la pila o estribo.

La conexión al cable de retorno se realizará a través del poste de electrificación más próximo a la pila o estribo.

Las condiciones anteriores son aplicables asimismo al caso particular del tablero solidarizado a los apoyos laterales (caso de pórticos o marcos cerrados en los Pasos Inferiores sin cobertura de terraplén), con la particularidad de que en estas estructuras ya existe continuidad de toda la armadura hasta la cimentación de los apoyos.

En caso que la armadura del tablero no esté unida de la forma indicada anteriormente, se colocará longitudinalmente en ambos lados de las vías, un cable de cobre de 50 mm<sup>2</sup> como mínimo, que se unirá a los redondos de la armadura y a los carriles exteriores en cada pila y estribo, debiéndose conectar al sistema de puesta a tierra descrito anteriormente.

En las juntas de dilatación del tablero deberán montarse las correspondientes conexiones de puenteo de las armaduras.

Cualquier otro elemento metálico situado en viaductos o puentes, se conectará al carril, bien directamente o a través del cable de retorno o poste de electrificación.

## **ANCLAJE EN TABLERO DE PUENTES, PARA LOS POSTES DE SUJECCIÓN DE CATENARIAS**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición**

Elementos metálicos que quedan anclados al tablero de la estructura, con el fin de que en su momento se sujeten a ellos los postes de sustentación de la catenaria.

#### **Condiciones generales**

La posición exacta de la unidad de anclaje sobre el tablero de la estructura se fijará por la D.O. Dicha unidad comprende los siguientes elementos:

- Ocho pernos tipo GEWI Ø 25 galvanizados, unidos a la armadura del tablero
- Tres tuercas galvanizadas en cada perno
- Una pletina de nivelación de dimensiones 500 x 920 x 50 mm.
- Ocho protecciones de los pernos, formadas por caperuzas de PVC previamente rellenas con grasa de silicona

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

El anclaje se realizará de acuerdo a lo indicado en los Planos, y se cuidará especialmente el replanteo de los pernos de anclaje. Estos quedarán embebidos en el tablero, sobresaliendo 35 cm por debajo del nivel del plano medio de rodadura a la espera de la colocación de la placa de anclaje. La nivelación de la pletina se realizará con la precisión necesaria para que no se necesite utilizar mortero de nivelación en la colocación del poste posteriormente. Cada perno quedará protegido por un tubo de PVC relleno de grasa de silicona.

## **VALLA METÁLICA ANTIVANDALISMO EN PASOS SUPERIORES**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición:**

Enrejado de 2,5 m. de altura, con malla y postes de tubo, o malla, bastidor y postes, colocados con soldadura sobre la placa de anclaje de la barandilla, en los lugares y forma que indiquen los planos o las instrucciones de la D.O.

La unidad de obra comprende las operaciones siguientes:

- Replanteo y alineación de los elementos que forman la valla.
- Suministro de la valla.
- Colocación de los elementos que forman el enrejado.

#### **Condiciones generales:**

Los elementos de la valla serán de acero galvanizado y cumplirán las especificaciones del Artículo 620 y siguientes del PG-3.

La reja quedará bien fijada al soporte. Estará aplomada y con los ángulos y niveles previstos.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN**

La D.O. aprobará el replanteo antes de la fijación de la valla.

Durante todo el proceso constructivo, se garantizará la protección de la valla contra los empujes e impactos mediante los anclajes oportunos y se mantendrá el aplomado con ayuda de elementos auxiliares.

## **PRUEBAS DE CARGA EN PASOS SUPERIORES DE CARRETERA**

### **DEFINICIÓN Y CONDICIONES GENERALES**

#### **Definición**

Se define como prueba de carga en puentes de carretera, al conjunto de operaciones de control, cuya realización es preceptiva antes de su apertura al tráfico, a fin de comprobar la adecuada concepción, la estabilidad y el buen comportamiento de la obra.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Inspección previa de todos los elementos de la estructura.
- Marcado de posiciones de los camiones.
- Colocación y nivelación de flexímetros y demás aparatos de medida.
- Ejecución de las fases de carga y medición de flechas.
- Informe de resultados.

#### **Condiciones generales**

El Contratista deberá presentar a la D.O. el proyecto correspondiente para la realización de la prueba de carga mediante camiones siguiendo lo especificado en el PROYECTO.

Se tendrán en cuenta las directrices generales incluidas en las "Recomendaciones para el Proyecto y Ejecución de Pruebas de Carga en Puentes de Carretera", Ministerio de Fomento, 1999.

Los camiones a utilizar en la prueba de carga cumplirán los requisitos establecidos en las citadas Recomendaciones, de forma que las solicitaciones teóricas elegidas sean prácticamente idénticas a las producidas por los vehículos previstos.

Los equipos de medida cumplirán lo especificado en dicha Recomendación, y serán manipulados por personal adecuadamente formado, de manera que los datos y resultados respondan fehacientemente a la respuesta de la estructura en las diferentes fases de carga. A estos efectos, son condiciones obligadas: su calibración previa, una sensibilidad mínima superior al 5% de los valores más pequeños esperados y un rango de medida como mínimo superior en un 50% a los valores máximos esperados. Deberán utilizarse equipos de registro automático con posibilidad de visualización en tiempo real.

Se utilizarán, al menos, los siguientes aparatos de medida:

Flexímetros, para medida de deformaciones verticales: serán adecuados en cada puente a las posibilidades de observación existente, pero en ningún caso tendrán menos de 5 cm. de recorrido y 0,01 mm. de precisión.

Si las condiciones físicas del puente, no permiten utilizar flexímetros se usarán picas o elementos topográficos que garanticen una sensibilidad de lectura adecuada.

Lupas graduadas para observar y medir la formación de fisuras: permitirán observar décimas de milímetro

### **CONDICIONES DEL PROCESO DE EJECUCIÓN.**

#### **Cargas de los ensayos.**

En ningún caso las acciones del tren de cargas a utilizar y las solicitaciones a que aquéllas den lugar, podrán ser más desfavorables que las del tren de cargas de la "Instrucción de Acciones", estimándose como suficiente si tales esfuerzos oscilan entre el 60 y el 70% de los máximos producidos por el citado tren de la Instrucción.

El tren de cargas estará compuesto por un conjunto de camiones con el peso total, por unidad, adoptado en el cálculo de la prueba, pesados los ejes de cada camión por separado, y colocados en sucesivas filas.

Una vez colocados los camiones como se indica en el apartado "Pruebas de carga" del Anejo de Estructuras y en el punto 2 siguiente, se harán las mediciones correspondientes.

En el momento de iniciarse las pruebas, el hormigón de cualquier elemento resistente de la obra deberá haber alcanzado su resistencia característica.

Se comprobará, asimismo, que los elementos auxiliares de acceso a las zonas de control y trabajo estén correctamente adaptados con el fin de no retrasar o entorpecer el proceso de ensayo.

Se controlarán especialmente las condiciones generales del ambiente, especialmente los cambios climatológicos y de las situaciones de soleamiento, previo y durante el proceso de ensayo, determinando claramente los aspectos específicos de estos cambios.

#### **Mediciones mínimas a realizar**

- Para cada estado de cargas se medirán, al menos, los siguientes datos de las secciones indicadas:
  - Sección central: Flecha en sus bordes y punto medio.
  - Secciones de apoyos: Deformaciones verticales.
- En cada una de las secciones antes definidas, se harán las mediciones indicadas en cada uno de los siguientes estados:
  - Descargado el tablero
  - Cargada la mitad del tablero longitudinalmente
  - Cargado todo el tablero
  - Después de retirar la mitad de la carga total
- Los camiones se colocarán en la posición de carga en cada caso, manteniéndolos en ella 10 minutos, descargando después el tablero y dejando otros 10 minutos antes de empezar un escalón de carga.
- Las flechas se medirán:
  - Antes de empezar la prueba de carga.
  - A los 10 minutos de colocados los camiones de cada escalón de carga.
  - 10 minutos después de retirados los camiones en cada escalón de carga.

#### **Preparación de la prueba de carga**

- **Cálculo.**

El proyecto de la prueba de carga definirá, con los tipos de camiones y cargas elegidos, un croquis en planta de la situación exacta de cada camión y eje en el tablero.

Este croquis servirá para reflejar en el tablero mediante señales adecuadas para la correcta situación de cada camión.

Una vez definido el croquis de cargas y situaciones, se calcularán los esfuerzos y las flechas correspondientes en cada punto y sección antes indicados y para cada escalón de carga antes definido.

- **Referencias fijas y mediciones precisas.**

Antes de proceder a la realización de las pruebas se nivelarán los puntos de medición ya indicados en el apartado 1, referidos a puntos de referencia fijos fuera del puente y no afectados por la prueba de carga de forma que sea lo más sencillo posible referir a éstos las deformaciones de un punto cualquiera de cada escalón de carga.

- **Observación previa del tablero.**

Antes de comenzar las pruebas se recorrerán detenidamente las estructuras, observando concienzudamente las fisuras que existan, midiendo su tamaño con lupas y marcando los puntos en que se hagan estas medidas para realizar posteriores mediciones en cada escalón de carga.

- **Resultados y tolerancias.**

En todo lo que sigue, y a efectos de flechas en centro de vano se considera como tal, la diferencia entre la lectura correspondiente a ese centro de vano y la media de las lecturas correspondientes a las secciones de apoyo del vano.

Se considerará estabilizado el proceso de carga cuando, transcurridos 10 minutos desde las lecturas iniciales inmediatas a la colocación de la carga, las nuevas lecturas difieran de aquellas en menos del 5% de los valores iniciales, o bien la diferencia sea del mismo orden de la precisión de los aparatos de medida. En caso contrario, se actuará según lo indicado en las Recomendaciones antes citadas.

Las flechas estabilizadas obtenidas para cada escalón, se compararán con las teóricas calculadas para esa misma fase.

Se considerarán aceptables estos resultados si la diferencia entre ambos valores es inferior, en valor absoluto, al 10% de la flecha teórica, para puentes de hormigón pretensado, o al 15% para puentes de hormigón armado.

Del cálculo teórico de las flechas debidas a las sobrecargas y de las flechas medidas, se deducirá el coeficiente de elasticidad medio del hormigón, comprobándose si dicho coeficiente tiene un valor razonable, habida cuenta de las características del hormigón empleado.

Asimismo, se obtendrá la flecha remanente por diferencia entre las lecturas correspondientes a los estados anterior y posterior a la prueba. Como orden de magnitud para valores aceptables expresados en porcentajes de las flechas máximas obtenidas en la prueba:

- Del orden del 20% de la flecha máxima, para puentes de hormigón armado.
- Del orden del 15% de la flecha máxima, para puentes de hormigón pretensado.

Si en la primera carga se obtienen flechas remanentes elevadas, se procederá a un segundo ciclo de carga y si tampoco se obtuviesen resultados satisfactorios, la D.O. suspenderá la prueba y adoptará las medidas convenientes.

#### **Desarrollo de la prueba**

- Antes de comenzar la prueba de carga:
  - Se marcarán sobre el tablero las posiciones exactas que han de tener los ejes longitudinales de los camiones y los transversales de los ejes en estas posiciones, durante la prueba.
  - Se pesarán cada uno de los ejes de los camiones, comprobando su coincidencia con las teorías de la prueba.
  - Se habrán colocado y nivelado o tarado los flexímetros y demás aparatos de medida, en las secciones y puntos antes indicados.
  - Se harán las nivelaciones, observación y medición de fisuras previstas en la preparación de la prueba.
  - Medición de flechas en el tablero descargado.
- Durante la realización de la prueba de carga.

- Se colocará primero un camión en su posición exacta antes de entrar el siguiente de la misma fila y así sucesivamente hasta completar ésta.

Durante esta operación, se observarán en todo momento los aparatos de medida, anotando los resultados más importantes, aunque no figurarán en el informe, ni tengan valor para deducir el comportamiento de la estructura mientras se actúe con cargas parciales.

Una vez colocada toda la fila, se harán las medidas en las secciones y puntos previstos.

Se continuará cargando con las mismas precauciones antes citadas en cada uno de los escalones indicados.

- Se deberá medir con especial cuidado los descensos de los apoyos.
- Se anotarán siempre los datos siguientes:
  - Hora exacta de las sucesivas operaciones efectuadas.
  - Lista y matrícula de los vehículos utilizados, con sus pesos por ejes.
  - Posiciones de los vehículos en cada escalón de carga.
  - Resultados en cada medición de cada aparato.
  - Comprobación de flechas calculadas y medidas.
  - Datos que permitan el fácil reencuentro de las referencias de nivelación.
  - Comienzo y progresión de fisuras.
  - Cualquier otro dato que pueda parecer útil (vibraciones, etc.)

- Una vez terminada la prueba se hará un informe, que constará como mínimo de:
  - Croquis de situación de camiones, indicando posiciones y cargas por eje.
  - Croquis de situación de todos los aparatos de medida.
  - Croquis de situación de puntos de referencias fijos.
  - Lecturas realizadas en todos los aparatos de medida en escalón o estado de carga.
  - Flechas que se deducen de las anteriores lecturas.
  - Diagrama de flechas reales (tanto longitudinalmente como transversales), descontando el descenso de los apoyos.



- Diagrama de los descensos de los apoyos.
- Porcentajes de recuperación registrados en flechas.
- Registros de fisuras.
- Incidencias que se presentaron durante la realización de la prueba.
- Conclusiones.

En las conclusiones figurarán expresamente la aceptación o no del puente ensayado con las exigencias de nuevas pruebas de carga, puesta en servicio provisional o definitiva, refuerzo, etc.

La prueba de carga del puente incluirá, además de la prueba con carga estática antes descrita, una prueba dinámica con camión, con y sin la interposición de un obstáculo normalizado, formado por un tablón RILEM. Se dispondrá de un instrumento para medida de aceleraciones y obtención de la frecuencia de vibración del tablero.

## **PRUEBAS DE CARGA EN PUENTES y VIADUCTOS DE FERROCARRIL**

### **DEFINICIÓN Y CONDICIONES DE LAS PARTIDAS DE OBRA EJECUTADAS**

#### **Definición**

Se define como prueba de carga en puentes y viaductos de ferrocarril al conjunto de operaciones de control, cuya realización es preceptiva antes de su apertura al tráfico, a fin de comprobar la adecuada concepción, la estabilidad y el buen comportamiento de la obra.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Inspección previa de todos los elementos de la estructura.
- Marcado de posiciones de los camiones.
- Colocación y nivelación de flexímetros.
- Ejecución de las fases de carga y medición de flechas.
- Informe de resultados.

Se realizarán dos pruebas de carga mediante camiones:

- Prueba estática.
- Prueba dinámica.

No es objeto del presente proyecto la prueba de carga definitiva del viaducto, utilizando material ferroviario, una vez colocado el balasto y las instalaciones de vía

#### **Condiciones generales**

Se realizará una prueba de carga inicial provisional estática sobre la estructura terminada, antes de proceder a la colocación del balasto.

La prueba de carga estática se controlará con ordenador y sistemas de medición de alta precisión.

También se realizará una prueba de carga dinámica utilizándose acelerómetros de 50 Hz y analizadores de espectro. Se obtendrán frecuencias y períodos propios, así como el coeficiente de amortiguamiento de la estructura.

Para la prueba de carga dinámica se utilizarán instrumentos de medición que permitan lecturas de 100 medidas/segundo.

### **CONDICIONES DEL PROCESO DE EJECUCIÓN.**

El Contratista presentará a la D.O. el proyecto correspondiente para la realización de la prueba de carga.

El tren de cargas estará compuesto por un conjunto de camiones con el peso y posición indicados en el proyecto de prueba de carga.

En el Anejo de Estructuras se aconseja un tren de cargas compuesto por camiones de 36 t. Se ajustarán las dimensiones y pesos de los camiones a la disponibilidad, previa autorización de la D.O.

Será de aplicación todo lo indicado en el Artículo para Pruebas de carga en pasos superiores en cuanto a Mediciones mínimas a realizar y Preparación de la prueba estática.

### Desarrollo de la prueba de carga estática

- Antes de comenzar la prueba de carga:
  - Se marcarán sobre el tablero las posiciones exactas del tren de cargas.
  - Se pesarán cada uno de los ejes de los camiones, comprobando su coincidencia con las teorías de la prueba.
  - Se habrán colocado y nivelado o tarado los flexímetros y demás aparatos de medida, controlados por ordenador.
  - Se harán nivelaciones, observación y medición de fisuras previstas anteriormente.
  - Medición de flechas en el tablero descargado.
- Durante la realización de la prueba de carga:
  - Se colocará primero una línea de camiones (2x3) en su posición exacta. Durante esta operación, se observarán en todo momento los aparatos de medida, anotando los resultados más importantes, aunque no figurarán en el informe, ni tengan valor para deducir el comportamiento de la estructura.

Una vez colocado una línea de camiones (2x3), se harán las medidas previstas.

Se continuará cargando el tablero con la segunda línea de camiones (2x3).
  - Se deberá medir con especial cuidado los descensos de los apoyos.
  - Se anotarán siempre los datos siguientes:
    - Hora exacta de las sucesivas operaciones efectuadas.
    - Lista de los camiones utilizados, con sus pesos por ejes.
    - Posiciones del tren de cargas en cada caso de carga.
    - Resultados de cada medición de cada aparato.
    - Comprobación de flechas calculadas y medidas.
    - Datos que permitan el fácil reencuentro de las referencias de nivelación.
    - Comienzo y progresión de fisuras.
    - Cualquier otro dato que pueda parecer útil (vibraciones, etc).
- Una vez terminada la prueba se hará un informe, que constará como mínimo de:
  - Croquis de situación de los camiones, indicando posiciones y cargas por eje.

- Croquis de situación de todos los aparatos de medida.
- Croquis de situación de puntos de referencias fijos.
- Lecturas realizadas en todos los aparatos de medida en escalón o estado de carga.
- Flechas que se deducen de las anteriores lecturas.
- Diagrama de flechas reales (tanto longitudinalmente como transversales), descontando el descenso de los apoyos.
- Diagrama de los descensos de los apoyos.
- Porcentajes de recuperación registrados en flechas.
- Registros de fisuras.
- Incidencias que se presentaron durante la realización de la prueba.
- Conclusiones.

En las conclusiones figurarán expresamente la aceptación o no de la obra ensayada a reserva de las exigencias de la prueba de carga definitiva con material ferroviario.

### Desarrollo de la prueba de carga dinámica

El Contratista deberá presentar asimismo el proyecto correspondiente, en el cual se deben incluir como mínimo las siguientes fases de paso de un tren de camiones sobre la estructura, y medidas correspondientes a realizar:

- Un primer paso, a 5 km/hora, para el calibrado inicial de los sistemas de medida, que permita el contraste de resultados en las fases siguientes:
- Un segundo paso a 20 km/hora.
- Un tercer paso a 40 km/hora

A la terminación de la prueba, el Contratista entregará a la D.O el preceptivo Informe de conclusiones.



## PUESTA A TIERRA DE ELEMENTOS METÁLICOS Y ARMADURAS EN PASOS SUPERIORES

### DEFINICIÓN Y CONDICIONES GENERALES

#### Definición

La puesta a tierra de las armaduras, barandillas y todos los elementos metálicos en pasos superiores sobre ferrocarriles, tiene por objeto proteger a las personas e instalaciones de los efectos derivados de la diferencia de potencial causados por el propio sistema de tracción eléctrica en condiciones normales y en condiciones anormales (fallos, cortocircuitos, etc.).

Esta unidad consiste en la puesta a tierra de las partes metálicas y armaduras de acero (salvo los cables de tesado) de todos los pasos superiores, a fin de conseguir que dichos elementos se encuentren unidos equipotencialmente.

Todos los elementos metálicos (incluido elementos de protección, barandillas, etc), deben ponerse a tierra a través del sistema global que se describe.

#### Condiciones generales

Los cables para las conexiones a tierra deben ser, en todos los casos, resistentes a las intensidades de cortocircuito.

La colocación de los cables y conexiones de puesta a tierra se realizará según el detalle que figura en planos.

### CONDICIONES DEL PROCESO DE EJECUCIÓN

La armadura del tablero estará unida (salvo los cables de tesado), tanto transversal como longitudinalmente para conseguir la continuidad eléctrica. En las juntas de dilatación del tablero, deberán montarse las correspondientes conexiones de puenteo de las armaduras.

Asimismo, en los estribos y en los pilares del paso elevado, la armadura también debe estar unida longitudinal y transversalmente, y conectada a la armadura de la cimentación, para darle continuidad eléctrica.

Para la puesta a tierra de las armaduras se unirá, mediante lazos de conexión, la armadura de los estribos a la del tablero y la de éste a la armadura de los pilares, estando finalmente éstos últimos conectados a los carriles exteriores de las vías, y debiéndose dejar preparados en la fase de construcción del paso superior los siguientes terminales:

- Armadura tablero – armadura estribos 4 - 4
- Armadura tablero – armadura pilar 2 - 2
- Armadura pilar – carriles exteriores 2

La conexión a los carriles se realizará en la fase de instalación de la catenaria.

Las barandillas, las biondas y los dispositivos metálicos de protección de los pasos elevados se pondrán a tierra, conectándose entre sí y, posteriormente, a la armadura de los pilares y a través de éstos a los carriles exteriores.

Las barandillas y biondas deben estar eléctricamente seccionadas al final de la zona de afectación al ferrocarril para impedir que haya fugas del potencial de vía o se produzcan corrientes de retorno.

Todos los lazos de conexión se realizarán mediante cable de Cu desnudo de 50 mm<sup>2</sup>, con terminales para atornillar o soldar.