ANEJO Nº 6. ESTRUCTURAS

4. Cálculos

4.3. CÁLCULOS

• Paso superior 4.3

INDICE

Bases de cálculo y dimensionamiento .....

Descripción del programa “Emparrillados”.....

Descripción del programa “Dimensionamiento de vigas”..

Cálculo por Emparrillado Vanos Centrales.....

Datos de Entrada.....

Croquis Emparrillado.....

Resultados del análisis.....

Dimensionamiento vigas Centrales.....

Cálculo por Emparrillado Vanos Laterales.....

Datos de Entrada.....

Croquis Emparrillado.....

Resultados del análisis.....

Dimensionamiento vigas Laterales.....

Armadura Transversal de la Losa.....

Cálculo de los Neoprenos .....

Cargas Horizontales.....

Bases de cálculo y dimensionamiento

1.- Bases de cálculo y dimensionamiento

Se exponen a continuación los criterios y normativas empleadas en la realización de este anejo de cálculo.

1.1.- Normativas empleadas

- Instrucción sobre las Acciones a considerar en el proyecto de Puentes de carretera (IAP-98).
- Instrucción de Hormigón Estructural (EHE).
- Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (MOPU 1982)

1.2.- Análisis estructural

El análisis de la estructura objeto de este anejo de cálculo se ha abordado mediante la técnica del emparrillado.

El comportamiento de todos los elementos ha sido considerado elástico y lineal.

Las acciones sísmicas no han sido consideradas puesto que, de acuerdo a la vigente norma sismorresistente, la aceleración de cálculo de la zona geográfica no supera las seis centésimas de la gravedad.

1.3. - Cargas aplicadas

- Peso específico del hormigón armado o pretensado: $\gamma_h = 2.50$ Mp/m^3
- Peso específico de mezcla bituminosa: $\gamma_a = 2.40$ Mp/m^3
- Peso barrera y acera: p = 1.10 Mp/m
- Sobrecarga repartida debida al tráfico: S = 0.4 Mp/m^2
- Sobrecarga puntual debida al tráfico: P = 60 Mp.

1.4.- Características de los materiales empleados

- Hormigones:
  - Prefabricados:
    - Armado: HA-40/ B / 17 / II b
    - Pretensado: HP-50/ B / 17 / II b
  - "In situ":
    - Armado: HA-25/ F / 20 / II b
- Aceros:
  - Elementos prefabricados:
    - Acero pasivo: B 500 S
    - Acero activo: Cordones Y 186057
  - Elementos "in situ":
    - Acero pasivo: B 500 S

1.5.- Coeficientes de seguridad adoptados

- Mayoración acciones (Estados Límites Últimos):
  - Nivel de control intenso:
    - Permanentes: $\gamma_G = 1.35$
    - Variable: $\gamma_Q = 1.50$
  - Nivel de control normal:
    - Permanentes: $\gamma_G = 1.50$
    - Variable: $\gamma_Q = 1.60$

- Minoración de resistencia del hormigón:
  - En prefabricados: $\gamma_c = 1.50$
  - "In situ": $\gamma_c = 1.50$

- Minoración de resistencia del acero:
  - En prefabricados: $\gamma_s = 1.15$
  - "In situ": $\gamma_s = 1.15$

1.6.- Dimensionamiento de elementos de hormigón

Para el dimensionamiento de los elementos de hormigón pretensado se ha analizado su comportamiento de acuerdo a la vigente norma EHE. Como se puede observar en los ficheros de salida de datos del programa "Dimensionamiento de Vigas" se ha realizado el dimensionamiento atendiendo al comportamiento de las vigas frente a diversas solicitaciones. El tipo de pretensado utilizado es interior de armaduras pretesas y adherente.

1.7. - Programas informáticos utilizados

Los programas de cálculo matricial "Emparrillado" y el programa "Dimensionamiento de Vigas Puente Nervado", desarrollados por Research & Concrete, S.A., han sido utilizados para la obtención de los esfuerzos de vigas y losa y armado de las mismas. En los apartados siguientes se incluye una somera explicación de la nomenclatura utilizada y del funcionamiento de dichos programas.

Descripción del programa "Emparrillados"

EMPARRILLADO

Los cálculos del Emparrillado se han desarrollado mediante el programa **"EMPARRILLADO"** en una Red Local, compuesta de varios ordenadores Personales (PCs) con memoria RAM de 128 Mb. y disco duro en cada uno de ellos.-

Para la resolución del emparrillado se utiliza el cálculo matricial . La estructura se discretiza en nudos y barras. Los nervios longitudinales corresponden a cada una de las vigas prefabricadas y las barras transversales idealizan la losa superior.

Se generan de forma automática, todas las hipótesis de cálculo, el programa coloca la sobrecarga móvil en intervalos transversales y longitudinales de 0.5 m. obteniendo una envolvente de esfuerzos y reacciones.

Una vez resuelto el emparrillado se introducen los valores obtenidos en la rutina de dimensionamiento y se obtienen las diferentes armaduras activas y pasivas correspondientes.

Descripción del programa "Dimensionamiento de vigas"

ANEJO DE CALCULOS DE VIGAS

1. - Programa de cálculo :

Los cálculos del tablero se han desarrollado mediante el programa **"Dimensionamiento de vigas"** en una Red Local, compuesta de varios ordenadores Personales (PCs) con memoria RAM de 128 Mb. y disco duro en cada uno de ellos.-

2. - Datos de cargas :

Se consideran los siguientes pesos específicos para la evaluación de las cargas permanentes y pesos propios:

Hormigón armado ó pretensado: 2,50 Tn/m^3
Hormigón en masa: 2,40 Tn/m^3
Pavimento asfáltico: 2,40 Tn/m^3

La carga permanente de aceras, barreras y barandillas se introduce en los cálculos como cargas lineales situadas longitudinalmente en el C. de G. de cada acera.

La sobrecarga considerada es la especificada en la "Instrucción relativa a las acciones a considerar en el proyecto de puentes de Carreteras" (**I.A.P- 98**) situando el o los carros, en la posición pésima.

3. - Desarrollo del Cálculo:

Con los esfuerzos obtenidos del emparrillado se calculan las tensiones de la viga.

Se estudian a continuación las tensiones producidas por el pretensado tanto durante la fabricación (en el instante de la transferencia) como a largo plazo, considerando respectivamente unas pérdidas del 5% y 20%.

La adición de estas tensiones a las producidas por las cargas exteriores conduce a las tensiones reales (en fibra superior e inferior de la viga, y fibra superior de la losa) que aparecen en las distintas fases, fabricación, servicio bajo cargas permanentes, y servicio bajo máxima sobrecarga.

Se comprueba que las tracciones (si existen) son admisibles en función de la clase de comportamiento de la estructura y se obtiene la resistencia característica del hormigón en cada fase para soportar las compresiones existentes.

Los esfuerzos rasantes entre viga y losa se resisten exclusivamente con armadura pasiva, sin contar con la colaboración del hormigón.

4. - Notación utilizada:

Para poder interpretar la salida de la impresora debe tenerse en cuenta la siguiente notación:

Datos Geométricos

B = Ancho real del tablero
B_o = Ancho eficaz del tablero
B_1 = Anchura de cada acera
D_1 = Distancia del eje de la última viga al borde del tablero.

Características Mecánicas

Va_i = Distancia fibra superior viga a fibra neutra en sección inicial homogeneizada
Vb_i = Distancia fibra inferior viga a fibra neutra en sección inicial homogeneizada
Va_f = Distancia fibra superior viga a fibra neutra en sección final homogeneizada
Vb_f = Distancia fibra inferior viga a fibra neutra en sección final homogeneizada
Vc_f = Distancia fibra superior losa a fibra neutra en sección final homogeneizada

A = Area de la sección inicial homogeneizada
I = Inercia de la sección inicial homogeneizada
If = Inercia de la sección final homogeneizada

Esfuerzos Longitudinales

M_1 = Momento en el centro de la luz de la viga producido por p.p. de la viga.
M_2 = Momento en el centro de la luz de la viga producido por peso de la losa.
M_3 = Momento en el centro de la luz de la viga producido por las cargas permanentes.
M_4 = Momento en el centro de la luz de la viga producido por la sobrecarga uniforme
M_5 = Momento en el centro de la luz de la viga producido por sobrecarga puntual móvil

Cálculo de Tensiones

SA = Tensión en fibra superior de la viga
SB = Tensión en fibra inferior de la viga
SC = Tensión en fibra superior de la losa

Pretensado

N = Esfuerzo axil de pretensado inicial, en bancada.
Exc. = Excentricidad del esfuerzo de pretensado con respecto a la fibra neutra de la sección inicial homogeneizada de la viga.

PA = Tensión en fibra superior de viga, producida por el pretensado.
PB = Tensión en fibra inferior de viga, producida por el pretensado.

Cálculo armadura cortantes

Q1 = cortante en el extremo de la viga debido al peso propio de la viga
Q2 = cortante en el extremo de la viga debido al peso propio de la losa
Q3 = cortante en el extremo de la viga debido a las cargas permanentes
Q4 = cortante en el extremo de la viga debido a la sobrecarga repartida
Q5 = cortante en el extremo de la viga debido a la sobrecarga puntal móvil.

FY = Límite elástico del acero pasivo
FCT'K = Resistencia a tracción del hormigón
V = Cortante máximo en la sección considerada
VRD = Cortante mayorado
SIGMA CL, D = Tensión normal en fibra extrema más traccionada o menos comprimida, bajo la actuación de los esfuerzos normales de cálculo más desfavorables.

Placas Apoyo de Neopreno

CARGA MIN. AP. : Carga vertical mínima por apoyo.
CARGA MAX. AP : Carga vertical máxima por apoyo.
MOD. ELAS. H. : Módulo elasticidad hormigón en Tn/m²
MOD. DEF. TRANSV. NEO. C. LENTAS. : Módulo de deformación transversal del neopreno cargas lentas.
MOD. DEF. TRANSV. NEO. C. RÁPIDA. : Módulo de deformación transversal del neopreno cargas rápidas.
GIRO DE AP. : Giro del apoyo debido a las sobrecargas.
CARGA DE FRE. AP : Carga horizontal de Frenado.
CARGA DE VIENTO . AP : Carga horizontal de viento en apoyo
CARGA DE RETRAC. FLU. EN AP : Carga horizontal de retracción y fluencia en apoyo.

Cálculo por Emparrillado Vanos Centrales

Datos de Entrada

Calculo automatico de Emparrillados

Cliente : AVE OLERDOLA U.T.E.

Obra : P.S. 4+3 (Vano Central)

Fecha : 29/01/2004

Hora : 18:03

Datos de la estructura

Luz de cálculo (m)	:	22.100
Ancho (m)	:	8.000
Esviaje (g)	:	100.000
Dist. Eje Viga borde a ext. tablero (m)	:	4.000
Ancho de las aceras (m)	:	1.000
Dist. Eje Barrera a ext. tablero (m)	:	0.100
Espesor de la losa (m)	:	0.255
Peso pavimento (t/m²)	:	0.252
Peso de las aceras (t/m²)	:	0.500
Peso Barrera (t/m)	:	0.500
Sobrecarga uniforme (t/m²)	:	0.400
Peso total del vehículo (t)	:	60.000
Distancia de la rueda a la acera (m)	:	0.500

Datos de las vigas

Viga	Tipo	Canto (m)	Area (m²)	Peso (t/m)	Va (m)	Inercia (m4)
1	C-110AA	1.100	1.517055	3.5987	0.7379	0.184343

Datos del Emparrillado

Datos de Nudos

Nudo	X (m)	Y (m)
1	0.000	0.000
2	-0.000	2.169
3	-0.000	2.650
4	-0.000	4.000
5	-0.000	5.350
6	-0.000	5.831
7	-0.000	8.000
8	2.210	0.000
9	2.210	2.169
10	2.210	5.831
11	2.210	8.000
12	4.420	0.000
13	4.420	2.169
14	4.420	5.831
15	4.420	8.000
16	6.630	0.000
17	6.630	2.169
18	6.630	5.831
19	6.630	8.000
20	8.840	0.000
21	8.840	2.169
22	8.840	5.831
23	8.840	8.000
24	11.050	0.000
25	11.050	2.169
26	11.050	5.831
27	11.050	8.000
28	13.260	0.000
29	13.260	2.169
30	13.260	5.831
31	13.260	8.000
32	15.470	0.000
33	15.470	2.169
34	15.470	5.831
35	15.470	8.000
36	17.680	0.000
37	17.680	2.169
38	17.680	5.831
39	17.680	8.000
40	19.890	0.000
41	19.890	2.169
42	19.890	5.831
43	19.890	8.000
44	22.100	0.000
45	22.100	2.169

46	22.100	2.650
47	22.100	4.000
48	22.100	5.350
49	22.100	5.831
50	22.100	8.000

Datos de Barras

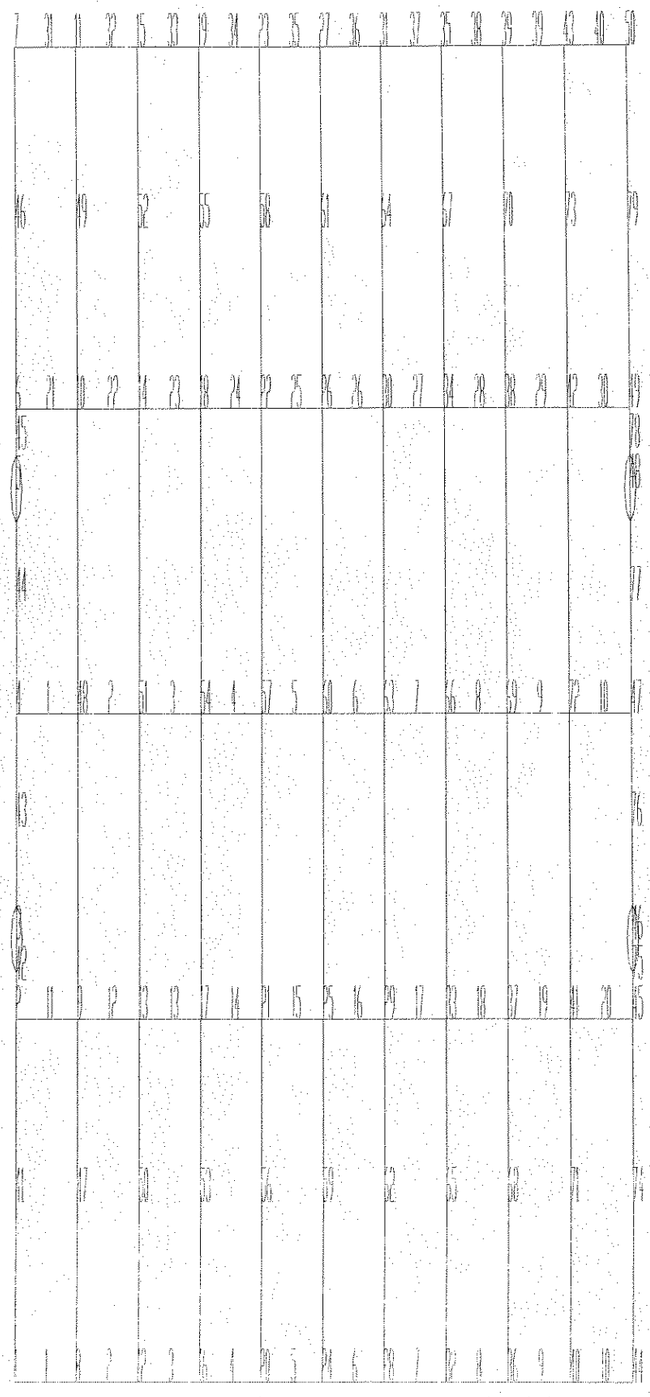
Barra	Nudo I	Nudo J	Ancho (m)	Iflex (m4)	Jtor (m4)
1	1	8	1.085	0.000999	0.003110
2	8	12	1.085	0.000999	0.003110
3	12	16	1.085	0.000999	0.003110
4	16	20	1.085	0.000999	0.003110
5	20	24	1.085	0.000999	0.003110
6	24	28	1.085	0.000999	0.003110
7	28	32	1.085	0.000999	0.003110
8	32	36	1.085	0.000999	0.003110
9	36	40	1.085	0.000999	0.003110
10	40	44	1.085	0.000999	0.003110
11	2	9	2.915	0.324996	0.199746
12	9	13	2.915	0.324996	0.199746
13	13	17	2.915	0.324996	0.199746
14	17	21	2.915	0.324996	0.199746
15	21	25	2.915	0.324996	0.199746
16	25	29	2.915	0.324996	0.199746
17	29	33	2.915	0.324996	0.199746
18	33	37	2.915	0.324996	0.199746
19	37	41	2.915	0.324996	0.199746
20	41	45	2.915	0.324996	0.199746
21	6	10	2.915	0.324996	0.199746
22	10	14	2.915	0.324996	0.199746
23	14	18	2.915	0.324996	0.199746
24	18	22	2.915	0.324996	0.199746
25	22	26	2.915	0.324996	0.199746
26	26	30	2.915	0.324996	0.199746
27	30	34	2.915	0.324996	0.199746
28	34	38	2.915	0.324996	0.199746
29	38	42	2.915	0.324996	0.199746
30	42	49	2.915	0.324996	0.199746
31	7	11	1.085	0.000999	0.003110
32	11	15	1.085	0.000999	0.003110
33	15	19	1.085	0.000999	0.003110
34	19	23	1.085	0.000999	0.003110
35	23	27	1.085	0.000999	0.003110
36	27	31	1.085	0.000999	0.003110
37	31	35	1.085	0.000999	0.003110
38	35	39	1.085	0.000999	0.003110
39	39	43	1.085	0.000999	0.003110
40	43	50	1.085	0.000999	0.003110
41	1	2	1.105	0.001018	0.002036

42	2	3	1.105	0.155494	0.400398
43	3	4	1.105	0.155494	0.400398
44	4	5	1.105	0.155494	0.400398
45	5	6	1.105	0.155494	0.400398
46	6	7	1.105	0.001018	0.002036
47	8	9	2.210	0.002036	0.004072
48	9	10	2.210	0.276738	0.800796
49	10	11	2.210	0.002036	0.004072
50	12	13	2.210	0.002036	0.004072
51	13	14	2.210	0.276738	0.800796
52	14	15	2.210	0.002036	0.004072
53	16	17	2.210	0.002036	0.004072
54	17	18	2.210	0.276738	0.800796
55	18	19	2.210	0.002036	0.004072
56	20	21	2.210	0.002036	0.004072
57	21	22	2.210	0.276738	0.800796
58	22	23	2.210	0.002036	0.004072
59	24	25	2.210	0.002036	0.004072
60	25	26	2.210	0.276738	0.800796
61	26	27	2.210	0.002036	0.004072
62	28	29	2.210	0.002036	0.004072
63	29	30	2.210	0.276738	0.800796
64	30	31	2.210	0.002036	0.004072
65	32	33	2.210	0.002036	0.004072
66	33	34	2.210	0.276738	0.800796
67	34	35	2.210	0.002036	0.004072
68	36	37	2.210	0.002036	0.004072
69	37	38	2.210	0.276738	0.800796
70	38	39	2.210	0.002036	0.004072
71	40	41	2.210	0.002036	0.004072
72	41	42	2.210	0.276738	0.800796
73	42	43	2.210	0.002036	0.004072
74	44	45	1.105	0.001018	0.002036
75	45	46	1.105	0.155494	0.400398
76	46	47	1.105	0.155494	0.400398
77	47	48	1.105	0.155494	0.400398
78	48	49	1.105	0.155494	0.400398
79	49	50	1.105	0.001018	0.002036

Datos de Tramos de Vigas

Tramo	Viga	Ancho (m)	Canto (m)	Area (m)	Va (m)	Vb (m)	Inercia (m4)	JTor (m4)
1	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
2	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
3	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
4	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
5	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
6	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
7	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
8	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
9	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
10	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968

Croquis Emparrillado



Resultados del análisis

Envolvente de Esfuerzos

Esfuerzos Cortantes en t

Viga	Tramo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máximo	S.C. Mínimo	Carro Máximo	Carro Mínimo	Total Máximo	Total Mínimo
1	1	-39.77	-56.35	-34.87	0.00	-31.83	0.00	-78.98	-130.99	-241.80
-	-	-31.81	-45.08	-34.87	0.00	-31.83	0.00	-78.98	-111.76	-222.57
1	2	-31.81	-45.08	-27.12	0.00	-24.77	0.00	-69.47	-104.02	-198.25
-	-	-23.86	-33.81	-27.12	0.00	-24.77	0.00	-69.47	-84.79	-179.02
1	3	-23.86	-33.81	-19.37	0.00	-17.69	11.19	-59.20	-65.86	-153.94
-	-	-15.91	-22.54	-19.37	0.00	-17.69	11.19	-59.20	-46.63	-134.71
1	4	-15.91	-22.54	-11.62	0.00	-10.61	21.72	-49.19	-28.35	-109.88
-	-	-7.95	-11.27	-11.62	0.00	-10.61	21.72	-49.19	-9.13	-90.66
1	5	-7.95	-11.27	-3.87	0.00	-3.54	29.07	-42.17	5.98	-68.81
-	-	-0.00	-0.00	-3.87	0.00	-3.54	29.07	-42.17	25.20	-49.58
1	6	-0.00	0.00	3.87	3.54	0.00	42.17	-29.07	49.58	-25.20
-	-	7.95	11.27	3.87	3.54	0.00	42.17	-29.07	68.81	-5.98
1	7	7.95	11.27	11.62	10.61	0.00	49.19	-21.72	90.66	9.13
-	-	15.91	22.54	11.62	10.61	0.00	49.19	-21.72	109.88	28.35
1	8	15.91	22.54	19.37	17.69	0.00	59.20	-11.19	134.71	46.63
-	-	23.86	33.81	19.37	17.69	0.00	59.20	-11.19	153.94	65.86
1	9	23.86	33.81	27.12	24.77	0.00	69.47	0.00	179.02	84.79
-	-	31.81	45.08	27.12	24.77	0.00	69.47	0.00	198.25	104.02
1	10	31.81	45.08	34.87	31.83	0.00	78.98	0.00	222.57	111.76
-	-	39.77	56.35	34.87	31.83	0.00	78.98	0.00	241.80	130.99

Momentos flectores en t.m

Viga	Tramo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máximo	S.C. Mínimo	Carro Máximo	Carro Mínimo	Total Máximo	Total Mínimo
1	1	-0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00
-	-	79.09	112.09	77.06	70.33	0.00	104.10	0.00	442.67	268.24
1	2	79.09	112.09	77.06	70.33	0.00	104.10	0.00	442.67	268.24
-	-	140.61	199.27	136.99	125.03	0.00	189.30	0.00	791.20	476.87
1	3	140.61	199.27	136.99	125.03	0.00	189.30	0.00	791.20	476.87
-	-	184.55	261.54	179.80	164.11	0.00	251.00	0.00	1041.00	625.89
1	4	184.55	261.54	179.80	164.11	0.00	251.00	0.00	1041.00	625.89
-	-	210.91	298.91	205.48	187.55	0.00	285.70	0.00	1188.55	715.31
1	5	210.91	298.91	205.48	187.55	0.00	285.70	0.00	1188.55	715.31
-	-	219.70	311.36	214.05	195.36	0.00	301.50	0.00	1241.97	745.11
1	6	219.70	311.36	214.05	195.36	0.00	301.50	0.00	1241.97	745.11
-	-	210.91	298.91	205.48	187.55	0.00	285.70	0.00	1188.55	715.31
1	7	210.91	298.91	205.48	187.55	0.00	285.70	0.00	1188.55	715.31
-	-	184.55	261.54	179.80	164.11	0.00	251.00	0.00	1041.00	625.89
1	8	184.55	261.54	179.80	164.11	0.00	251.00	0.00	1041.00	625.89
-	-	140.61	199.27	136.99	125.03	0.00	189.30	0.00	791.20	476.87
1	9	140.61	199.27	136.99	125.03	0.00	189.30	0.00	791.20	476.87
-	-	79.09	112.09	77.06	70.33	0.00	104.10	0.00	442.67	268.24
1	10	79.09	112.09	77.06	70.33	0.00	104.10	0.00	442.67	268.24
-	-	-0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00

Envolvente de Reacciones

Nudo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máxima	S.C. Mínima	Carro Máxima	Carro Mínima	Total Máxima	Total Mínima
3	19.883	28.177	19.371	21.936	-4.256	58.195	-2.539	147.562	60.636
5	19.883	28.177	19.371	21.936	-4.256	58.195	-2.539	147.562	60.636
46	19.883	28.177	19.371	21.936	-4.256	58.195	-2.539	147.562	60.636
48	19.883	28.177	19.371	21.936	-4.256	58.195	-2.539	147.562	60.636

Dimensionamiento Vigas Centrales

DIMENSIONAMIENTO DE VIGAS

CALCULO DE PUENTES NERVADOS DE CARRETERA

© Research & Concrete S.A.

CLIENTE : AVE OLERDOLA U.T.E.

OBRA : VANO CENTRAL

FECHA : 30/01/04

DATOS GEOMETRICOS

```
Solución ..................... = 1  CAA- 110
Luz de Cálculo .............[m] = 22.1
Intereje ...................[m] = 8
Dis. eje V.Borde a Ex.Tablero [m] = 4
Ancho Cabeza Superior ........... = 1.095
Canto Cabeza Superior ........... = 0.13
Ancho Cabeza Inferior ........... = 3.4
Profundidad Talón ............... = 0.25

Ancho del Tablero ............[m] = 8
Ancho de las Aceras ..........[m] = 1
Ancho Eficaz [ B0 ] ..........[m] = 8

Angulo de Esviaje ............[g] = 100
Espesor de la Losa ...........[m] = 0.255
Canto Total ..................[m] = 1.355
Espesor del Pavimento .......[cm] = 10.5

Peso del Carro ..............[Tn] = 60
Distan. del carro a la Acera  [m] = 0.5
Peso Aceras y Barandillas [Tn/ml] = 1
Tipo ambiente .........(I,II,III) = II
```

CARACTERISTICAS MECANICAS

[INICIALES]

```
VaI ...  [m] = 0.73790
VbI .... [m] = 0.36210
AREA .. [m²] = 1.51706
INERCIA [m4] = 0.18434
```

[FINALES]

```
VaF ...... [m] = 0.315586
VbF ...... [m] = 0.784414
VcF ...... [m] = 0.570586
INER.FIN. [m4] = 0.747655
K (rasante)... = 0.967179
```


ESFUERZOS LONGITUDINALES [MTn.]

```
M1 =    219.6999
M2 =    311.3599
M3 =    214.0500
M4 =    195.3600
M5 =    301.5000
```

TENSIONES

TENSIONES DE FLEXION DEBIDO A LAS CARGAS EXTERIORES SIN PRETENSADO [Tn/m²]

Resumen

	EN FABRICA		EN SERVICIO		
PUNTO	SA	SB	SA	SB	SC
11.05	879.4	-431.6	2216.1	-1267.8	163.3L/2
10.05	872.2	-428.1	2197.9	-1257.4	162.0
9.05	850.6	-417.5	2143.5	-1226.2	158.0
8.05	814.6	-399.8	2052.7	-1174.3	151.3
7.05	764.1	-375.0	1925.7	-1101.6	141.9
6.05	699.3	-343.2	1762.3	-1008.2	129.9
5.05	620.1	-304.4	1562.7	-894.0	115.1
4.05	526.5	-258.4	1326.7	-759.0	97.8
3.05	418.4	-205.4	1054.5	-603.3	77.7
2.05	296.0	-145.3	745.9	-426.8	54.9
1.05	159.1	-78.2	401.1	-229.5	29.5
0.05	7.9	-3.9	20.0	-11.5	1.4
0.00	0.0	0.0	0.0	0.0	0.0APOYO

CON CARGAS MAXIMAS

	SA			SB			SC		
PUNTO	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL
11.05	2258.0	2321.0	2425.8	-1372.1	-1528.4	-1789.1	239.1	352.9	542.5L/2
10.05	2239.5	2301.9	2405.9	-1360.8	-1515.9	-1774.4	237.2	350.0	538.1
9.05	2184.1	2244.9	2346.3	-1327.0	-1478.3	-1730.4	231.3	341.4	524.7
8.05	2091.6	2149.9	2247.0	-1270.9	-1415.8	-1657.2	221.5	326.9	502.5
7.05	1962.1	2016.8	2107.9	-1192.2	-1328.1	-1554.6	207.8	306.6	471.4
6.05	1795.7	1845.7	1929.1	-1091.1	-1215.5	-1422.8	190.2	280.6	431.4
5.05	1592.3	1636.6	1710.6	-967.5	-1077.8	-1261.6	168.6	248.8	382.5
4.05	1351.8	1389.5	1452.3	-821.4	-915.0	-1071.1	143.2	211.3	324.8
3.05	1074.5	1104.4	1154.3	-652.9	-727.3	-851.3	113.8	167.9	258.1
2.05	760.0	781.2	816.5	-461.9	-514.5	-602.3	80.4	118.8	182.6
1.05	408.7	420.1	439.1	-248.4	-276.7	-323.9	43.2	63.8	98.2
0.05	20.4	21.0	21.9	-12.4	-13.9	-16.2	2.1	3.1	4.8

CUADRO DE PRETENSADOS

FILA ->	1	2	3	4	5	6	7	8		
TIPO DE CABLE->	0.6	0.6	0.6							
TRAZADO	RECTO	RECTO	RECTO						N	EX
COTA->	4	9	106						(TN)	(Cm)
X	Num.	Num.	Num.							
11.05	67	14	6						1736	24
2.05	67	9	6						1636	24
1.05	62	0	6						1357	23
0.05	62	0	6						1357	23
0	62	0	6						1357	23

No se consideran los entubados cuya longitud es menor de 0.5 metros

TENSIONES EN DIFERENTES PUNTOS A LO LARGO DE LA VIGA [Tn/m²]

FABRICA ..... = Peso Propio + Pretensado con Pérdidas a Corto Plazo
SERVICIO ..... = Cargas Permanentes + Pretensado con Pérdidas Totales
CARGAS MAXIMAS = Servicio + Sobrecargas Máximas

Resumen

	EN FABRICA		EN SERVICIO		
PUNTO	SA	SB	SA	SB	SC
11.05	357.7	1444.5	1776.8	312.1	163.3L/2
10.05	350.5	1448.0	1758.6	322.5	162.0
9.05	328.9	1458.6	1704.2	353.7	158.0
8.05	292.9	1476.3	1613.4	405.6	151.3
7.05	242.4	1501.1	1486.4	478.3	141.9
6.05	177.6	1532.9	1323.0	571.7	129.9
5.05	98.4	1571.7	1123.4	685.9	115.1
4.05	4.8	1617.7	887.4	820.9	97.8
3.05	-103.3	1670.7	615.2	976.6	77.7
2.05	-184.9	1617.7	340.9	1057.8	54.9
1.05	-188.8	1358.8	108.1	980.6	29.5
0.05	-340.0	1433.1	-273.0	1198.6	1.4
0.00	-347.9	1437.0	-293.0	1210.1	0.0APOYO

CON CARGAS MAXIMAS

	SA			SB			SC		
PUNTO	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL
11.05	1818.7	1881.7	1986.5	207.8	51.5	-209.2	239.1	352.9	542.5L/2
10.05	1800.2	1862.6	1966.6	219.1	64.0	-194.5	237.2	350.0	538.1
9.05	1744.8	1805.6	1907.0	252.9	101.6	-150.5	231.3	341.4	524.7
8.05	1652.3	1710.6	1807.7	309.0	164.1	-77.3	221.5	326.9	502.5
7.05	1522.8	1577.5	1668.6	387.7	251.8	25.3	207.8	306.6	471.4
6.05	1356.4	1406.4	1489.8	488.8	364.4	157.1	190.2	280.6	431.4
5.05	1153.0	1197.4	1271.3	612.4	502.1	318.3	168.6	248.8	382.5
4.05	912.5	950.2	1013.0	758.5	664.8	508.8	143.2	211.3	324.8
3.05	635.2	665.1	715.0	927.0	852.6	728.6	113.8	167.9	258.1
2.05	355.0	376.2	411.5	1022.7	970.1	882.3	80.4	118.8	182.6
1.05	115.7	127.1	146.1	961.7	933.4	886.2	43.2	63.8	98.2
0.05	-272.6	-272.0	-271.1	1197.7	1196.3	1193.9	2.1	3.1	4.8
0.00	-293.0	-293.0	-293.0	1210.1	1210.1	1210.1	0.0	0.0	0.0APOYO

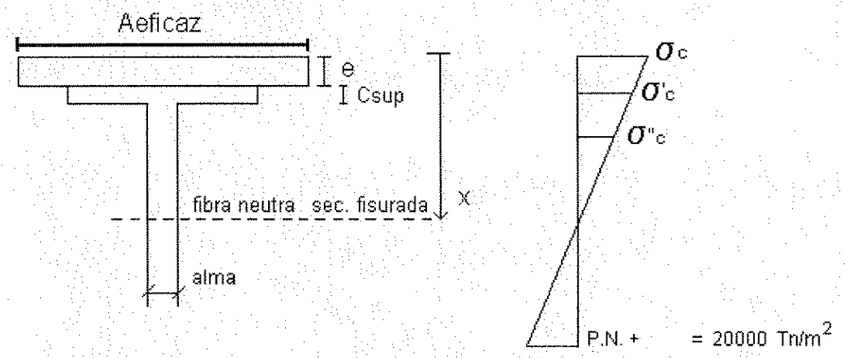
siones con el entubado real

RESISTENCIA DE HORMIGONES [Tn/m²]

AL DESTESAR .. = 2783.47
A LOS 28 DIAS = 3178.51 se dispone Hormigón de 5000
EN LOSA ..... = 868.06 '' '' '' '' 2500

APERTURA DE FISURAS (Art. 49.2.5.)

Criterio aproximado : La apertura de fisura <= 0.2 mm está asegurada si el incremento de tensión de la armadura activa debido a la acción de las cargas exteriores es inferior a 2000 Kg/cm².



Considerando losa:

Ancho eficaz = 8
Alma = 0.5
e = 0.255
Csup = 0.13

Canto útil = 130.636 cm (110 + 25.5 - C.D.G. tracción)

Ap = 113.400 cm²
Pretensado = 1615.950 Tn
0.8 P = 1292.760 Tn

- AT para 20000 Tn/m² -> AT = 113.4 x 2000 = 226800 Kg.

Resulta x = 33.41219

S1 = 1249.685
S2 = 295.9323
S3 = -190.2944

Mfisuración para (Wk = 0.2 mm) = 1851.345

El momento total de las cargas exteriores en servicio era de 1241.97 < 1851.34 tm por tanto no se llega a una apertura de fisura de 0.2 mm.

Comprobación Ambiente tipo II :

Tensión bajo 20% SC = 207.84
Mfis > Mcav CUMPLE Art. 49.2.4

CALCULO A ROTURA

Pasiva en Tracción ..... [Tn] = 0.00
Armadura Activa ..... [Tn] = 1686.21
Capacidad total en tracción N.. [Tn] = 1686.21
Pasiva en Compresión ..... [Tn] = 0.00
Recubrimiento Pasiva Compresión [cm] = 0.00
Zona ..... = I
Ancho Eficaz ..... [m] = 8.00
Capa Compresión ..... [cm] = 25.50

Dis. CDG Compre. a Fibra Super. [cm] = 7.44
Profundidad de Compresiones ... [cm] = 14.88
Dis. CDG Trac. a Fibra Inferior [cm] = 4.86
Canto Resistente ..... [m] = 1.23

[MR+] Momento de Rotura ..... [MTn.] = 2077.35

[Ma]= 1.35 x(M1+ M2+ M3) [MTn.] = 1005.89
[Mb]= 1.50 x(M4 + M5) [MTn.] = 745.28
[Mt] Momento Total ..... [MTn.] = 1751.18

MR+ > Mt [Admisible]

[MOMENTOS [MTn.]]

M1 ... = 219.699
M2 ... = 311.359
M3 ... = 214.050
M4 ... = 195.360
M5 ... = 301.500
M TOTAL= 1241.969

[VOLUMEN DE TRACCIONES]

SA [Tn/m²] = 1986.57373
SB [Tn/m²] = -209.03885
X [m] = 0.10472

Ancho Cabeza Inferior [cm] = 340.0
Volumen de Tracciones [Tn] = 37.2

ARMADURAS DE CORTANTES

Acero Fy [Kg/cm²] = 5000 Espesor del Alma [cm] = 50
Ff1 [fct´m] = 407.163 Canto Util (mm) = 1305.0
Fydc = 40000 (Tn / m²) Xi = 1.39
Fcdv = 3333.333 Armadura mínima = 8.3 (cm²/ml)
Q1 = 39.7700
Q2 = 56.3499
Q3 = 34.8699
Q4 = 31.8299
Q5= 78.9800

ARMADURAS DE CORTANTES

PTO	X	Vcperm	Vsob	V	Vrd	SIGMA xd	COTAG
1	0	130.99	110.81	241.79	343.05	-13.84	1.15
2	1.05	118.54	90.65	209.19	296	-43.57	1.43
3	3.05	94.83	70.49	165.32	233.75	-92.16	1.80
4	5.05	71.13	50.32	121.44	171.5	-129.83	2.00
5	7.05	47.42	30.16	77.57	109.25	-156.73	2.00

ARMADURAS DE CORTANTES

		Vcu						
PTO	X	Vu1	C.Hor.	C.Pre.	Vv2	Vsu	A90	Diam	S
1	0	645.58	42.14	29.9	72.0	271.04	49.84	12	5
2	1.05	611.59	42.14	36.0	78.2	217.85	32.23	12	10
3	3.05	552.95	42.14	38.2	80.3	153.4	18.07	10	15
4	5.05	522	42.14	38.2	80.3	91.15	9.7	8	20
5	7.05	522	42.14	38.2	80.3	28.9	8.33	8	20

S I M B O L O G I A

PTO = Punto número
X = Distancia al apoyo en m.
SIGMAXD = Tensión normal de cálculo a la altura del centro de gravedad de la sección. (art. 44.2.3.2)
COTAG = Cotangente. (art. 44.2.3.2.2)
K = Coef. reductor por efecto del esfuerzo axil. (art. 44.2.3.1)
Vu1 = Cortante de agotamiento por compresión oblicua. (art. 44.2.3.1)
VCU = Contribución hormigón resist. esfuerzo cortante. (art. 44.2.3.2.2)
A90 = Area necesaria en estribos por metro lineal en cm²/ml.
Diam. = Diámetro de la barra en estribos en mm.
S = Separación entre estribos en cm.

Estribos por alma

RASANTE VIGA - LOSA

Rugosidad alta

Betarug = 0.4 Murug = 0.9
Fck losa = 2500 Tn/m²
Fcltk = 179.5475 Tn/m²
Fcltd = 119.6983 Tn/m²
Tau1 = 416.6667 Tn/m²
Apre = 0.01134 m²
Fd junta (S9) = 1413.145 Tn
Superficie contacto (P) = 0.3815737 (m²/m)
Ar.min.ras.= 3.62495 cm²/m
Arm. Total = 336.4631 cm²

PROPUESTA DE ARMADO

Pto	Desde	Hasta	Arm. Total (cm²)	A90 (cm²/ml)
1	0	4.42	224.309	50.74858
2	4.42	7.37	84.116	28.54607
3	7.37	11.05	28.039	7.612287

RASANTE FONDO - VIGAS

Pto	Desde	Hasta	Rasante (Tn/m)	A90 (cm²/ml)
1	0	4.42	209.015	52.2537
2	4.42	7.37	81.124	20.2810
3	7.37	11.05	36.447	9.1117

PLACAS DE APOYO DE NEOPRENO

Carga Máxima en Apoyo..... [Tn] = 147.5620
Carga Mínima en Apoyo..... [Tn] = 67.4310
Módulo Elasticidad Hormigón [Tn/m²] = 3000000
Mód. Def. Trans. Neo. C.Lentas[Tn/m²] = 90
Mód. Def. Trans. Neo. C.Rápida[Tn/m²] = 180
Giro de Apoyo..... [Rad] = 0.0014
Carga de Frenado en Apoyo..... [Tn] = 7.0000
Carga de Viento en Apoyo ..... [Tn] = 6.7819
Carga de Retrac. Flu. en Apoyo ..[Tn] = 4.5250

---- APOYO de 350 mm X 400 mm. en Planta y 34 mm. de Altura ----

[COMPROBACION]

Estabilidad : e.neto <= a/5 [mm]
- 20 < 70 --> CUMPLE
Tensión Máxima de Compresión [Kg/cm²] :
- 105.4014 --> CUMPLE
Tensión Mínima de Compresión [Kg/cm²] :
- 48.1650 --> CUMPLE
Deslizamiento : H < N x (0.1 + (6 x A / N)) [Tn.]
- Cargas Máximas : 12.2222 < 23.1562 --> CUMPLE
- Cargas Mínimas : 8.1529 < 15.1431 --> CUMPLE
Deformación tangencial horizontal :
- Cargas Lentas : Des.l / e.neto < 0.5
- 0.3591 < 0.5 --> CUMPLE
- Cargas Totales : Des.t / e.neto < 0.7
- 0.6571 < 0.7 --> CUMPLE
Giro : G. máximo > G. apoyo [Rad.]
- 0.0061 > 0.0014 --> CUMPLE
Comprobación de Rasantes :
- Vertical : rv < 3 Gl [Kg/cm²]
- 16.9395 < 27 --> CUMPLE
- Giro : ra < 1.5 Gl [Kg/cm²]
- 3.8155 < 13.5 --> CUMPLE
Rotura por tracción de Chapas :
- e.chapa [cm] = 0.3 > 0.0002 --> CUMPLE

Cálculo por Emparrillado Vanos Laterales

Datos de Entrada

Calculo automatico de Emparrillados

Cliente : AVE OLERDOLA U.T.E.

Obra : P.S. 4+3 (Vanos Laterales)

Fecha : 29/01/2004

Hora : 18:05

Datos de la estructura

Luz de cálculo (m)	:	12.400
Ancho (m)	:	8.000
Esviaje (g)	:	100.000
Dist. Eje Viga borde a ext. tablero (m)	:	4.000
Ancho de las aceras (m)	:	1.000
Dist. Eje Barrera a ext. tablero (m)	:	0.100
Espesor de la losa (m)	:	0.255
Peso pavimento (t/m²)	:	0.252
Peso de las aceras (t/m²)	:	0.500
Peso Barrera (t/m)	:	0.500
Sobrecarga uniforme (t/m²)	:	0.400
Peso total del vehículo (t)	:	60.000
Distancia de la rueda a la acera (m)	:	0.500

Datos de las vigas

Viga	Tipo	Canto (m)	Area (m²)	Peso (t/m)	Va (m)	Inercia (m4)
1	C-110AA	1.100	1.517055	3.5987	0.7379	0.184343

Datos del Emparrillado

Datos de Nudos

Nudo	X (m)	Y (m)
1	0.000	0.000
2	-0.000	2.169
3	-0.000	2.650
4	-0.000	4.000
5	-0.000	5.350
6	-0.000	5.831
7	-0.000	8.000
8	1.550	0.000
9	1.550	2.169
10	1.550	5.831
11	1.550	8.000
12	3.100	0.000
13	3.100	2.169
14	3.100	5.831
15	3.100	8.000
16	4.650	0.000
17	4.650	2.169
18	4.650	5.831
19	4.650	8.000
20	6.200	0.000
21	6.200	2.169
22	6.200	5.831
23	6.200	8.000
24	7.750	0.000
25	7.750	2.169
26	7.750	5.831
27	7.750	8.000
28	9.300	0.000
29	9.300	2.169
30	9.300	5.831
31	9.300	8.000
32	10.850	0.000
33	10.850	2.169
34	10.850	5.831
35	10.850	8.000
36	12.400	0.000
37	12.400	2.169
38	12.400	2.650
39	12.400	4.000
40	12.400	5.350
41	12.400	5.831
42	12.400	8.000

Datos de Barras

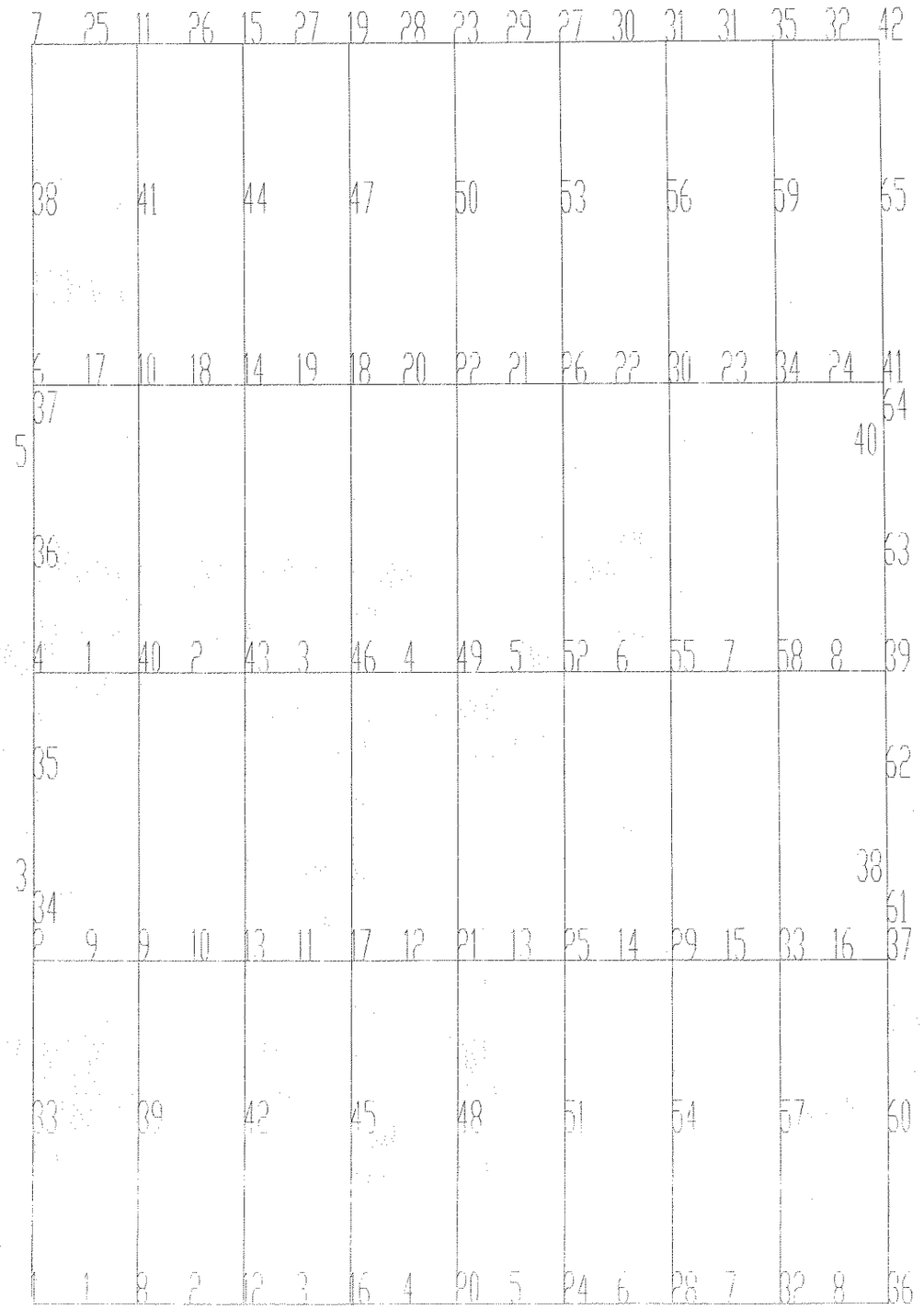
Barra	Nudo I	Nudo J	Ancho (m)	Iflex (m4)	Jtor (m4)
1	1	8	1.085	0.000999	0.003110
2	8	12	1.085	0.000999	0.003110
3	12	16	1.085	0.000999	0.003110
4	16	20	1.085	0.000999	0.003110
5	20	24	1.085	0.000999	0.003110
6	24	28	1.085	0.000999	0.003110
7	28	32	1.085	0.000999	0.003110
8	32	36	1.085	0.000999	0.003110
9	2	9	2.915	0.324996	0.199746
10	9	13	2.915	0.324996	0.199746
11	13	17	2.915	0.324996	0.199746
12	17	21	2.915	0.324996	0.199746
13	21	25	2.915	0.324996	0.199746
14	25	29	2.915	0.324996	0.199746
15	29	33	2.915	0.324996	0.199746
16	33	37	2.915	0.324996	0.199746
17	6	10	2.915	0.324996	0.199746
18	10	14	2.915	0.324996	0.199746
19	14	18	2.915	0.324996	0.199746
20	18	22	2.915	0.324996	0.199746
21	22	26	2.915	0.324996	0.199746
22	26	30	2.915	0.324996	0.199746
23	30	34	2.915	0.324996	0.199746
24	34	41	2.915	0.324996	0.199746
25	7	11	1.085	0.000999	0.003110
26	11	15	1.085	0.000999	0.003110
27	15	19	1.085	0.000999	0.003110
28	19	23	1.085	0.000999	0.003110
29	23	27	1.085	0.000999	0.003110
30	27	31	1.085	0.000999	0.003110
31	31	35	1.085	0.000999	0.003110
32	35	42	1.085	0.000999	0.003110
33	1	2	0.775	0.000714	0.001428
34	2	3	0.775	0.113938	0.280822
35	3	4	0.775	0.113938	0.280822
36	4	5	0.775	0.113938	0.280822
37	5	6	0.775	0.113938	0.280822
38	6	7	0.775	0.000714	0.001428
39	8	9	1.550	0.001428	0.002856
40	9	10	1.550	0.194092	0.561644
41	10	11	1.550	0.001428	0.002856
42	12	13	1.550	0.001428	0.002856
43	13	14	1.550	0.194092	0.561644
44	14	15	1.550	0.001428	0.002856
45	16	17	1.550	0.001428	0.002856
46	17	18	1.550	0.194092	0.561644
47	18	19	1.550	0.001428	0.002856

48	20	21	1.550	0.001428	0.002856
49	21	22	1.550	0.194092	0.561644
50	22	23	1.550	0.001428	0.002856
51	24	25	1.550	0.001428	0.002856
52	25	26	1.550	0.194092	0.561644
53	26	27	1.550	0.001428	0.002856
54	28	29	1.550	0.001428	0.002856
55	29	30	1.550	0.194092	0.561644
56	30	31	1.550	0.001428	0.002856
57	32	33	1.550	0.001428	0.002856
58	33	34	1.550	0.194092	0.561644
59	34	35	1.550	0.001428	0.002856
60	36	37	0.775	0.000714	0.001428
61	37	38	0.775	0.113938	0.280822
62	38	39	0.775	0.113938	0.280822
63	39	40	0.775	0.113938	0.280822
64	40	41	0.775	0.113938	0.280822
65	41	42	0.775	0.000714	0.001428

Datos de Tramos de Vigas

Tramo	Viga	Ancho (m)	Canto (m)	Area (m)	Va (m)	Vb (m)	Inercia (m4)	JTor (m4)
1	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
2	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
3	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
4	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
5	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
6	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
7	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968
8	1	8.000	1.355	2.8771	0.3288	0.7712	0.728779	1.597968

Croquis Emparrillado


7 25 11 26 15 27 19 28 23 29 27 30 31 31 35 32 42
38 41 44 47 50 53 56 59 65
6 17 10 18 14 19 18 20 22 21 26 22 30 23 34 24 41
5
37 64
40
36 63
4 1 40 2 43 3 46 4 49 5 52 6 55 7 58 8 39
35 62
3
38
34 61
2 9 9 10 13 11 17 12 21 13 25 14 29 15 33 16 37
33 39 42 45 48 51 54 57 60
1 1 8 2 12 3 16 4 20 5 24 6 28 7 32 8 36

Resultados del análisis

Envolvente de Esfuerzos

Esfuerzos Cortantes en t

Viga	Tramo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máximo	S.C. Mínimo	Carro Máximo	Carro Mínimo	Total Máximo	Total Mínimo
1	1	-22.31	-31.62	-19.02	0.00	-17.36	0.00	-76.66	-72.95	-166.98
-	-	-16.73	-23.71	-19.02	0.00	-17.36	0.00	-76.66	-59.47	-153.49
1	2	-16.73	-23.71	-13.59	0.00	-12.41	0.00	-61.24	-54.03	-127.68
-	-	-11.16	-15.81	-13.59	0.00	-12.41	0.00	-61.24	-40.55	-114.20
1	3	-11.16	-15.81	-8.15	0.00	-7.45	13.70	-49.07	-21.42	-91.63
-	-	-5.58	-7.90	-8.15	0.00	-7.45	13.70	-49.07	-7.94	-78.15
1	4	-5.58	-7.90	-2.72	0.00	-2.48	25.65	-37.35	9.45	-56.03
-	-	-0.00	0.00	-2.72	0.00	-2.48	25.65	-37.35	22.93	-42.54
1	5	-0.00	-0.00	2.72	2.48	0.00	37.35	-25.65	42.54	-22.93
-	-	5.58	7.90	2.72	2.48	0.00	37.35	-25.65	56.03	-9.45
1	6	5.58	7.90	8.15	7.45	0.00	49.07	-13.70	78.15	7.94
-	-	11.16	15.81	8.15	7.45	0.00	49.07	-13.70	91.63	21.42
1	7	11.16	15.81	13.59	12.41	0.00	61.24	0.00	114.20	40.55
-	-	16.73	23.71	13.59	12.41	0.00	61.24	0.00	127.68	54.03
1	8	16.73	23.71	19.02	17.36	0.00	76.66	0.00	153.49	59.47
-	-	22.31	31.62	19.02	17.36	0.00	76.66	0.00	166.98	72.95

Momentos flectores en t.m

Viga	Tramo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máximo	S.C. Mínimo	Carro Máximo	Carro Mínimo	Total Máximo	Total Mínimo
1	1	0.00	-0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00
-	-	30.26	42.88	29.48	26.91	0.00	69.50	0.00	199.03	102.63
1	2	30.26	42.88	29.48	26.91	0.00	69.50	0.00	199.03	102.63
-	-	51.87	73.52	50.54	46.13	0.00	116.00	0.00	338.06	175.93
1	3	51.87	73.52	50.54	46.13	0.00	116.00	0.00	338.06	175.93
-	-	64.84	91.90	63.17	57.66	0.00	144.33	0.00	421.91	219.91
1	4	64.84	91.90	63.17	57.66	0.00	144.33	0.00	421.91	219.91
-	-	69.17	98.02	67.39	61.50	0.00	156.00	0.00	452.08	234.57
1	5	69.17	98.02	67.39	61.50	0.00	156.00	0.00	452.08	234.57
-	-	64.84	91.90	63.17	57.66	0.00	144.33	0.00	421.91	219.91
1	6	64.84	91.90	63.17	57.66	0.00	144.33	0.00	421.91	219.91
-	-	51.87	73.52	50.54	46.13	0.00	116.00	0.00	338.06	175.93
1	7	51.87	73.52	50.54	46.13	0.00	116.00	0.00	338.06	175.93
-	-	30.26	42.88	29.48	26.91	0.00	69.50	0.00	199.03	102.63
1	8	30.26	42.88	29.48	26.91	0.00	69.50	0.00	199.03	102.63
-	-	-0.00	-0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00

Envolvente de Reacciones

Nudo	P.Propio Viga	P.Propio Losa	Carga Perman.	S.C. Máxima	S.C. Mínima	Carro Máxima	Carro Mínima	Total Máxima	Total Mínima
3	11.156	15.810	10.869	12.308	-2.388	54.177	-1.918	104.319	33.528
5	11.156	15.810	10.869	12.308	-2.388	54.177	-1.918	104.319	33.528
38	11.156	15.810	10.869	12.308	-2.388	54.177	-1.918	104.319	33.528
40	11.156	15.810	10.869	12.308	-2.388	54.177	-1.918	104.319	33.528

Dimensionamiento Vigas Laterales

DIMENSIONAMIENTO DE VIGAS

CALCULO DE PUENTES NERVADOS DE CARRETERA

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CLIENTE : AVE OLERDOLA U.T.E.

OBRA : VANOS LATERALES

FECHA : 30/01/04

DATOS GEOMETRICOS

```
Solución ..................... = 1  CAA- 110
Luz de Cálculo .............[m] = 12.4
Intereje ...................[m] = 8
Dis. eje V.Borde a Ex.Tablero [m] = 4
Ancho Cabeza Superior ........... = 1.095
Canto Cabeza Superior ........... = 0.13
Ancho Cabeza Inferior ........... = 3.4
Profundidad Talón ............... = 0.25

Ancho del Tablero ..........[m] = 8
Ancho de las Aceras ........[m] = 1
Ancho Eficaz [ B0 ] ........[m] = 8

Angulo de Esviaje ..........[g] = 100
Espesor de la Losa .........[m] = 0.255
Canto Total ................[m] = 1.355
Espesor del Pavimento ......[cm] = 10.5

Peso del Carro .............[Tn] = 60
Distan. del carro a la Acera  [m] = 0.5
Peso Aceras y Barandillas [Tn/ml] = 1
Tipo ambiente .....(I,II,III) = II
```

CARACTERISTICAS MECANICAS

[INICIALES]

```
VaI ...  [m] = 0.73790
VbI .... [m] = 0.36210
AREA .. [m²] = 1.51706
INERCIA [m4] = 0.18434
```

[FINALES]

```
VaF ..... [m] = 0.315586
VbF ..... [m] = 0.784414
VcF ..... [m] = 0.570586
INER.FIN. [m4] = 0.747655
K (rasante)... = 0.967179
```


ESFUERZOS LONGITUDINALES [MTn.]

```
M1 =    69.1699
M2 =    98.0199
M3 =    67.3899
M4 =    61.5000
M5 =   156.0000
```

TENSIONES

TENSIONES DE FLEXION DEBIDO A LAS CARGAS EXTERIORES SIN PRETENSADO [Tn/m²]

Resumen

	EN FABRICA		EN SERVICIO		
PUNTO	SA	SB	SA	SB	SC
6.19	276.8	-135.9	697.6	-399.2	51.4L/2
5.69	275.0	-135.0	693.1	-396.6	51.0
5.19	269.6	-132.4	679.5	-388.8	50.0
4.69	260.6	-128.0	656.8	-375.8	48.4
4.19	248.0	-121.8	625.0	-357.6	46.0
3.69	231.8	-113.8	584.2	-334.3	43.0
3.19	212.0	-104.1	534.3	-305.7	39.3
2.69	188.6	-92.6	475.3	-272.0	35.0
2.19	161.6	-79.4	407.2	-233.0	30.0
1.69	131.0	-64.3	330.1	-188.9	24.3
1.19	96.8	-47.6	243.9	-139.6	17.9
0.69	58.9	-29.0	148.6	-85.1	10.9
0.19	17.5	-8.7	44.2	-25.4	3.2
0.00	0.0	0.0	0.0	0.0	0.0APOYO

CON CARGAS MAXIMAS

	SA			SB			SC		
PUNTO	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL
6.19	716.0	743.5	789.4	-444.8	-513.3	-627.4	84.6	134.4	217.4L/2
5.69	711.3	738.7	784.3	-441.9	-510.0	-623.3	84.0	133.5	216.0
5.19	697.4	724.2	768.9	-433.2	-499.9	-611.0	82.3	130.9	211.7
4.69	674.1	700.0	743.2	-418.8	-483.2	-590.6	79.6	126.5	204.6
4.19	641.5	666.2	707.3	-398.5	-459.8	-562.1	75.7	120.3	194.7
3.69	599.6	622.7	661.1	-372.5	-429.9	-525.4	70.8	112.5	182.0
3.19	548.4	569.4	604.6	-340.7	-393.1	-480.5	64.7	102.9	166.5
2.69	487.8	506.5	537.8	-303.1	-349.7	-427.4	57.6	91.6	148.1
2.19	417.9	434.0	460.8	-259.6	-299.6	-366.2	49.4	78.4	126.9
1.69	338.8	351.8	373.5	-210.5	-242.9	-296.9	40.0	63.6	102.8
1.19	250.3	260.0	276.0	-155.6	-179.5	-219.4	29.5	47.0	76.0
0.69	152.5	158.4	168.2	-94.8	-109.4	-133.7	18.0	28.6	46.3
0.19	45.4	47.2	50.1	-28.3	-32.7	-39.9	5.3	8.5	13.8

CUADRO DE PRETENSADOS

FILA ->	1	2	3	4	5	6	7	8		
TIPO DE CABLE->	0.6	0.6								
TRAZADO	RECTO	RECTO							N	EX
COTA->	4	106							(TN)	(Cm)
X	Num.	Num.								
6.2	34	6							798	17
0	34	6							798	17

TENSIONES EN DIFERENTES PUNTOS A LO LARGO DE LA VIGA [Tn/m²]

FABRICA ..... = Peso Propio + Pretensado con Pérdidas a Corto Plazo
SERVICIO ..... = Cargas Permanentes + Pretensado con Pérdidas Totales
CARGAS MAXIMAS = Servicio + Sobrecargas Máximas

Resumen

	EN FABRICA		EN SERVICIO		
PUNTO	SA	SB	SA	SB	SC
6.19	263.3	615.5	686.2	233.5	51.4L/2
5.69	261.5	616.4	681.7	236.1	51.0
5.19	256.1	619.0	668.1	244.0	50.0
4.69	247.1	623.4	645.4	257.0	48.4
4.19	234.5	629.6	613.6	275.2	46.0
3.69	218.3	637.6	572.8	298.5	43.0
3.19	198.5	647.3	522.9	327.1	39.3
2.69	175.1	658.8	463.9	360.8	35.0
2.19	148.1	672.0	395.8	399.8	30.0
1.69	117.5	687.1	318.7	443.9	24.3
1.19	83.3	703.8	232.5	493.2	17.9
0.69	45.4	722.4	137.2	547.7	10.9
0.19	4.0	742.7	32.8	607.4	3.2
0.00	-13.5	751.4	-11.4	632.7	0.0APOYO

CON CARGAS MAXIMAS

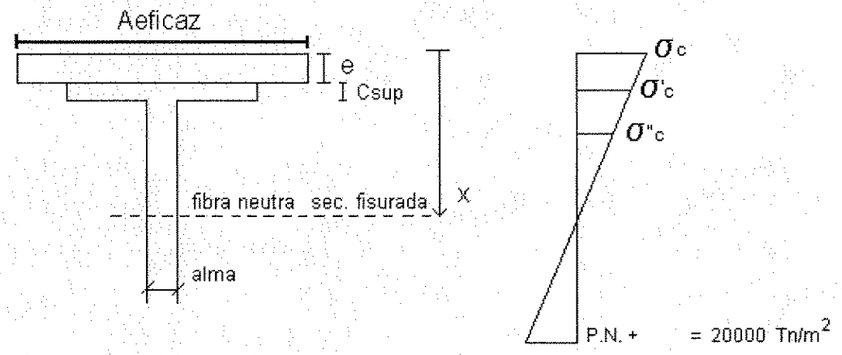
	SA			SB			SC		
PUNTO	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL	0.2SC	0.5SC	TOTAL
6.19	704.6	732.1	778.0	187.9	119.4	5.3	84.6	134.4	217.4L/2
5.69	699.9	727.3	772.9	190.8	122.8	9.5	84.0	133.5	216.0
5.19	686.0	712.8	757.5	199.6	132.9	21.8	82.3	130.9	211.7
4.69	662.7	688.6	731.8	214.0	149.6	42.2	79.6	126.5	204.6
4.19	630.1	654.8	695.9	234.3	173.0	70.7	75.7	120.3	194.7
3.69	588.2	611.3	649.7	260.3	202.9	107.3	70.8	112.5	182.0
3.19	537.0	558.1	593.2	292.1	239.7	152.3	64.7	102.9	166.5
2.69	476.4	495.2	526.4	329.7	283.1	205.4	57.6	91.6	148.1
2.19	406.5	422.6	449.4	373.2	333.2	266.6	49.4	78.4	126.9
1.69	327.4	340.4	362.1	422.3	389.9	335.9	40.0	63.6	102.8
1.19	238.9	248.6	264.6	477.2	453.3	413.4	29.5	47.0	76.0
0.69	141.1	147.0	156.8	538.0	523.4	499.1	18.0	28.6	46.3
0.19	34.0	35.8	38.7	604.5	600.2	592.9	5.3	8.5	13.8
0.00	-11.4	-11.4	-11.4	632.7	632.7	632.7	0.0	0.0	0.0APOYO

RESISTENCIA DE HORMIGONES [Tn/m²]

AL DESTESAR .. = 1251.91
A LOS 28 DIAS = 1245.10 se dispone Hormigón de 5000
EN LOSA ..... = 347.87 '' '' '' '' 2500

APERTURA DE FISURAS (Art. 49.2.5.)

Criterio aproximado : La apertura de fisura <= 0.2 mm está asegurada si el incremento de tensión de la armadura activa debido a la acción de las cargas exteriores es inferior a 2000 Kg/cm².



Considerando losa:

Ancho eficaz = 8
Alma = 0.5
e = 0.255
Csup = 0.13

Canto útil = 131.500 cm (110 + 25.5 - C.D.G. tracción)

Ap = 47.600 cm²
Pretensado = 678.300 Tn
0.8 P = 542.640 Tn

- AT para 20000 Tn/m² -> AT = 47.6 x 2000 = 95200 Kg.

Resulta x = 25.00088

S1 = 853.6434
S2 = -17.04223
S3 = -460.9211

Mfisuración para (Wk = 0.2 mm) = 780.058

El momento total de las cargas exteriores en servicio era de 452.08 < 780.06 tm por tanto no se llega a una apertura de fisura de 0.2 mm.

Comprobación Ambiente tipo II :

Tensión bajo 20% SC = 187.86
Mfis > Mcav CUMPLE Art. 49.2.4

CALCULO A ROTURA

Pasiva en Tracción ..... [Tn] = 0.00
Armadura Activa ..... [Tn] = 707.79
Capacidad total en tracción N.. [Tn] = 707.79
Pasiva en Compresión ..... [Tn] = 0.00
Recubrimiento Pasiva Compresión [cm] = 0.00
Zona ..... = I
Ancho Eficaz ..... [m] = 8.00
Capa Compresión ..... [cm] = 25.50

Dis. CDG Compre. a Fibra Super. [cm] = 3.12
Profundidad de Compresiones ... [cm] = 6.25
Dis. CDG Trac. a Fibra Inferior [cm] = 4.00
Canto Resistente ..... [m] = 1.28

[MR+] Momento de Rotura ..... [MTn.] = 908.64

[Ma]= 1.35 x(M1+ M2+ M3) [MTn.] = 316.68
[Mb]= 1.50 x(M4 + M5) [MTn.] = 326.25
[Mt] Momento Total ..... [MTn.] = 642.93

MR+ > Mt [Admisible]

[MOMENTOS [MTn.]]

M1 ... = 69.169
M2 ... = 98.019
M3 ... = 67.389
M4 ... = 61.500
M5 ... = 156.000
M TOTAL= 452.079

ARMADURAS DE CORTANTES

Acero Fy [Kg/cm²] = 5000 Espesor del Alma [cm] = 50
Ff1 [fct´m] = 407.163 Canto Util (mm) = 1305.0
Fydc = 40000 (Tn / m²) Xi = 1.39
Fcdv = 3333.333 Armadura mínima = 8.3 (cm²/ml)
Q1 = 22.3099
Q2 = 31.6200
Q3 = 19.0200
Q4 = 17.3600
Q5= 76.6600

ARMADURAS DE CORTANTES

PTO	X	Vcperm	Vsob	V	Vrd	SIGMA xd	COTAG
1	0	72.95	94.02	166.97	239.51	-17.36	1.19
2	0.69	64.71	77.22	141.92	203.18	-28.37	1.30
3	1.69	52.95	60.41	113.35	162.09	-41.82	1.42
4	2.69	41.18	43.61	84.78	121	-52.58	1.51
5	3.69	29.42	26.80	56.21	79.91	-60.66	1.57

ARMADURAS DE CORTANTES

PTO	X	Vu1	Vcu C.Hor.	Vcu C.Pre.	Vv2	Vsu	A90	Diam	S
1	0	642.35	42.14	17.6	59.7	179.8	32.04	12	10
2	0.69	630.34	42.14	17.6	59.7	143.47	23.44	12	15
3	1.69	613.79	42.14	17.6	59.7	102.38	15.3	10	20
4	2.69	600.18	42.14	17.6	59.7	61.29	8.61	8	20
5	3.69	590.06	42.14	17.6	59.7	20.2	8.33	8	20

S I M B O L O G I A

PTO = Punto número
X = Distancia al apoyo en m.
SIGMAXD = Tensión normal de cálculo a la altura del centro de gravedad de la sección. (art. 44.2.3.2)
COTAG = Cotangente. (art. 44.2.3.2.2)
K = Coef. reductor por efecto del esfuerzo axil. (art. 44.2.3.1)
Vu1 = Cortante de agotamiento por compresión oblicua. (art. 44.2.3.1)
VCU = Contribución hormigón resist. esfuerzo cortante. (art. 44.2.3.2.2)
A90 = Area necesaria en estribos por metro lineal en cm²/ml.
Diam. = Diámetro de la barra en estribos en mm.
S = Separación entre estribos en cm.

Estribos por alma

RASANTE VIGA - LOSA

Rugosidad alta

Betarug = 0.4 Murug = 0.9
Fck losa = 2500 Tn/m²
Fcltk = 179.5475 Tn/m²
Fcltd = 119.6983 Tn/m²
Tau1 = 416.6667 Tn/m²
Apre = 0.00476 m²
Fd junta (S9) = 497.8859 Tn
Superficie contacto (P) = 0.2396029 (m²/m)
Ar.min.ras.= 2.276228 cm²/m
Arm. Total = 118.5443 cm²

PROPUESTA DE ARMADO

Pto	Desde	Hasta	Arm. Total (cm²)	A90 (cm²/ml)
1	0	2.48	79.030	31.86674
2	2.48	4.13	29.636	17.92504
3	4.13	6.20	9.879	4.78001

RASANTE FONDO - VIGAS

Pto	Desde	Hasta	Rasante (Tn/m)	A90 (cm²/ml)
1	0	2.48	131.247	32.8118
2	2.48	4.13	50.940	12.7351
3	4.13	6.20	22.886	5.7216

PLACAS DE APOYO DE NEOPRENO

Carga Máxima en Apoyo..... [Tn] = 104.3190
Carga Mínima en Apoyo..... [Tn] = 37.8340
Módulo Elasticidad Hormigón [Tn/m²] = 3000000
Mód. Def. Trans. Neo. C.Lentas[Tn/m²] = 90
Mód. Def. Trans. Neo. C.Rápida[Tn/m²] = 180
Giro de Apoyo..... [Rad] = 0.0003
Carga de Frenado en Apoyo..... [Tn] = 7.0000
Carga de Viento en Apoyo ..... [Tn] = 3.8052
Carga de Retrac. Flu. en Apoyo ..[Tn] = 1.9042

---- APOYO de 300 mm X 350 mm. en Planta y 34 mm. de Altura ----

[COMPROBACION]

Estabilidad : e.neto <= a/5 [mm]
- 20 < 60 --> CUMPLE
Tensión Máxima de Compresión [Kg/cm²] :
- 99.3514 --> CUMPLE
Tensión Mínima de Compresión [Kg/cm²] :
- 36.0324 --> CUMPLE
Deslizamiento : H < N x (0.1 + (6 x A / N)) [Tn.]
- Cargas Máximas : 9.1922 < 16.7319 --> CUMPLE
- Cargas Mínimas : 4.2551 < 10.0834 --> CUMPLE
Deformación tangencial horizontal :
- Cargas Lentas : Des.l / e.neto < 0.5
- 0.2015 < 0.5 --> CUMPLE
- Cargas Totales : Des.t / e.neto < 0.7
- 0.5845 < 0.7 --> CUMPLE
Giro : G. máximo > G. apoyo [Rad.]
- 0.0091 > 0.0003 --> CUMPLE
Comprobación de Rasantes :
- Vertical : rv < 3 Gl [Kg/cm²]
- 18.4510 < 27 --> CUMPLE
- Giro : ra < 1.5 Gl [Kg/cm²]
- 0.6661 < 13.5 --> CUMPLE
Rotura por tracción de Chapas :
- e.chapa [cm] = 0.3 > 0.0002 --> CUMPLE

Armadura Transversal de la Losa

CALCULO ARMADURA

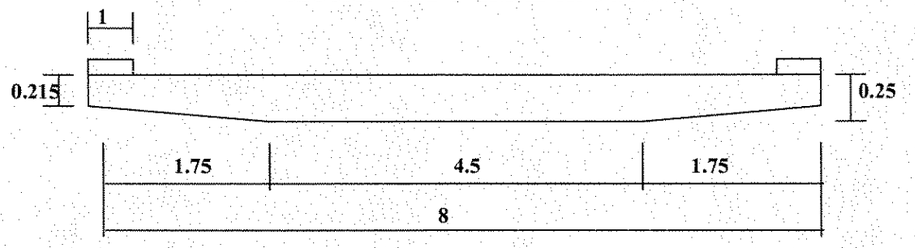
TRANSVERSAL DE LA LOSA

CLIENTE . . . . . : AVE OLERDOLA

LUGAR DE LA OBRA . . . . : P.S. 4 + 300

FECHA . . . . . : 17/02/2004

SECCION TRANSVERSAL TIPO LOSA



DATOS PARA EL CALCULO

Espesor del pavimento . . . . . [m] : **0.105**
Peso de la Acera . . . . . [Tn/m2] : **0.5**
Peso de la Barandilla . . [Tn/ml] : **0.5**
Dis. Carro a la Acera . . . . . [m] : **0.5**
Recubrimiento [*] . . . . . [m] : **0.04**
Lc de Voladizo . . . . . [m] : **1.9**
Luz de Cálculo M+ . . . . . [m] : **3.95**

[*] El recubrimiento introducido es al C.D.G. de la Armadura

RESISTENCIAS Y COEFICIENTES

Res. Hormigón Fck . . . [Tn/m2] : **2500**
Res. Acero Fyk . . . . . [Tn/m2] : **50000**
Coef. Minoración Hormigón . . . . : **1.5**
Coef. Minoración Acero . . . . . : **1.15**

CALCULO DE MOMENTOS NEGATIVOS

Momento de Peso Propio : **1.0148** [mTn / ml]
Momento de Aceras y Bara. : **1.6500** [mTn / ml]
Momento de Pavimento : **0.1020** [mTn / ml]
Momento de Sobrecarga : **0.7220** [mTn / ml]
Momento del Carro . . . . . : **3.1602** [mTn / ml] Para AMBIENTE II
Momento del Carro . . . . . : **1.8961** [mTn / ml] Para AMBIENTE III

Para AMBIENTE III se considera una Carga 6 Tn. por Rueda
Los momentos de Peso Propio no se han considerado por estar soportados por la armadura existente en el encofrado prefabricado (CELOSIAS)

Momento máximo Negativo por metro : **5.6343** [mTn] Para AMBIENTE II
Momento máximo Negativo por metro : **3.6482** [mTn] Para AMBIENTE III
Momento máximo Negativo mayorado : **8.4515** [mTn]

CALCULO DE MOMENTOS POSITIVOS

Momento máximo Positivo mayorado por metro : **10.3601** [mTn]

COMPROBACION DEL ESTADO DE FISURACION

AMBIENTE II

Solicitación de Servicio [Mtn] : **2.528517**

Apertura Fisura Carac. Wk [mm] : **5.431562**
Separación de Fisuras. Sm [cm] : **15.37359**
Tensión de Servicio [Kp/cm2] : **109.1088**
Ten. Arm. Ins. Fisura [Kp/cm2] : **1511.909**

Apertura Fisura Máxima [mm] : **0.3**

AMBIENTE III

Solicitación de Servicio [Mtn] : **2.131294**

Apertura Fisura Carac. Wk [mm] : **4.578279**
Separación de Fisuras. Sm [cm] : **15.37359**
Tensión de Servicio [Kp/cm2] : **91.96811**
Ten. Arm. Ins. Fisura [Kp/cm2] : **1511.909**

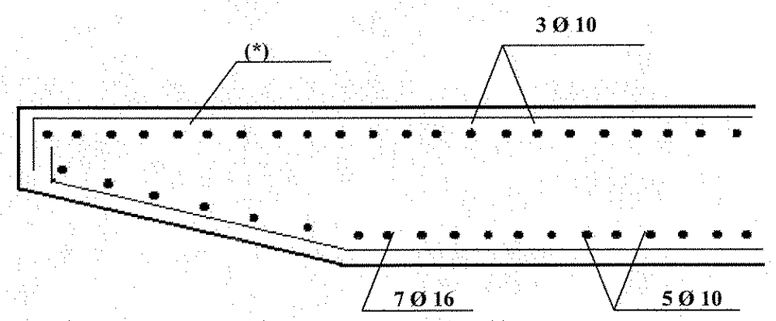
Apertura Fisura Máxima [mm] : **0.15**

ARMADO DE LA LOSA

ARMADURA PRINCIPAL CARA SUPERIOR (*)

a) Armadura necesaria por Flexión = **5 Ø 16**
b) Arm. Nec. Fisuración AMBIENTE II = **5 Ø 16**
c) Arm. Nec. Fisuración AMBIENTE III = **5 Ø 16**

Armaduras por metro



Cálculo de los Neoprenos

	Estribo		Pila 1		Pila 2		Pila 3		Estribo
MÁXIMA (Tn)	104.319	104.319	126.98	126.98	147.56	147.56	104.319	104.319	
MÍNIMA (Tn)	33.528	33.528	53.40	53.40	67.43	67.43	33.528	33.528	

DIMENSIONAMIENTO DE NEOPRENOS

	ESTRIBO	PILA 1		PILA 2		PILA 3		ESTRIBO
Dist. Pto dilatación nula (m)	33.700	21.300	20.300	2.800	1.800	20.300	21.300	33.700
Desplazamiento (m)	0.0211	0.0133	0.0127	0.0018	0.0011	0.0127	0.0133	0.0211
Dimensiones del apoyo								
a (mm)	**300**	**300**	**350**	**350**	**350**	**350**	**300**	**300**
b (mm)	**350**	**350**	**350**	**350**	**400**	**400**	**350**	**350**
Tensiones medias (Kg /cm²)								
□max	99.351	99.351	103.658	103.658	105.402	105.400	99.351	99.351
□min	31.931	31.931	43.588	43.588	48.165	48.164	31.931	31.931
Espesores capas								
Neopreno (mm)	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
Acero (mm)	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Nº de capas	5.000	3.000	3.000	2.000	2.000	3.000	3.000	5.000
h neopreno (m)	0.05	0.03	0.03	0.02	0.02	0.03	0.03	0.05
tang □	0.4213	0.4438	0.4229	0.0875	0.0563	0.4229	0.4438	0.4213
h total (mm)	**73**	**47**	**47**	**34**	**34**	**47**	**47**	**73**
h neta (mm)	55	35	35	25	25	35	35	55

Cargas Horizontales

REACCIONES HORIZONTALES DEBIDAS A FRENADO

- Propiedades de los materiales (t/m2)

E pila : 3.00E+06
G neopreno : 180
Frenado (t) 14.00

APOYOS	Subestructura		NEOPRENOS		CONSTANTES ELÁSTICAS			FRENADO	
	Altura (m)	Inercia (m4)	Area (m2)	Altura (m)	Pila	Neoprenos	Total	Ki / K1	Hfr (t)
Estribo 1	0.000	0.000	0.210	0.055	0.000	630.000	630.000	1.000	1.639
Pila 1	8.439	0.3312	0.455	0.035	4959.751	2047.500	1449.226	2.300	3.771
Pila2	10.519	0.3312	0.525	0.025	2560.999	3150.000	1412.563	2.242	3.676
Pila 3	10.057	0.3312	0.490	0.035	2930.404	2205.000	1258.234	1.997	3.274
Estribo 2	0.000	0.000	0.210	0.055	0.000	630.000	630.000	1.000	1.639
							Total...	***8.540***	***14.000***

REACCIONES HORIZONTALES DEBIDAS A RETRACCIÓN Y FLUENCIA

- Propiedades de los materiales (t/m2)

E pila : 3.00E+06
G neopreno : 90.00

APOYO	SUBESTRUCTURA		NEOPRENOS		CONSTANTES ELÁSTICAS (t/m)			DESPLAZAMIENTOS Y REACCIONES			
	Altura (m)	Inercia (m4)	Area (m2)	Altura (m)	Pila	Neoprenos	Total	x (m)	K.Dx (t)	Desplaz. (m)	Reacción (t)
Estribo 1	0.000	0.000	0.210	0.055	0.000	315.000	315.000	0.000	0.000	0.02044	6.439
Pila 1	8.439	0.331	0.455	0.035	4959.751	1023.750	848.591	12.900	10946.824	0.01238	10.505
Pila2	10.519	0.331	0.525	0.025	2560.999	1575.000	975.236	31.400	30622.399	0.00082	0.797
Pila 3	10.057	0.331	0.490	0.035	2930.404	1102.500	801.103	54.500	43660.099	-0.01362	-10.911
Estribo 2	0.000	0.000	0.210	0.055	0.000	315.000	315.000	67.400	21231.000	-0.02168	-6.830
							Suma...	*3254.929*	*106460.322*		0.000

Cálculo subestructura P.S. 4+3

L.A.V. MADRID - BARCELONA.
SUBTRAMO X -A
PASO SUPERIOR 4 + 300

- INDICE -

1.- Introducción y Bases de Cálculo.

1.1.- Bases de Cálculo

1.1.1.- Materiales
1.1.1.2.- Hormigón
1.1.1.3.- Acero

1.1.2.- Acciones
1.1.2.1.- Acciones sísmicas
1.1.2.2.- Viento
1.1.2.3.- Combinación de acciones

1.1.3.- Normativa

2.- Sección Transversal.

2.1.- Espesor de losa

3.- Cálculo de Reacciones

3.1.- Cargas Permanentes

3.2.- Sobrecargas de uso
3.2.1.- Vehículo Pesado (Centrado en Tablero)
3.2.2.- Vehículo Pesado Excéntrico
3.2.3.- Sobrecarga uniforme (SCU)
3.2.4.- Frenado

3.3.- Reacciones de Viento sobre tablero

3.4.- Resumen de reacciones verticales

4.- Estribos

4.1.- Estribo 1.
4.1.1.- Dimensionado de muro
4.1.2.- Cimentación
4.1.3.- Aletas.

4.2.- Estribo 2.
4.2.1.- Dimensionado de muro
4.2.2.- Cimentación
4.2.3.- Aletas.

5.- Pilas

5.1.- Pila 1

5.1.1.- Cargas en Coronación Pila 1
5.1.2.- Esfuerzos en arranque de Pila 1
5.1.3.- Cimentación Pila 1

5.2.- Pila 2

5.2.1.- Cargas en Coronación Pila 2
5.2.2.- Esfuerzos en arranque de Pila 2
5.2.3.- Cimentación Pila 2

5.3.- Pila 3

5.3.1.- Cargas en Coronación Pila 3
5.3.2.- Esfuerzos en arranque de Pila 3
5.3.3.- Cimentación Pila 3

5.4.- Dimensionamiento de fuste de Pilas.

5.5.- Dimensionamiento de Zapatas de Pilas

L.A.V. MADRID - BARCELONA
SUBTRAMO X - A
PASO SUPERIOR 4 + 300

1. Introducción y Bases de Calculo.

En el presente Estudio se procede a dimensionar los estribos y pilas de un paso superior de carretera sobre la futura línea de Alta Velocidad en el Subtramo X - A. Esta Obra de Fábrica se ha concebido como una secuencia de 4 vanos isostáticos de luces (12,9 + 18,5 + 23,10 + 12,90), existiendo por lo tanto 2 estribos y 3 pilas.

En este Estudio se calculan las acciones que actuarán sobre los elementos de apoyo (estribos y pilas), para lo cual se ha tenido en cuenta una sección transversal de la OF como la que a continuación se justifica.

En cuanto a las pilas, se han considerado unos fustes de espesor variable (1,20 / 2,30 m) y de anchura variable desde 2,30 m en la base a los 3,40 m, la coronación, permitiendo la disposición de apoyos, tanto por en anchura como por su espesor, que permite el desdoblamiento delos mismos longitudinalmente.

Las cimentaciones de estribos y pilas se realizarán sobre el estrato N-3 de margas grises, por lo cual, y dada la profundidad que ello representa para los estribos, se preve la realización de una cimentación profunda por módulos de pantalla (pilotes rectangulares), para los estribos. También se utilizará este tipo de cimentación en la pila P1, dado que la proximidad a la línia férrea en servicio aconseja este tipo de cimentación, en lugar de utilizar pozos que pudieran exigir excavaciones demasiado profundas, dada la presencia contigua de la vía.

En las pilas P2 y P3 se utilizará una cimentación superficial mediante la ejecución de un pozo relleno con hormigón pobre, desde la cota de cimentación hasta la cota de zapata.

Este diferente tipo de cimentaciones provocará diferencia de asientos entre P1 y P2 y entre P3 y E2, y por lo tanto giros longitudinales de los vanos, siendo ello admisible dada la tipología isostática de los tramos, tal como se justifica en el Estudio Geotécnico de 2003, que evalúa dichos giros.

1.1. Bases de Calculo.

1.1.1. Materiales.

1.1.1.2. Hormigón.

HA 25/B/20/IIa	en pantallas.
HA 30/B/20/IIa	en zapatas.
HA 30/F/20/IIb	en fustes y alzados de estribos.

- Recubrimiento mínimo 25 mm en zapatas.
- Recubrimiento mínimo 30 mm en fuste y alzados de estribos.
- Recubrimiento mínimo 70 mm en pantallas.
- Nivel de control; Intenso $\Delta r = 5$ mm.
- Recubrimiento nominal, $r_{nom} = 30$ mm en zapatas.
  35 mm en fustes y alzados de estribos.
  70 mm en pantallas.

A efectos de determinar el canto útil de las piezas trabajamos con recubrimiento mecánico de 50 mm.

- Nivel de Control, Estadístico $\gamma_c = 1{,}50$.

1.1.1.3. Acero.

El acero en armaduras será

B 500 S

El control del acero será normal, $\gamma_s = 1{,}15$.

1.1.2. Acciones.

Las acciones y sobrecargas son las que se derivan de la aplicación de la "Instrucción sobre las acciones a considerar en el Proyecto de Puentes de Carretera (IAP)" de 1998.

1.1.2.1. Acciones sísmicas .

No es necesario tener en cuenta las acciones sismicas en efecto:

Aceleración básica = 0,04 g. (NCSR-02 Vilafranca del Penedés).

Coeficiente de nivel de daño: 1,3 (Tabla 12 de IAP).

Aceleración de cálculo : 1,3 x 0,04 = 0,052

Al ser Ac = 0,052 < 0,06 g no es necesario tener en cuenta las acciones sísmicas (Art. 3.2.4.2. IAP).

1.1.2.2. Viento.

De acuerdo con el apartado 3.2.3.2.1,h de IAP, podemos aplicar el cálculo simplificado, con los siguientes valores.

Entorno III, Tabla 1 de 3.2.3.2.1. de IAP para zona suburbana, forestal o industrial.

V_{ref} = 24 m/s (Figura 3 de 3.2.3.2.1. de IAP)

Empuje sobre el Tablero	p = 1, 25 KN/m²	Tabla 3 para H ≤ 10 m de
Empuje sobre Pila	p = 1, 54 KN/m²	Art. 3.2.3.1. de IAP

1.1.2.3. Combinación de acciones.

Los coeficientes de mayoración de acciones serán, concretamente en este caso,

$\gamma_g = 1,35.$
$\gamma_q = 1,50.$

y para las combinaciones de acciones se han tomado las sobrecarga de uso como acción dominante, y las solicitaciones de viento como concomitantes ($\psi_0 = 0,60$).

Los coeficientes de mayoración de acciones serán, concretamente en este caso,

$\gamma_g = 1,35.$
$\gamma_q = 1,50.$

y para las combinaciones de acciones se han tomado las sobrecarga de uso como acción dominnate, y las solicitaciones de viento como concomitantes ($\psi_0 = 0,60$).

Corresponde contemplar una situación persistente o transistoria (Art. 3.2.3. Tabla 14 y artículo 4.1.1. de IAP).

$$1,35\ \Sigma\ \gamma_G\ G_k + 1,35\ \Sigma\ \gamma_G \times G_K^* + 1,5\ Q_{K,1} + 1,5 \times 0,6 \times Q_{K,2}$$

donde G_K, acciones permanentes

G_K^*, acciones permanentes de valor np constante (redóficas en nuestro caso).

$Q_{K,1}$ acciones variables dominantes (trenes).

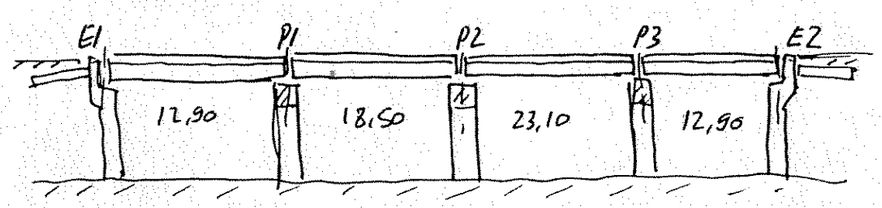
$Q_{K,2}$, acción del viento.

1.1.3. Normativa.

Además de la mencionada IAP, se ha respetado la instrucción EHE para el dimensionamiento de piezas de hormigón armado.

2. Sección Transversal.

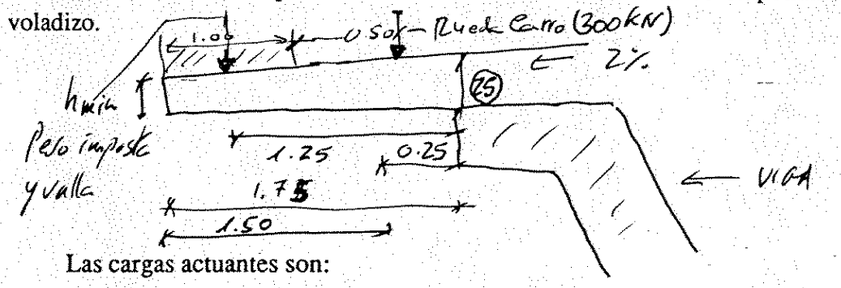
Esquema estático longitudinal.



La Sección Transversal , consiste en una viga cajón de 1,10 m de canto, ancho inferior 3,40 m y superior de 4,50 m. Esta disposición, para tablero de 8,0 m de ancho, permite utilizar losas de cantos razonables sin armadura de cortante. En la figura adjunta se muestra la sección prevista para el Cálculo de Reacciones, y seguidamente se justifica el canto de la losa.

2.1. Espesor de losa.

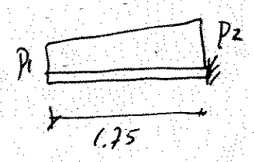
Calculamos el espesor de la losa, lo cual influirá, naturalmente, en el peso propio del tablero. Tanteamos un espesor de 25 cms en la sección critica de empotramiento del voladizo.



Las cargas actuantes son:

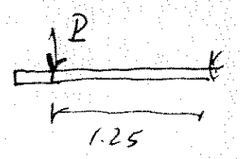
Peso propio:

P1 = 2,5 x 0,215 = 0,54 t/ml = 5,4 KN/ml.
P2 = 2,5 x 0,25 = 0,625 = 6,25 KN/ml.



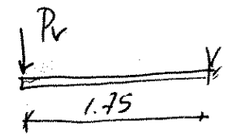
Imposta:

P = 1,25 t/ml = 12,5 KN/m



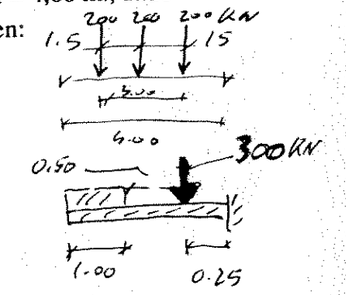
Valla + Barandilla

Pv = 0,25 t/ml = 2,5 KN/m



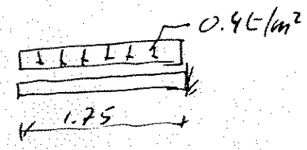
Carro

Para el resparto transversal de esta carga se tomará bef = 4,00 m., dado que longitudinalmente esos 300 KN se descomponen en:



* Art 3.2.3.1.1. IAP

Sobrecarga uniforme (0,4 t/m²) 4 KN/m²



En estas circunstancias los esfuerzos de flexión y cortante valen:

M =[(2 x 5,4 + 6,25) /6] x 1,75² + 12,5 x 1,25 + 2,5 x 1,75 + 300/4 x 0,25 +
+ (4 x 1,75² / 2) = 53,6 KN.m/m

V = (5,4 + 6,25 /2) x 1,75 + 12,5 + 2,5 + 300/4 + 4 x 1,75 = 107,2 KN/m

A partir del análisis de la sección:

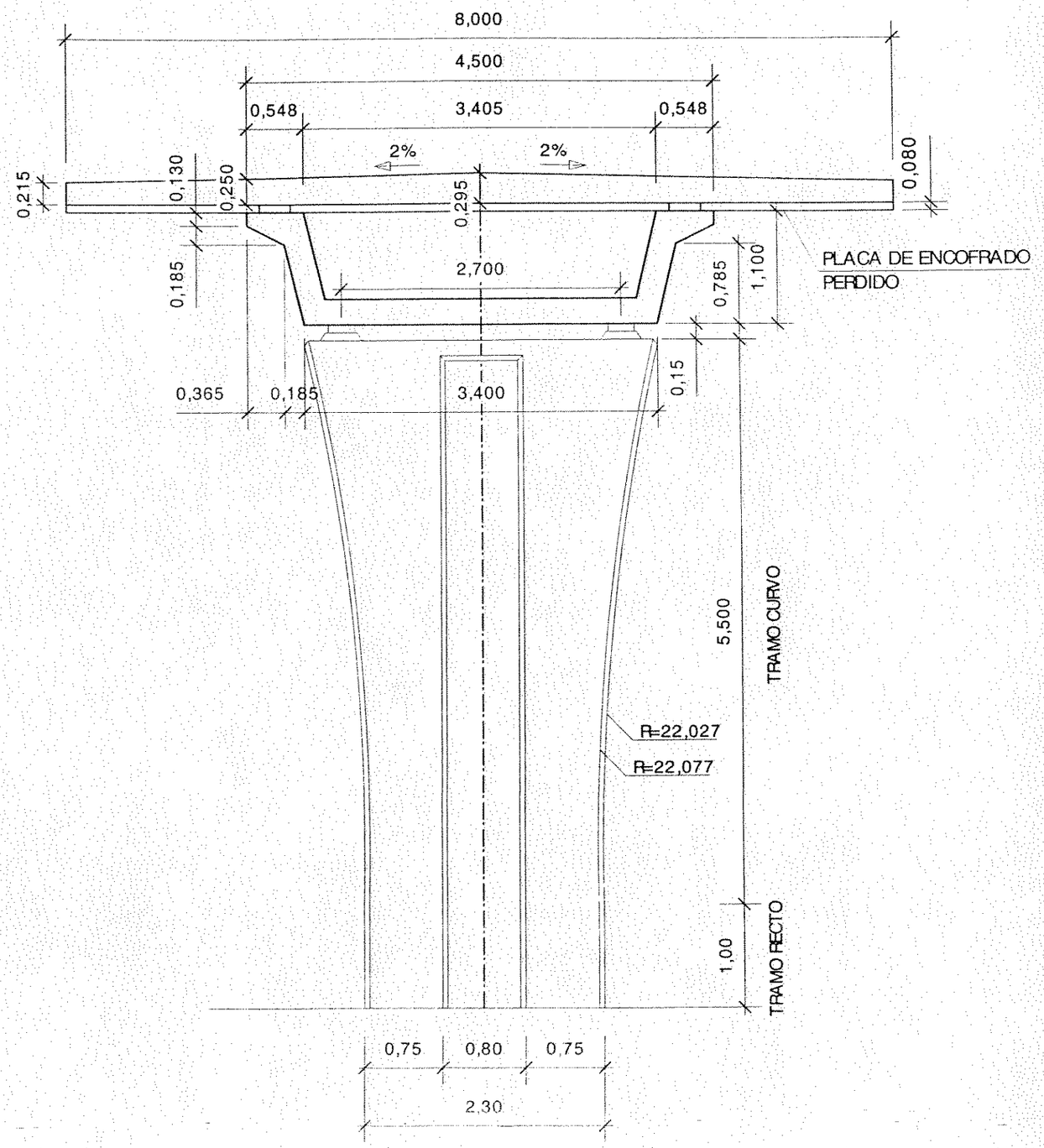
cuyos resultados figuran en los listados adjuntos, podemos concluir:

m_u = 87,1 KN.m/m, luego γ = 87,1 / 53,6 = 1,63, válido.

v_u = 160,2 KN.m/m, luego γ = 160,2 / 107,2 = 1,49, válido*.

* Nótese que el coeficiente de seguridad medio exigible estará entre 1,35 y 1,5.

Podemos pues concluir que la sección propuesta es válida y que no será necesario armar la losa a cortante.


8,000
4,500
0,548
3,405
0,548
2%
2%
0,215
0,130
0,250
0,295
0,080
0,185
2,700
0,785
1,100
PLACA DE ENCOFRADO PERDIDO
0,365
0,185
3,400
0,15
5,500
TRAMO CURVO
R=22,027
R=22,077
1,00
TRAMO RECTO
0,75
0,80
0,75
2,30

LOSA TABLERO

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 25/07/03
Hora: 10:57:43

Características mecánicas de las secciones

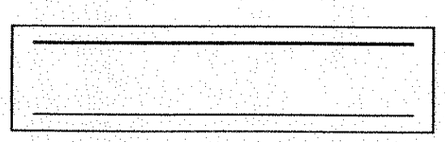
1 Datos

- Materiales

Tipo de hormigón : HA-35
Tipo de acero : B-500-S
fck [MPa] = 35.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : LOSA-TABLERO
b [m] = 1.00
h [m] = 0.25
ri [m] = 0.040
rs [m] = 0.040
A_i [cm2] = 10.00
A_s [cm2] = 25.00



	Sección bruta	Sección homogeneizada
A [m²]	0.2500	0.274
Ix [m4]	0.0013	0.0015
Iy [m4]	0.0208	0.0224
ix [m]	0.07	0.07
iy [m]	0.29	0.29
x´g [m]	0.50	0.50
y´g [m]	0.13	0.12

	Sección fisurada
Ix [m4]	0.0002
Mfis [kN·m]	36.8
y´fis [m]	0.05

2 Resultados

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 25/07/03
Hora: 11:02:52

Comprobación de secciones a flexión simple

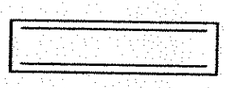
1 Datos

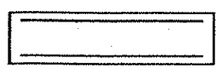
- Materiales

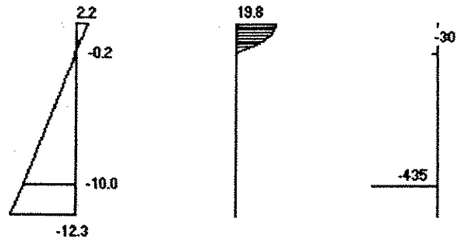
Tipo de hormigón : HA-35
Tipo de acero : B-500-S
fck [MPa] = 35.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : LOSA-TABLERO
b [m] = 1.00
h [m] = 0.25
ri [m] = 0.040
rs [m] = 0.040







Plano de deformación de agotamiento

x [m] = 0.037
1/r [1/m]·1.E-3 = 57.7
εs ·1.E-3 = 2.2
εi ·1.E-3 = -12.3

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.040	25.0	-0.2	30.4
0.210	10.0	-10.0	434.8

2 Comprobación

At [cm²] = 10.0
Ac [cm²] = 25.0

Mu [kN·m] = 87.1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 25/07/03
Hora: 11:00:45

Cálculo de secciones a cortante

1 Datos

- Materiales

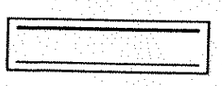
Tipo de hormigón : HA-35
Tipo de acero : B-500-S
fck [MPa] = 35.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : LOSA-TABLERO
b0 [m] = 1.00
h [m] = 0.25



2 Comprobación

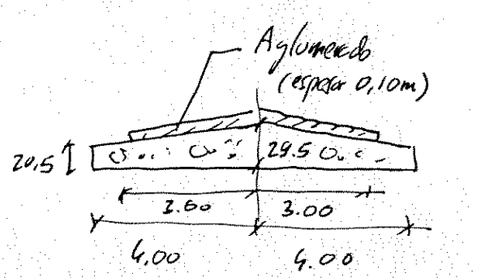
ρl [·1.E-3] = 10
Nd [kN] = 0.0
Vu [kN] = 162.9

3. Cálculo de Reacciones.

Fijada la sección transversal, podemos definir las cargas que nos permitirán calcular las acciones sobre pilas y estribos.

3.1. Cargas Permanentes.

Esquema losa.



SECCION TRANSVERSAL

A = 2 x [(0,215 + 0,295) /2] x 4,00 = 2,04 m²/ml
(area de la losa)

P = 2,04 m²/ml x 25 KN/m³ = 51 KN/ml
(peso losa)

Agl = 0,10 x 6,00 x 24 t/m³ = 14 KN/ml.
(Peso aglomerado)

En resumen, las cargas permanentes, tomando el peso de la viga de 3,6 t/ml, resulta:

Peso Viga:	36 KN/ml.	
Peso Losa:	51 KN/ml.	
Aglomerado:	14 KN/ml.	CP=147 KN/ml.(Total cargas permanentes)
Impostas:	25 KN/ml.	
Valla + Barandilla:	5 KN/ml.	
Encofrado perdido: 0,08x25x8 = 16 KN/ml.		

Las reacciones de carga permanente por apoyo son:

Estribos: (12,9/4) x 147 KN/ml = 474 KN.

Pila 1: [(12,9 + 18,5) / 4] x 147 = 474 + 680 = 1154 KN.

Pila 2: [(18,5 + 23,0) / 4] x 147 = 680 + 849 = 1528 KN.

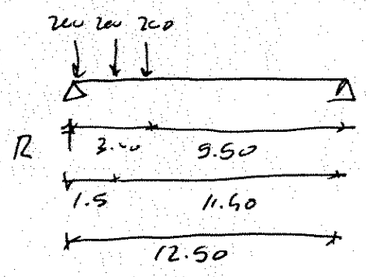
Pila 3: [(23,10 + 12,90) / 4] x 14,7 = 849 + 474 = 1323 KN.

3.2. Sobrecargas de Uso.

3.2.1. Vehículo Pesado. (Centrado en Tablero).

Se calculan las reacciones ante los siguientes posiciones del vehículo pesado (estas hipótesis están en correspondencia con las definidas en el apartado 5).

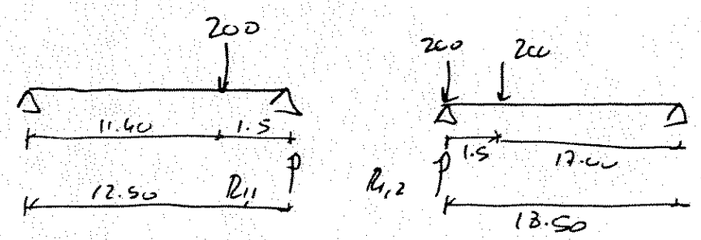
Estribos E_1 y E_2



R = 20 x [1 + (11,40 / 12,90) + (9,90 /12,90)] = 200 x 2,65 = 530 KN (265 KN/apoyo)

Pila P1 (Vanos 1 y 2)

HIP 1 (ambos vanos cargados)

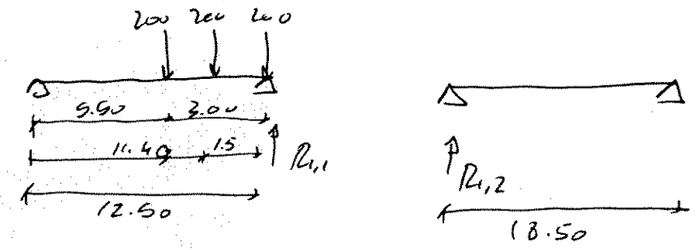


R1,1= 200 (11,40 / 12,90) = 177 KN (85 KN/apoyo)

R1,2 = 200 (1 + 17,00 / 18,50) = 384 KN (192 KN /apoyo)

HIP 2 (vanos continuos cargados excéntricamente). Se obtienen los mismos valores anteriores.

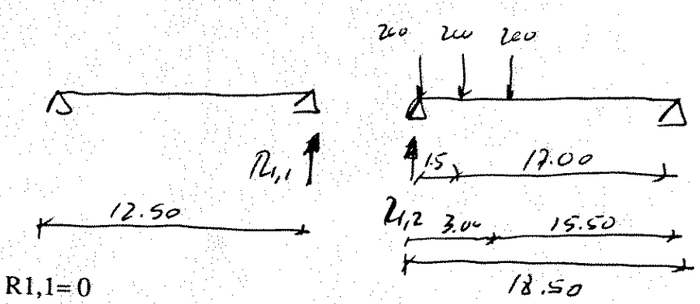
HIP 3 (vano 1 cargado y 2 descargado)



R1,1= 200 [1 + (11,40 / 12,90) + (1,5 / 12,90)] = 400 KN (200 KN/apoyo)

R1,2 = 0

HIP 4 (vano 1 descargado y 2 cargado)

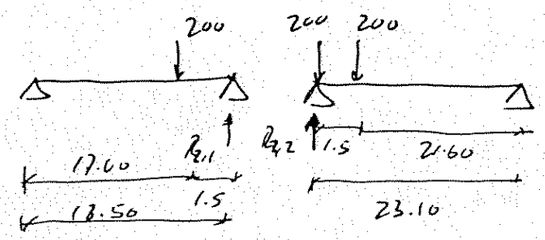


R1,1= 0

R1,2 = 200 [1 + (17,00 / 18,50) + (15,50 / 18,50)] = 551 KN (276 KN /apoyo)

Pila P_2 (Vanos 2 y 3)

HIP 1 (ambos vanos cargados)

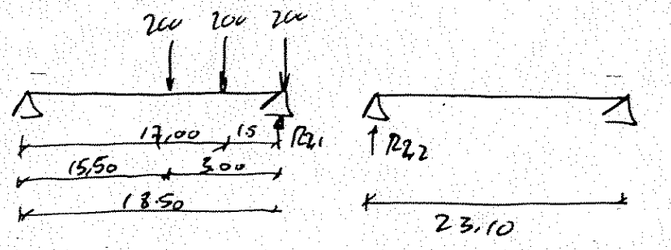


R2,1= 200 (17,00 / 18,50) = 183 KN (92 KN/apoyo)

R2,2 = 200 (1 + 21,60 / 23,10) = 387 KN (194 KN /apoyo)

HIP 2 (vanos continuos cargados excéntricamente). Se obtienen los mismos valores anteriores.

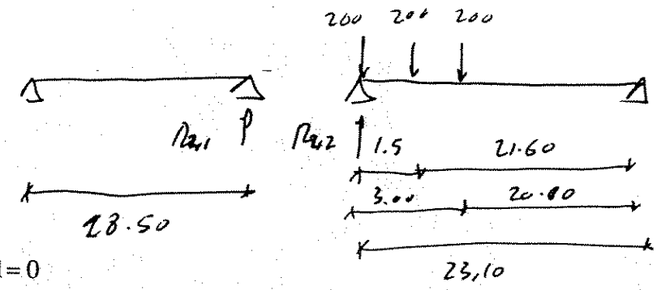
HIP 3 (vano 2 cargado y 3 descargado)



R2,1= 200 [1 + (17,00 / 18,50) + (15,50 / 18,50)] = 551 KN (276 KN/apoyo)

R2,2 = 0

HIP 4 (vano 2 descargado y 3 cargado)

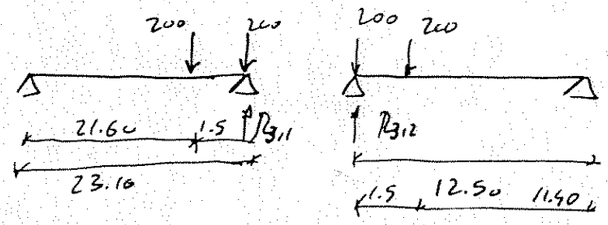


R2,1= 0

R2,2 = 200 [1 + (21,60 / 23,10) +(0,10 / 23,10)] = 561 KN (281 KN /apoyo)

Pila P_3 (Vanos 3 y 4)

HIP 1 (ambos vanos cargados)

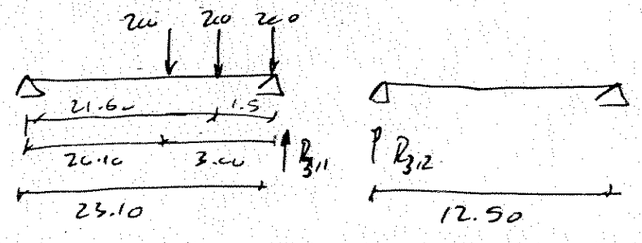


R3,1 = 200 (1 + 21,60 / 23,10) = 387 KN (194 KN /apoyo)

R3,2= 23,10 (11,40 / 12,90) = 177 KN (89 KN/apoyo)

HIP 2 (vanos continuos cargados excéntricamente). Se obtienen los mismos valores anteriores.

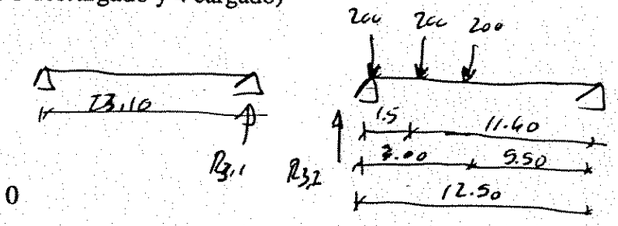
HIP 3 (vano 3 cargado y 4 descargado)



R3,1= 200 [1 + (21,60 / 23,10) + (20,10 / 23,10)]= 561 KN (280 KN/apoyo)

R3,2 = 0

HIP 4 (vano 3 descargado y 4 cargado)



R3,1= 0

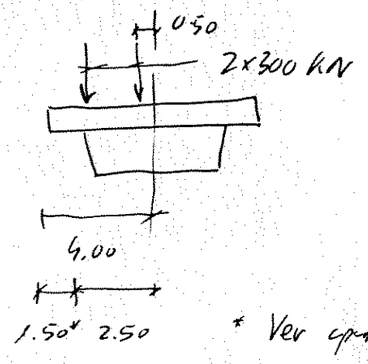
R3,2 = 200 [1 + (11,40 / 12,90) + (9,90 / 12,90)] = 530 KN (265 KN /apoyo)

En resumen, escribimos las reacciones del vehículo pesado obtenidas para las diferentes hipótesis de carga.

	Apoyo 1,i	Apoyo 2,i	Apoyo 1, i + 1	Apoyo 2, i + 1
ESTRIBO1	265	265	-----	-----
PILA 1				
HIP1	89	89	192	192
HIP2	89	89	192	192
HIP3	200	200	-----	-----
HIP4	-----	-----	276	276
PILA 2				
HIP1	92	92	194	194
HIP2	92	92	194	194
HIP3	276	276	-----	-----
HIP4	-----	-----	281	281
PILA 3				
HIP1	194	194	89	89
HIP2	194	194	89	89
HIP3	276	276	-----	-----
HIP4	-----	-----	281	281
ESTRIBO 2	265	265	-----	-----

3.2.2. Vehículo Pesado Excéntrico.

En el caso del Vehículo Pesado excéntrico existirán las mismas reacciones, añadiendo el efecto del torsor máximo:

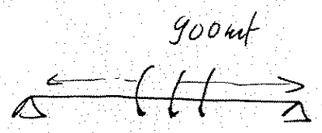


M_T = 300 x 2,5 + 300 x 0,5 = 900 KN/m

(en cualquier sección)

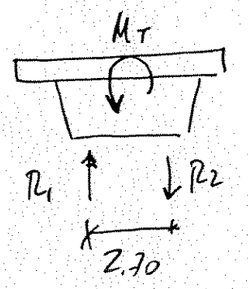
* Ver apdo 2.1

Mtmáx, apoyo = 900 KN . m



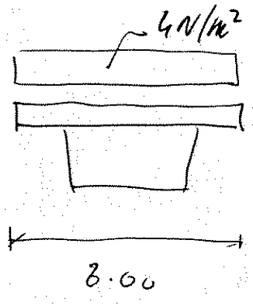
Las reacciones provocadas por este torsor,a añadir al propio peso del carro, son:

$R_1 = - R_2 = M_T / 2,70 = 333$ KN.



3.2.3. Sobrecarga uniforme. (SCU)

(1) SCU TOTAL

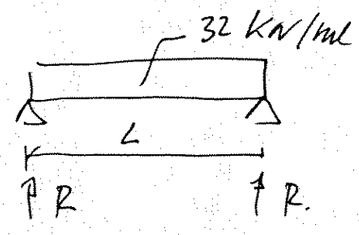


p = 4 KN/m² . 8 m = 32 KN/ml.

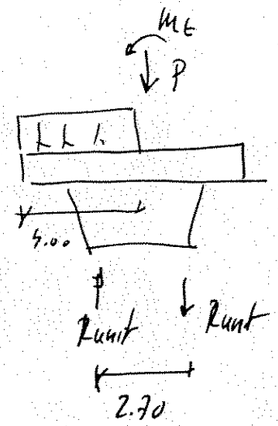
mt = 0

R = 32 . L/2 = 16 L (KN)

R_{unit} = R / 2 = 8 L



(2) SCU EXCENTRICA

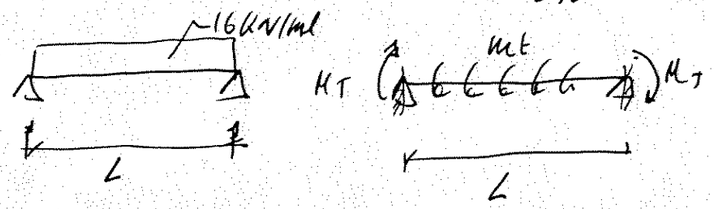


p = 4 KN/m² . 4 m = 16 KN/ml.

R = 16 L/2 = 8 L (KN)

mt = 4 KN/m² x 4²/2 = 32 KN . m/ml

R_{unit} = ± [32 KN m/ml x L/2] / 2,70



Reacciones por apoyo en este caso de SCU excéntrica:

$$R_{unit} = \frac{8\ L}{2} + \frac{32.\ L}{2\ .\ 2.\ 70} = 4\ L \pm 5{,}93\ L$$

9,93 L

- 1,93 L

Así pues, los valores de las reacciones, por apoyo, para los dos casos de carga considerados para la sobrecarga uniforme, para los diferentes vanos, son:

L	12,90	18,50	23,10
$R_{unit\ (1)}$	103	148	18
$R_{unit\ (2)}$	128 - 25	184 - 36	229 - 45

3.2.4. Frenado.

Según IAP, artículo 3.2.3.1.1., se tomarán los siguientes valores mínimos y máximos para las acciones de frenado (siendo b el ancho del tablero).

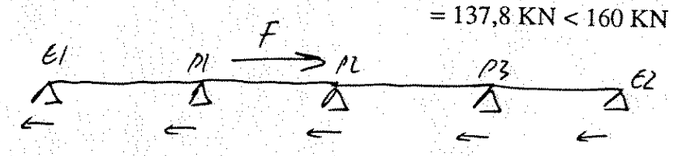
Mínima F= 20. b = 20 .8 = 160 KN.
Máximo F = 60 .b = 60 .8 = 480 KN.

El valor del frenado es 1/20 de la sobrecarga:

F = 1/20 (600 + Lb . 4)

F = (600 + 67,4 . 8 . 4) /20

= 137,8 KN < 160 KN



L, longitud del puente (12,90 + 18,50 + 23,10 + 12,90 = 67,40 m)

b, ancho del tablero, 8 m.

Luego se toma F = 160 KN repartida en todo el puente,

f = 160 / 67,4 = 2,37 KN/m. (valor de la carga repartida).

Las reacciones Rf a esa carga serán:

Reacciones horizontales de frenado, por apoyo

Estribos Rf = 2,37 x 12,9/2 = 15 KN

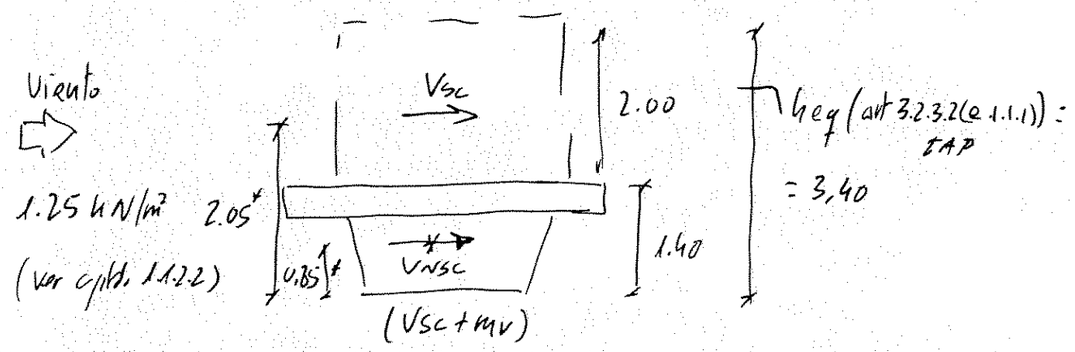
Pila 1 Rf = 2,37 x (12,9 + 18,5)/2 = 37 KN

Pila 2 Rf = 2,37 x (18,5 + 23,10)/2 = 49 KN

Pila 3 Rf = 2,37 x (23,10 + 12,9)/2 = 43 KN

3.3. Reacciones de Viento sobre tablero.

Para las reacciones de viento sobre tablero consideramos los siguientes empujes



* La posición de Vsc, Vnsc (viento con sobrecarga, viento sin sobrecarga respectivamente) responde al 60% de heq (art. 3.2.3.2. e.1.3.) de IAP.

Los valores de estas cargas y de los torsores acompañantes son:

Vsc = 1,25 x 3,40 = 4,25 KN/ml; mv = (2,04 - 0,85) x 4,25 = 5,06 KN.m.

Vnsc = 1,25 x 1,40 = 1,75 KN/ml; mv = 0

Las reacciones son:

Viento sin sobrecarga

Estribos: Ry = 1,75 x 12,9 / 2 = 11,3 KN

Pila 1: Ry = 1,75 x (12,9+18,5) /2 = 11,3 + 16,2 = 27,5 KN.m

Pila 2: Ry = 1,75 x (18,5 + 23,10) / 2 = 16,2 + 20,2 = 36,9 KN.m

Pila 3: Ry = 1,75 x (23,10+12,90) /2 = 20,2 + 11,3 = 31,5 KN.m

Viento con sobrecarga

Reacciones Horizontales (eje y) (Directamente $R_{yvsc} = 4{,}25/1{,}75\ R_{yvnsc}$)

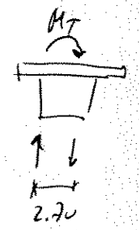
Estribos Ry = 27 KN

Pila 1 Ry= 27,4 + 39,3 = 67 KN

Pila 2 Ry = 39,3 + 49 = 88 KN

Pila 3 Ry = 49 + 27,4 = 77 KN

Torsores: MT = ± 5,06 x L/2



Estribos: Mx = 5,06 x (12,9/2) = 32 KN.m

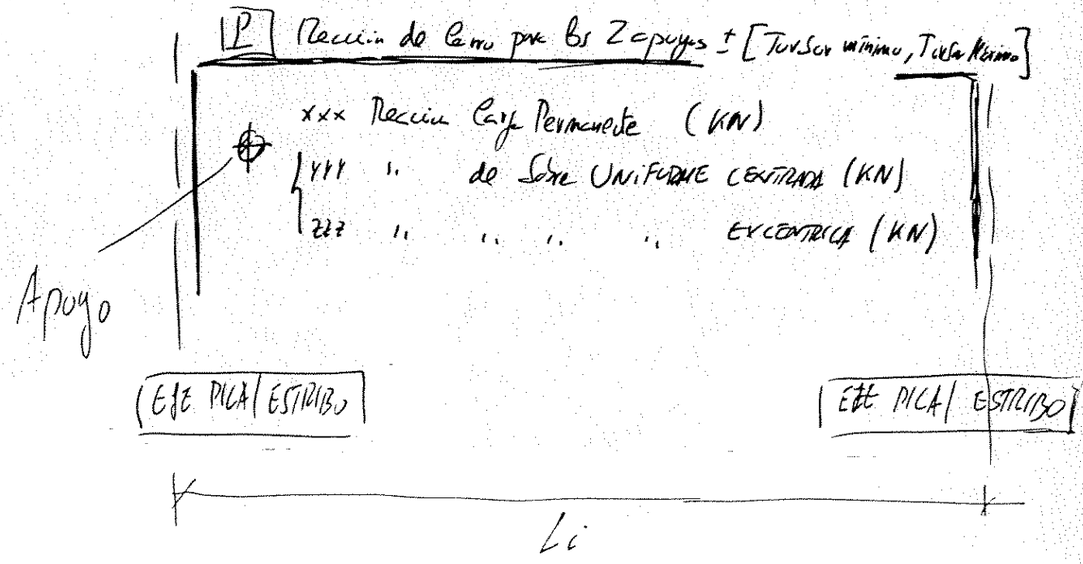
Pila 1: Mx = 5,06 x (12,9+18,5) /2 = 32 + 47 = 79 KN. m

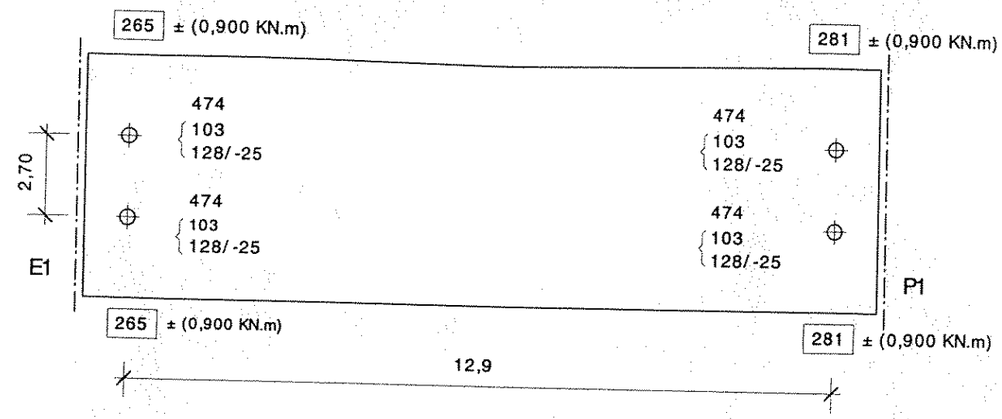
Pila 2: Mx = 5,06 x (18,5+23,10) /2 = 47 + 58 = 105 KN. m

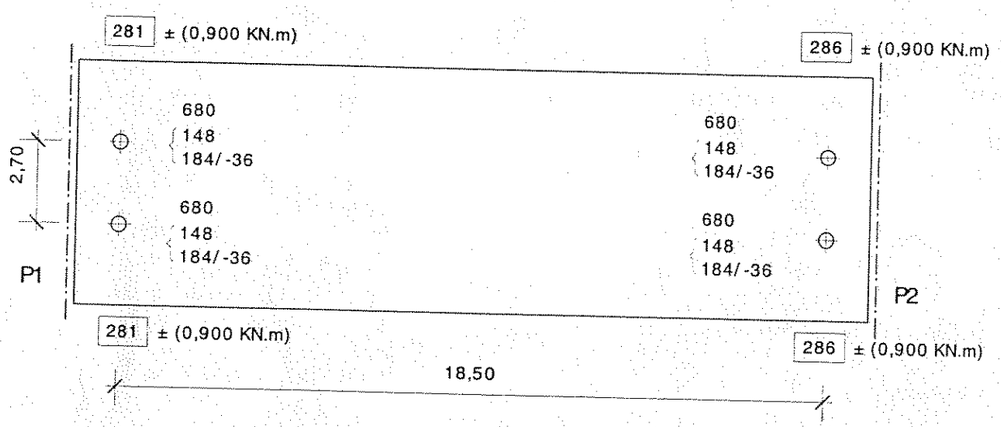
Pila 3: Mx = 5,06 x (23,10+12,90) /2 = 58 + 32 = 90 KN.m

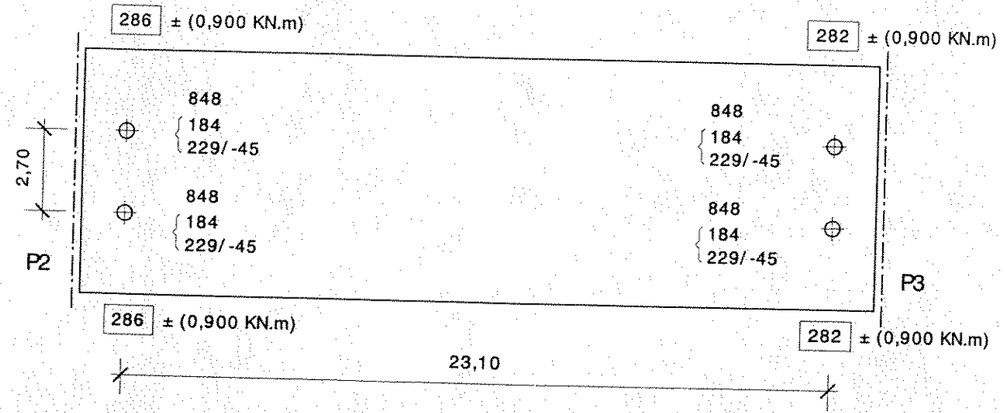
3.4. Resumen de reacciones verticales.

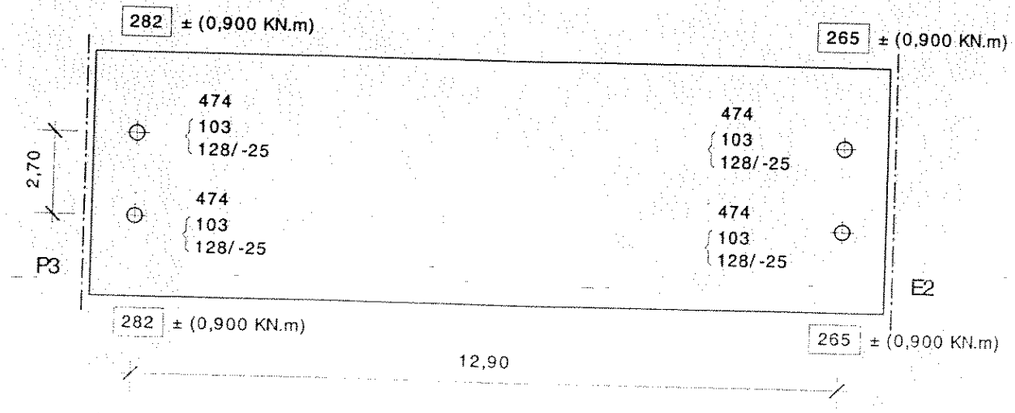
Todo ello se resume en los gráficos adjuntos, con las siguientes nomenclaturas.











4.- Estribos

4.1.- Estribo 1

Al tratarse de un estribo con cimentación profunda no procede la comprobación a vuelco y deslizamiento. En primer lugar hay que dimensionar el muro frontal frente a las flexiones derivadas del empuje de las tierras para, a continuación verificar las cimentaciones por módulos de pantalla. El esquema de cargas para el cálculo del muro frontal el que sigue. Reproducimos, antes, las reacciones que figuran en el apartado 3.3 y en 3.2.3.

Reacciones Verticales.

	Viento con SC	CP	SU(I)	SU (II)	VP (I)	VP(II)	(I)	(II)
N_1(KN)	12	474	103	128	265	265 + 333	842	1212
N_2(KN)	-12	474	103	128	265	265 - 333	842	473

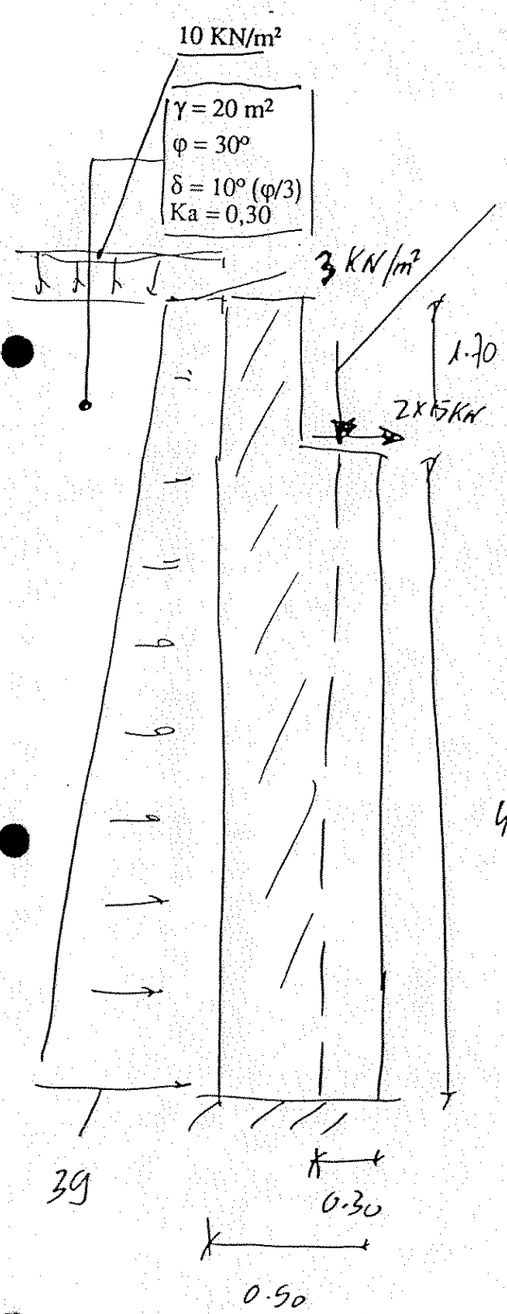
Notas: (I), sobrecargas centradas
(II) sobrecargas excéntricas. N_1 y N_2 se modifican en 333 KN (ver apartado 3.2.2.)

El viento con sobrecarga genera $N = \pm Mx / 2{,}70$, siendo 2,7 m la distancia entre apoyos (ver valores de Mx en apartado 3.3).

Reacciones Horizontales Longitudinales.

	Frenado (KN)
H_1	15
H_2	15

4.1.1. Dimensionado de muro.



$(\gamma_z + p)$ Ka

2 x 474 + 2 x 103 + 2 x 265 = 1684 KN

$Peso_{muro}$ = 6,90 x 4,30 x 8,00 x 25 = 774 KN e=0,15

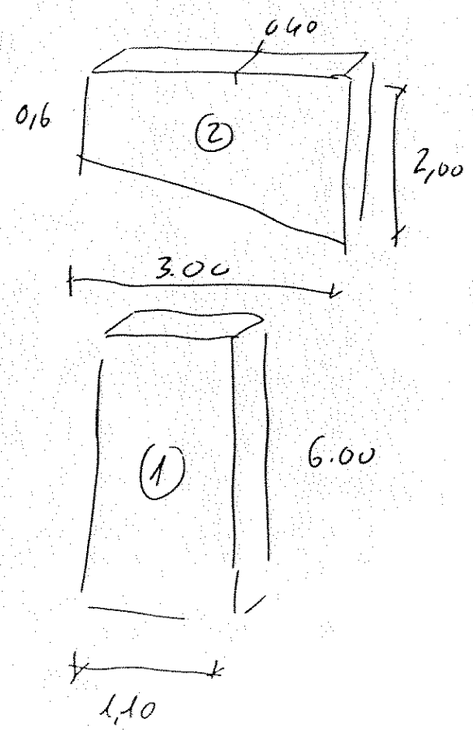
$Peso_{murete}$ = 1,00x 0,30 x 8,00 x 25 = 60 KN e=0,30

$Peso_{trasdós}$ = 1,20x 9,00x [6,00 x 20+10) =1404 KN e=1,20

et = 1,20.

$Peso_{alet1}$ = (1,10 x 6,00 x 0,40 x 25) = 66 KN e= 2,70

$Peso_{alet2}$ = [(2,6 + 0,6) / 2] x 3 x 0,40 x 25) = 48 KN e= 1,00



El valor de la flexión es:

M = Frenado x Altura + Empuje + Excentr. de cargas Verticales

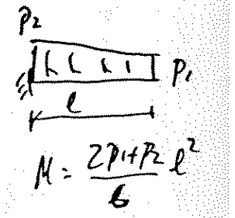
Frenado x Altura = 30 x 4,30 = 129 KN. m

Empuje de tierras = (39 + 2 x 3,0) x 6^2 /6 x 8,00 m de ancho = 2160 KN.m

Excentricidad de cargas verticales = 1684 x 0,15 = 253 KN.m

M= (129 + 2160 + 253) KN.m = 2542 KN.m

M = 2542 / 8 = 318 KN/m (por unidad de ancho).



Corresponde armadura mínima según se observa en listados adjuntos, donde se verifica el estado límite de fisuración. Se adoptan 6 ø 20 pml para la armadura principal.

Para las armaduras mínimas restantes dispondremos (EHE, Tabla 42.3.5.)

Vertical Exterior ≥ 0,9 ‰ s/ 90 x 100 = 8,1 cm^2. Dispondremos 5 ø 16 pml.

Horizontales = 3,2 ‰ / 90 x 100 = 28,8 cm^2

Estos 28,8 cm^2 se repartirán a razon de 2/3 en la cara vista (19,2 cm^2 - 10 ø 16 pml, y 1/3 en el lado tierras (9,6 cm^2 - 8 ø 12 pml).

Para la parrilla de apoyo (EHE, artículo 60).

Td = 0,25 Nd.

Nd = (resumen anterior) = 1,35 x (474) + 1,5 x (265 + 333)+1,5 x 12 = 1747 KN.

As ≥ 0,25 x 174,7 / 4 = 10,9 cm^2 Disponemos 2 capas de 5 ø 12 en cada sentido.

Por lo que concierne al esfuerzo cortante, resulta.

Vadm = 285,3 KN/ml

La carga horizontal en arranque es:

Hd = (30 KN / 8) x 1,5 + (39 + 3,0) x 0,5 x 6 x 1,35 = 176 KN/ml < Vadm

luego no se precisa armadura de cortante.

ALZADOS ESTRIBOS

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 03/12/03
Hora: 14:59:01

Dimensionamiento de secciones a flexión simple

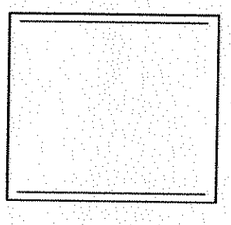
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

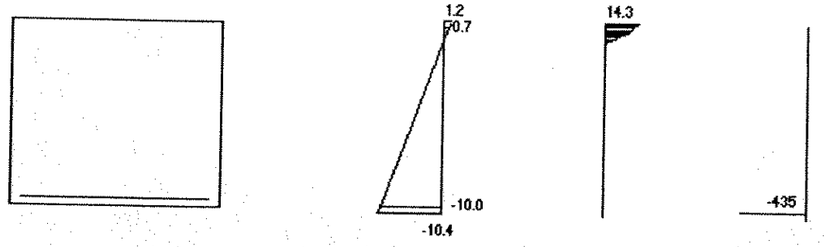
- Sección

Sección : ESTRIBOS
b [m] = 1.00
h [m] = 0.90
ri [m] = 0.035
rs [m] = 0.035



2 Dimensionamiento

Md [kN·m] = 318



Plano de deformación de agotamiento

x [m] = 0.093
1/r [1/m]·1.E-3 = 12.9
εs ·1.E-3 = 1.2
εi ·1.E-3 = -10.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	0.7	0.0
0.865	17.4	-10.0	434.8

At_est [cm²] = 17.4

ϕ [mm]	12	14	16	20	25
n°ϕ	16	12	9	6	4
n° capas	1	1	1	1	1
At [cm²]	18.1	18.5	18.1	18.8	19.6
wk [mm]	0.07	0.08	0.09	0.10	0.12

< 0.3 mm (OK)

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 03/12/03
Hora: 14:54:23

Cálculo de secciones a cortante

1 Datos

- Materiales

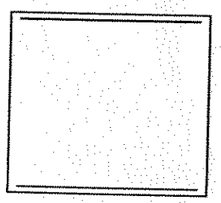
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γ_c = 1.50
γ_s = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : ESTRIBOS
b0 [m] = 1.00
h [m] = 0.90



2 Comprobación

ρl [·1.E-3] = 2.1
Nd [kN] = 0.0
Vu [kN] = 285.3

4.1.2. Cimentación.

Añadimos el peso del encepado: p = 3,6 x 8,6 x 1,20 x 25 = 1548 KN.

Las cargas totales, referidas al eje del encepado, son:

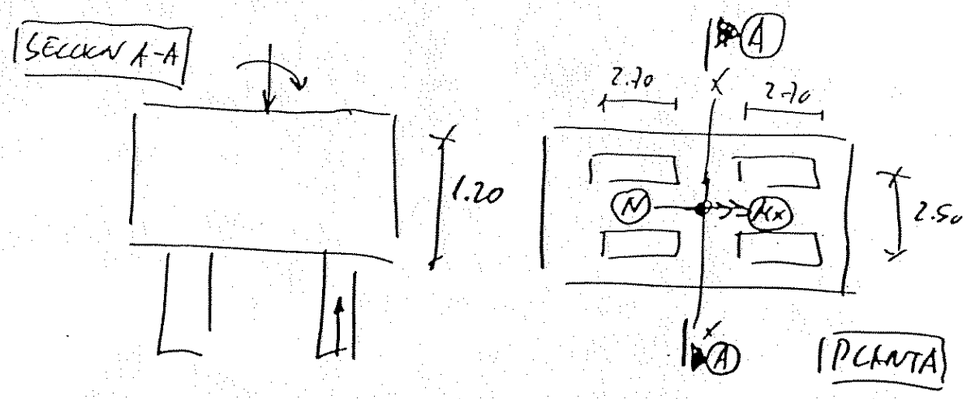
N = Reacciones Verticales del Tablero + Peso trasdós + Peso aletas + Peso encepado + Peso Muro.

N = 1684 + 1404 + (66 + 4,8) +1548 + (774 + 60) = 5584 KN

M = Momento de Flexión en Muro + Momento Peso trasdós + Momento Peso Aletas + Momento Peso Muro.

M = 2542 KN.m - 1404 x 1,20 - 66 x 2,70 - 48 x 1,00 - (774 x 0,15 + 60 x 0,30) = 497 KN.m

Disponiendo 4 bataches de 2,70 m,



En el análisis efectuado, que modela la interacción entre la estructura y el terreno a través de muelles que simulan el coeficiente de balasto horizontal, y que se recoge en el Anejo nº2, se desprende que:

N_{unit} = 311,9 / 2 =155,96 Tn=1559 KN (b=2,7 cm)
M= 287 KN.m Q=110 KN (b=5,40 m)

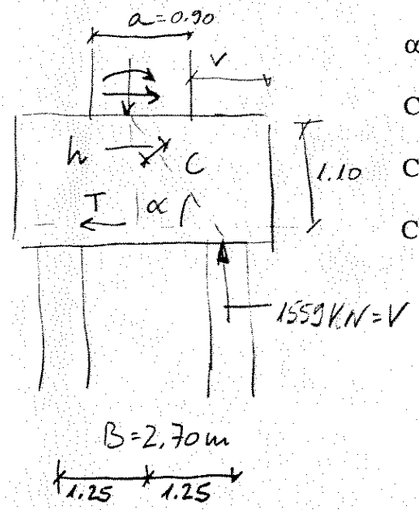
Valores suficientes para las pantallas de 60 cms de espesor (véase apartado 5, donde se ve que Nadm = 3740 KN).

Por lo que concierne al armado de la pantalla, de acuerdo con los valores de flexión y cortante obtenidos, se adoptan armaduras mínimas de 15 ø 20 / 2,70 m. (veánse listados adjuntos en el apartado 5.1.3. donde se agrupa la justificación de dimensiomado de pantallas de estribos y pila).

Para el dimensionado del encepado, se han realizado dos modelos. El primero de ellos, que se recoge en el Anejo 1, corresponde a un análisis plano cuyos resultados de esfuerzos y de dimensionado se adjuntan en los listados que figuran a continuación. Los listados del modelo SAP figuran en el Anejo 1. Las cargas introducidas se especifican en las hojas anteriores a dichos listados.

Por otra parte podemos realizar una comprobación por el método de las bielas (EHE).

Zona con pantallas enfrentadas:



α = arctg (1,10 / 1,25) = 41,35º

C = V/senα = 1559/ sen 41,35 = 2359 KN

Cd = 2359 KN x 1,5 = 3539 KN

Cu =0,70 . f,d x h x b = 0,70 x(25000/1,5) . h . b
= 0,70 x 16666 . 0,40 . 2,70 = 12600 KN,
válido

h = 0,60 cos (90 - α) = 0,40 m

Td = Nd (v + 0,25a) / 0,85d = 2339 (0,80 + 0,25 x 0,9) / (0,85 x 1,10) = 2564 KN

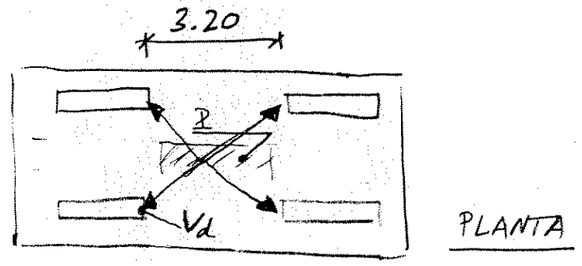
v = (2,50 - 0,90) / 2 = 0,80

As = 2564 x 1000 N / (500/1,15) N/mm² = 44,6 cm²,

44,6 cm² / 2,70 = 16,5 cm²/ml , 6 ø 20 ml

Armadura de valor inferior a la dada por el modelo plano, que adoptamos (11ø20/ml), de acuerdo a la justificación adjunta.

Para cubrir el efecto de discontinuidad de línea de pantallas, añadimos una armadura de cortante que cubra la entrada de reacción en la pantalla por el lado corto de la misma:



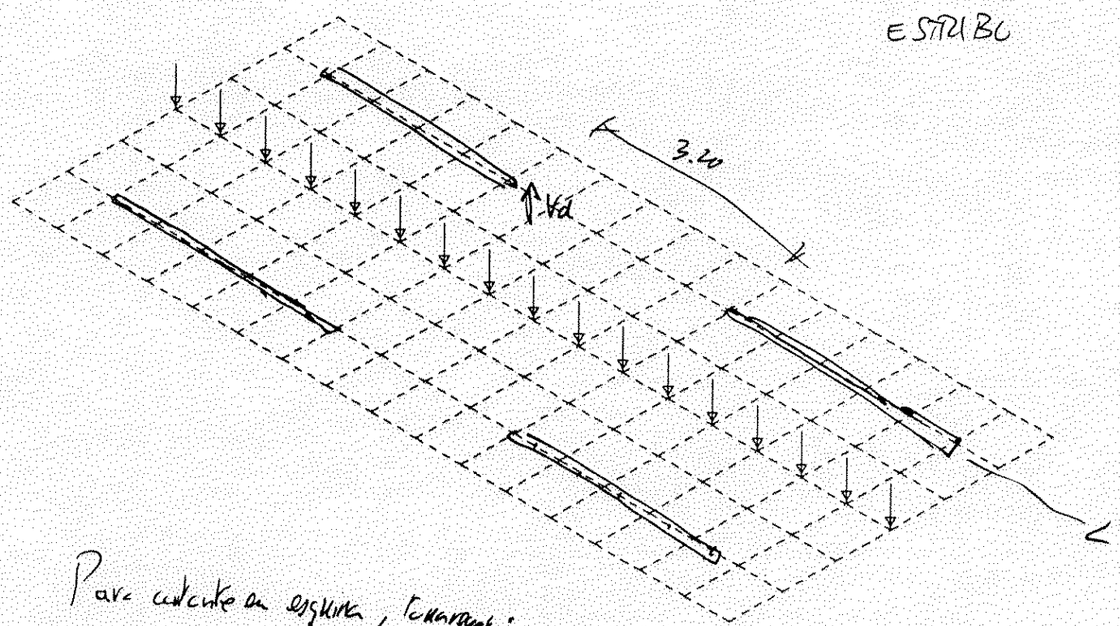
PLANTA

p = 2 x 1559 KN repartidos en 8,60 mm ≈ 365 KN/ml.

Vd = (365 x 3,20 / 2) x 1,5 = 876 KN, que requieren estribos dobles ø 10 a 0,20 como se justifica en los listados adjuntos.

ENCEPADO

ESTRIBO



Para cortante en esquina, tenemos:

N en la línea L = 2×1460 kN repartidos en 8m ⇒ $u = \frac{1460 \times 2}{8} = 365 \frac{kN}{m}$

Vd = (365×3,20/2)×1.5 = 876 → ϕ10 cada a c.20

Y
Z X

ENCEPADO
JOINT
LOADS
LOAD 1

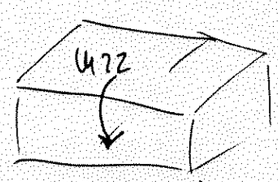
MINIMA
P -.2680E+02
MAXIMA
P -.2680E+02

ENCEPADO

SAP90

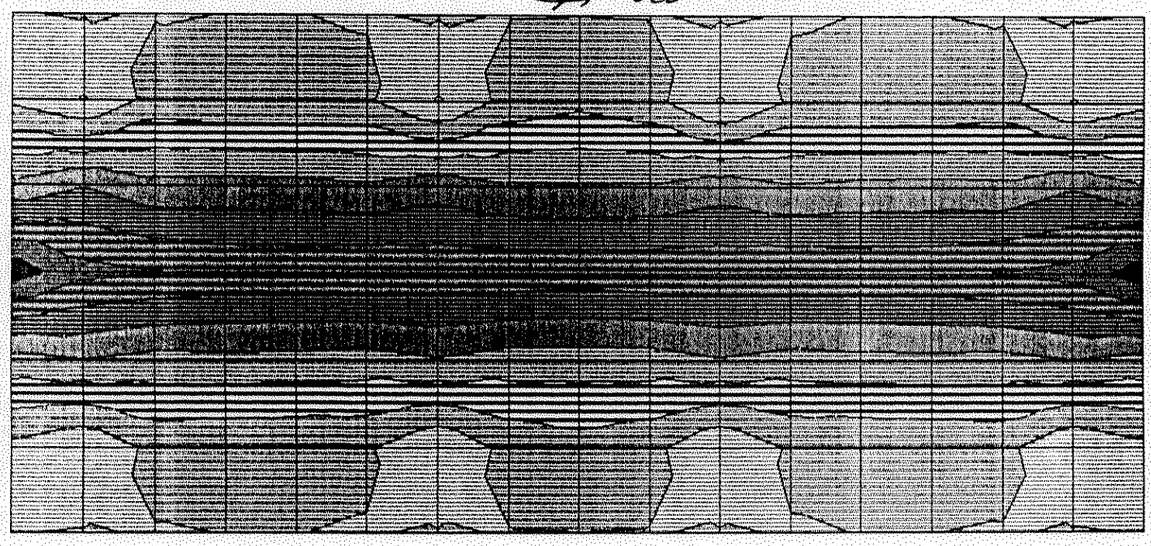
ENCEPADO ESTRIBO

Dirección principal.



Z
X

ENCEPADO
SHELL
OUTPUT M22
LOAD 1
(mt/ml)



X 10^{-1}
480
360
240
120
0
-120

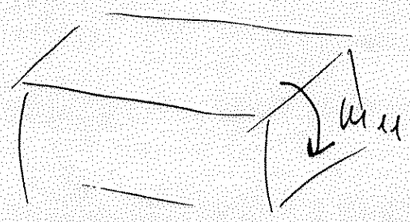
m = 48 mt/ml. As = 12 ϕ 20/ml.

(VER CUADROS ADICIONALES)

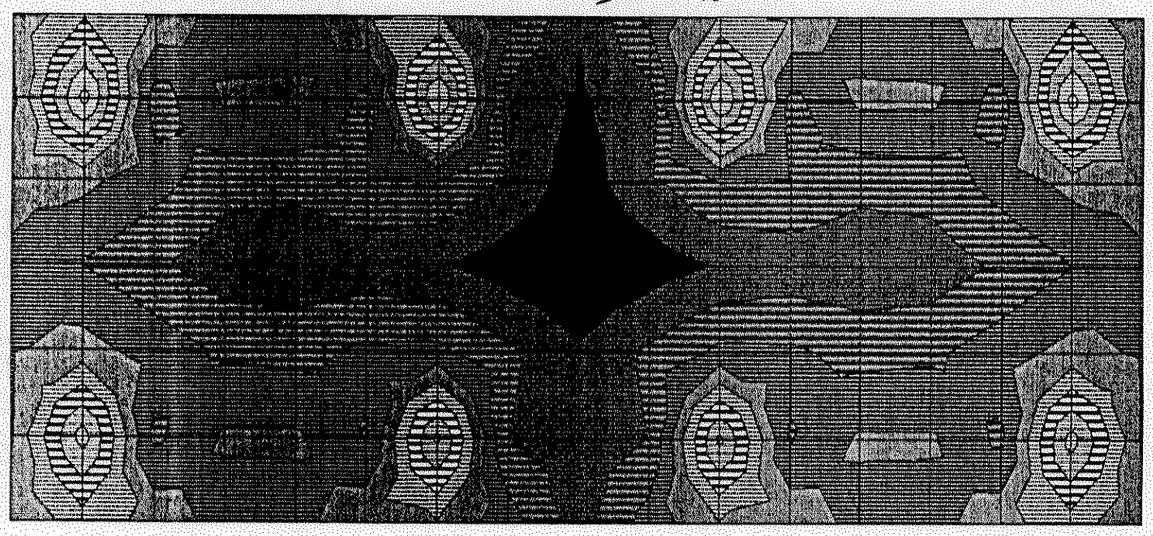
MIN IS -.645E+01 <JOINT 28> MAX IS .455E+02 <JOINT 68>

SAP90

ENCEPADO



Dirección secundaria.



Max = 13,2 mt/ml Mínima para 4 = 1.20

Z
X

ENCEPADO
SHELL
OUTPUT M11
LOAD 1

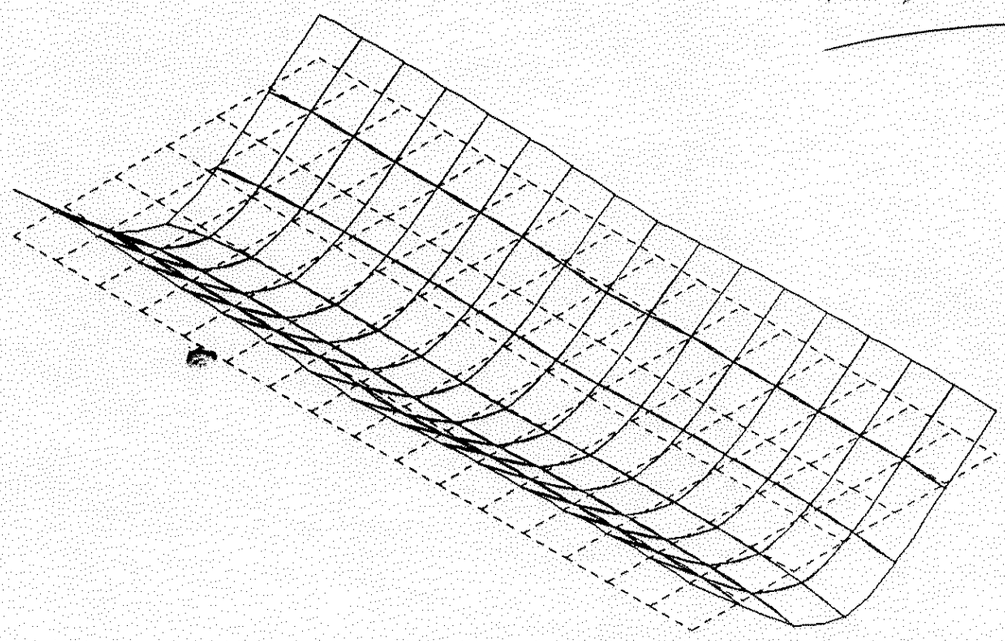
X 10^{-1}

88
44
0
-44
-88
-132

MIN IS -.119E+02 <JOINT 33> MAX IS .857E+01 <JOINT 60>

SAP90

ENCEPADO ESTADO DEFORMADA



Y
Z X

ENCEPADO
DEFORMED
SHAPE
LOAD 1

MINIMA
X .0000E+00
Y -.4239E-04
Z .0000E+00
MAXIMA
X .0000E+00
Y .2720E-04
Z .0000E+00

SAP90

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

ENCEPADO ESTRIBO

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 18:15:18

Dimensionamiento de secciones a flexión simple

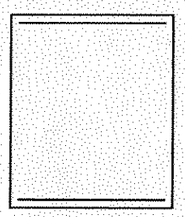
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

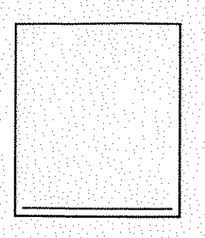
- Sección

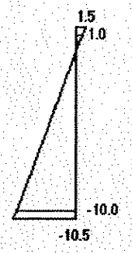
Sección : ENCEPADO
b [m] = 1.00
h [m] = 1.20
ri [m] = 0.050
rs [m] = 0.050

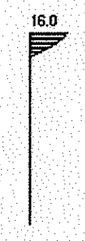


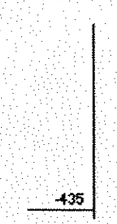
2 Dimensionamiento

Md [kN·m] = 720









Plano de deformación de agotamiento

x [m] = 0.152
1/r [1/m]·1.E-3 = 10.0
εs ·1.E-3 = 1.5
εi ·1.E-3 = -10.5

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	1.0	0.0
1.150	33.6	-10.0	434.8

At_est [cm²] = 33.6

φ [mm]	12	14	16	20	25
nºφ	30	22	17	11	7
nº capas	2	2	1	1	1
At [cm²]	33.9	33.9	34.2	34.6	34.4
wk [mm]	0.06	0.06	0.06	0.07	0.09

< 0.3 OK

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 18:44:03

Cálculo de secciones a cortante

1 Datos

- Materiales

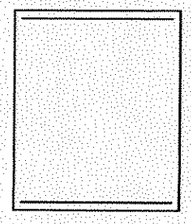
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : ENCEPADO
b0 [m] = 1.00
h [m] = 1.20



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 876

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 1.6
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	—	—	—	—	—	—
ø 8	0.10	4	20.1	2	836.4	1111.31
ø 10	0.20	4	15.7	2	653.5	928.34
ø 12	0.25	4	18.1	2	752.8	1027.66

Área estricta [cm²/m] = 14.4
Vul [kN] = 6900.0
Vcu [kN] = 274.9

En sentido transversal disponemos de armadura con capacidad mínima de 1/10 de la principal (EHE art. 59.4.1.2.1.2.), que hemos visto que es de 11 ø 20 /ml, o bien 1,5 °/$_{oo}$ s/ (120 x 100) (CALAVERA en "Estructuras de Cimentación"), es decir 18 cm²/ml.

At = 6 ø 20/ml.

La armadura secundaria tendrá un mínimo del 4°/$_{oo}$ (EHE):

Armadura perimetral : 4°/$_{oo}$ s/(115 x 62,5) = 29 cm²

Disponemos 5 ø 20 = 2 x 5 x 3,14 = 31,4 cm² ,válido.

En la cara superior disponemos armaduras con separaciones coherentes con las de las armaduras inferiores, y de cuantía mínima 1,5 °/$_{oo}$ s/ (120 x 100) = 18 cm² . (6 ø 20/ml y 10 ø 16/ml).

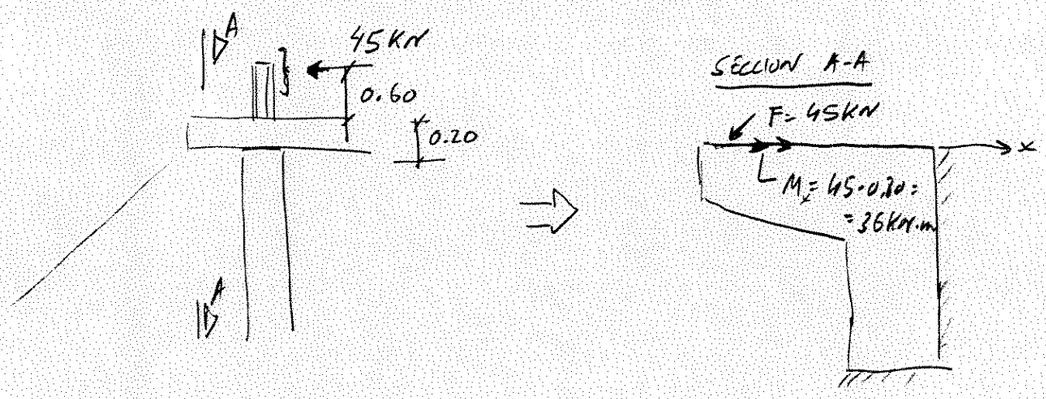
En este caso, no tiene sentido verificar la seguridad al vuelo de la pila.

Se dispone losa de transición con pendiente 1 / 100, de unos 5 metros de longitud, siguiendo las recomendaciones de Leonhardt en "Bases para la construcción de puentes monolíticos" . La losa será de 20 cms de espesor con armaduras del 4°/$_{oo}$ s/ (20 x 100), esto es 5 ø 16 /ml en ambas caras y direcciones.

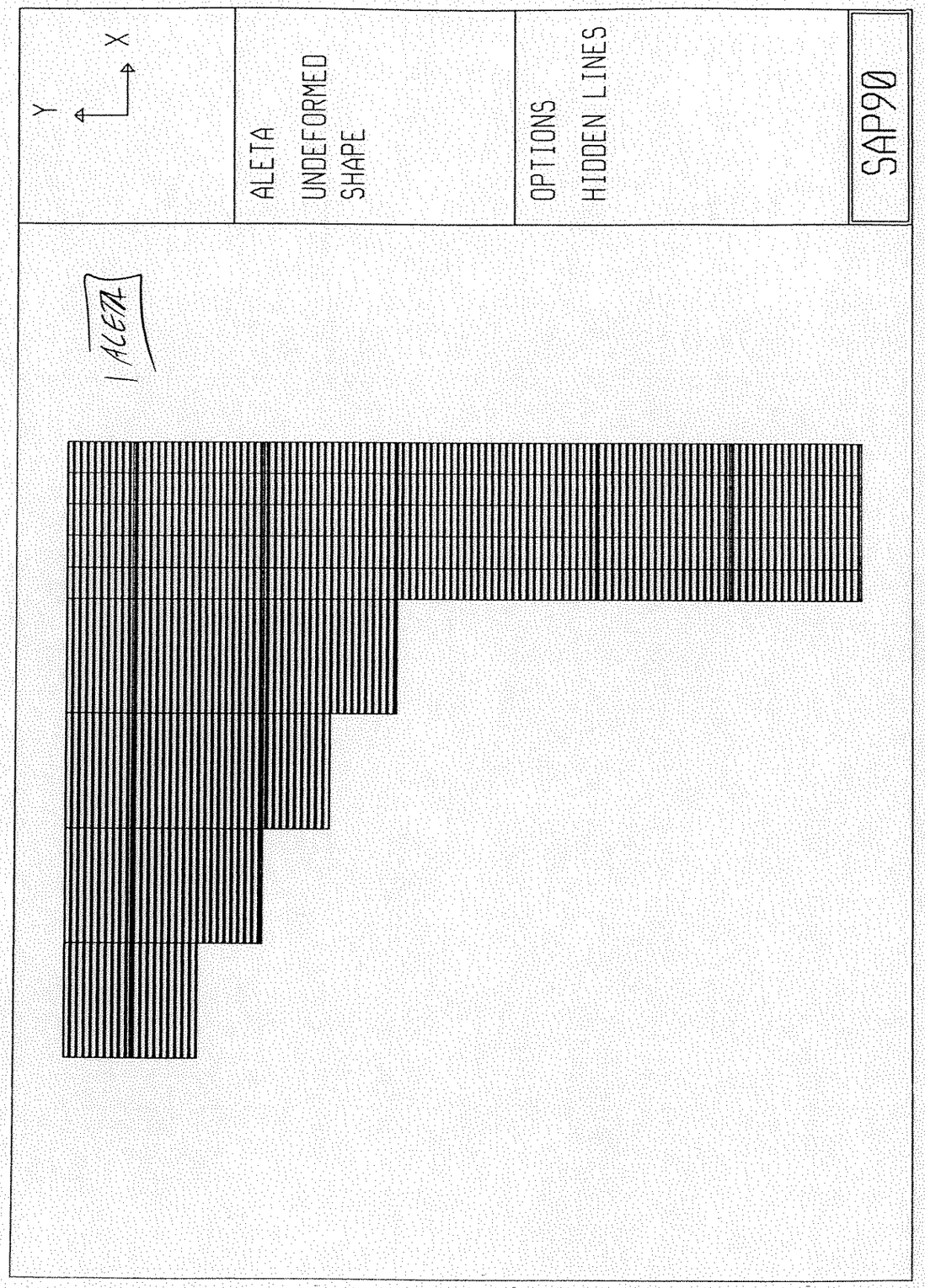
4~~3~~.- Aletas

Impacto sobre barrera rígida vinculada a aleta.

Según IAP, artículo 3.2.4.1.2., aplicamos una carga de impacto perpendicular a la aleta en el punto de máximo vuelo, de valor 45 KN, a 60 cms del pavimento:



En el Anejo 1 figuran los listados del modelo SAP utilizado. Las cargas introducidas se especifican en las hojas anteriores a dichos listados. A continuación figuran los gráficos donde se justifican las armaduras adoptadas en las diferentes secciones de las aletas.



ALETA

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 14:32:19

Cálculo de secciones a cortante

1 Datos

- Materiales

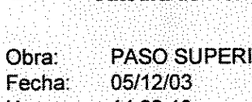
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : ALETA
b0 [m] = 1.00
h [m] = 0.40



2 Comprobación

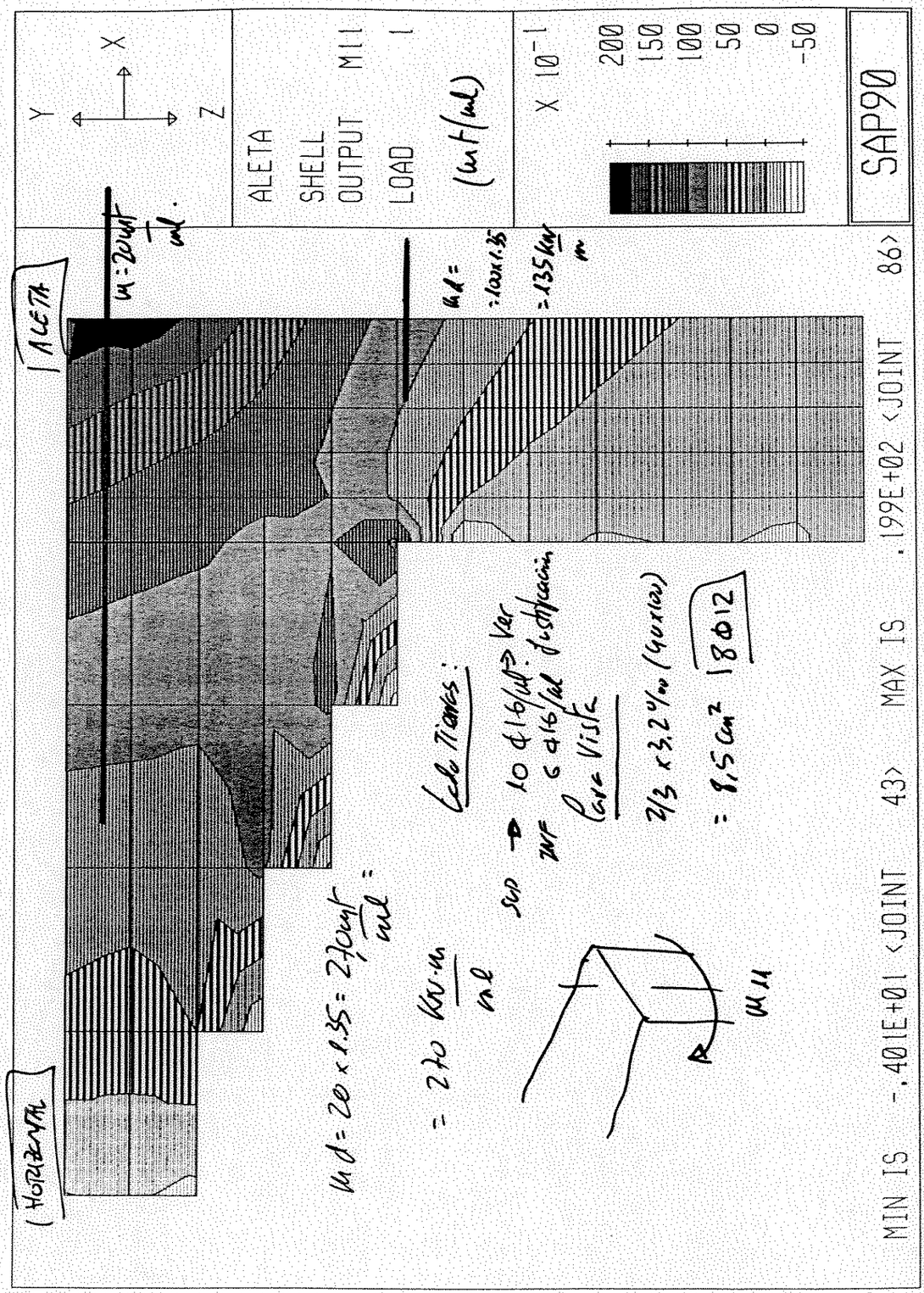
ρl [·1.E-3] = 2
Nd [kN] = 0.0
Vu [kN] = 137.0 > Vd

Del lado de la seguridad, pues para el impacto corresponderia 8 y menor, por ser ACCIDENTAL

Vd = 1.35 { 3,78 Nudo 76 ; 7,60 Nudo 86 ; 0,40 Nudo 96 } en 1,25m

= 1.35 × (3,78+7.60+0.40) / 1.25 = 12,72 Tn/m

= 127,2 KN/m



ALETA

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 14:41:27

Dimensionamiento de secciones a flexión simple

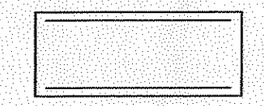
1 Datos

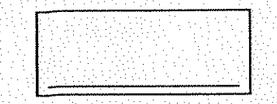
- Materiales

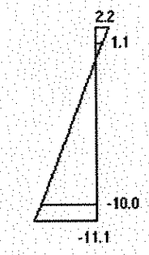
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : ALETA
b [m] = 1.00
h [m] = 0.40
ri [m] = 0.035
rs [m] = 0.035











Plano de deformación de agotamiento

x [m] = 0.067
1/r [1/m]·1.E-3 = 33.4
εs ·1.E-3 = 2.2
εi ·1.E-3 = -11.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	1.1	0.0
0.365	18.3	-10.0	434.8

At_est [cm²] = 18.3

φ [mm]	12	14	16	20	25
nºφ	17	12	10	6	4
nº capas	1	1	1	1	1
At [cm²]	19.2	18.5	20.1	18.8	19.6
wk [mm]	0.22	0.25	0.24	0.32	0.38

Lo.3 (VR)

2 Dimensionamiento

Md [kN·m] = 270

Armadura principal horizontal.

ALETA

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 15:02:01

Dimensionamiento de secciones a flexión simple

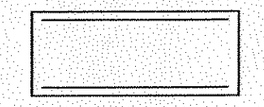
1 Datos

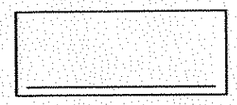
- Materiales

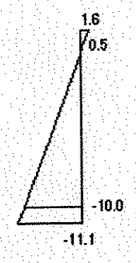
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γ_c = 1.50
γ_s = 1.15

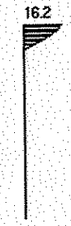
- Sección

Sección : ALETA
b [m] = 1.00
h [m] = 0.40
ri [m] = 0.035
rs [m] = 0.035











Plano de deformación de agotamiento

x [m] = 0.050
1/r [1/m]·1.E-3 = 31.6
ε_s ·1.E-3 = 1.6
ε_i ·1.E-3 = -11.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	0.5	0.0
0.365	11.2	-10.0	434.8

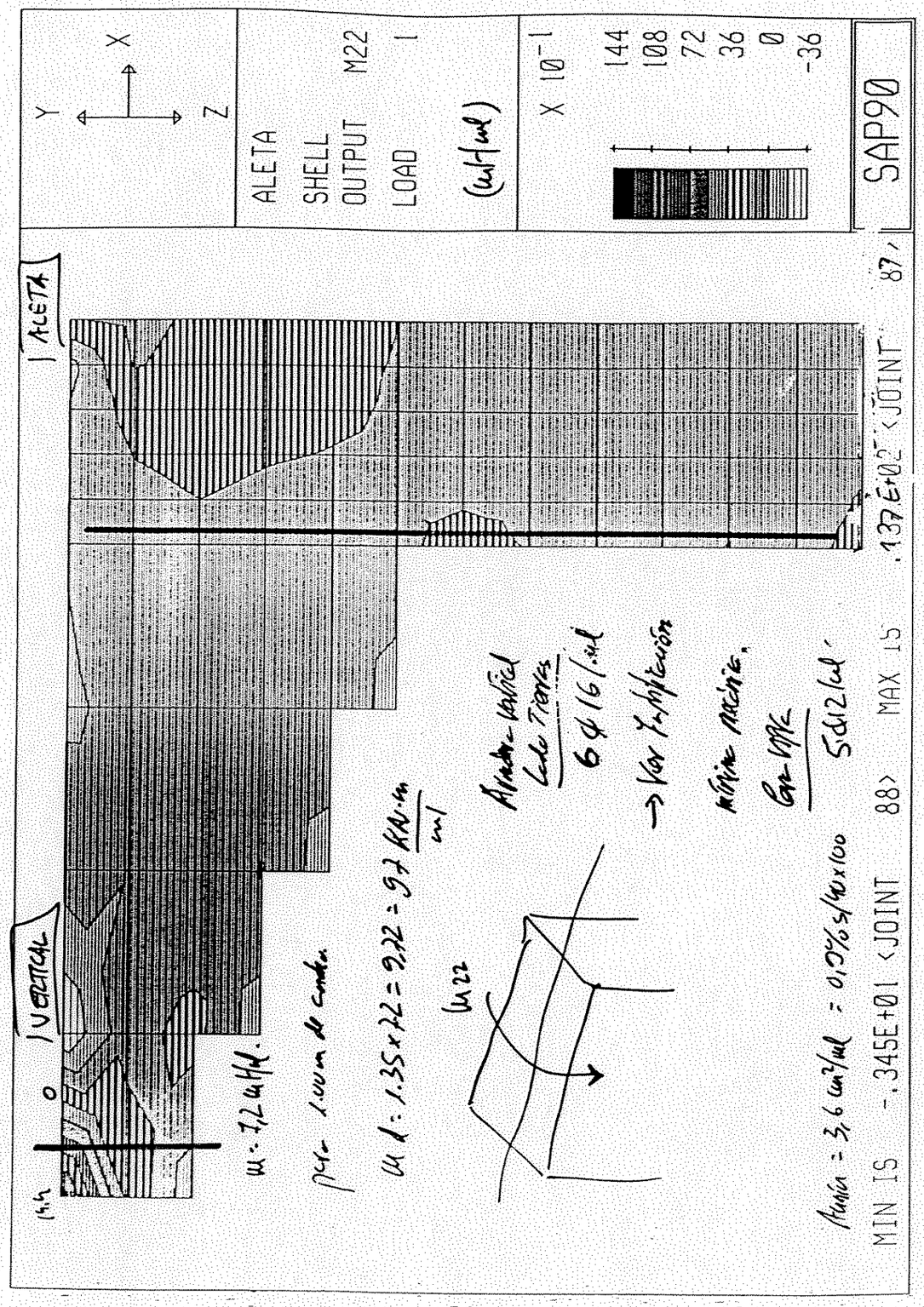
At_est [cm²] = 11.2

ϕ [mm]	12	14	16	20	25
n°ϕ	10	8	6	4	3
n° capas	1	1	1	1	1
At [cm²]	11.3	12.3	12.1	12.6	14.7
wk [mm]	0.12	0.12	0.14	0.18	0.18

LC.3 OK

2 Dimensionamiento

Md [kN·m] = 135 ← Armadura tracción del lecho inferior.



1 ALETA

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 14:44:11

Dimensionamiento de secciones a flexión simple

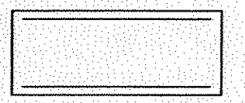
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

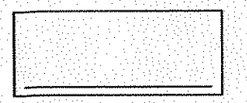
- Sección

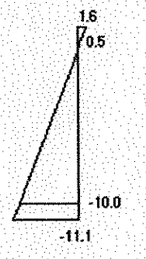
Sección : ALETA
b [m] = 1.00
h [m] = 0.40
ri [m] = 0.035
rs [m] = 0.035



2 Dimensionamiento

Md [kN·m] = 97 → Armadura vertical principal









Plano de deformación de agotamiento

x [m] = 0.050

1/r [1/m]·1.E-3 = 31.6

εs ·1.E-3 = 1.6

εi ·1.E-3 = -11.1

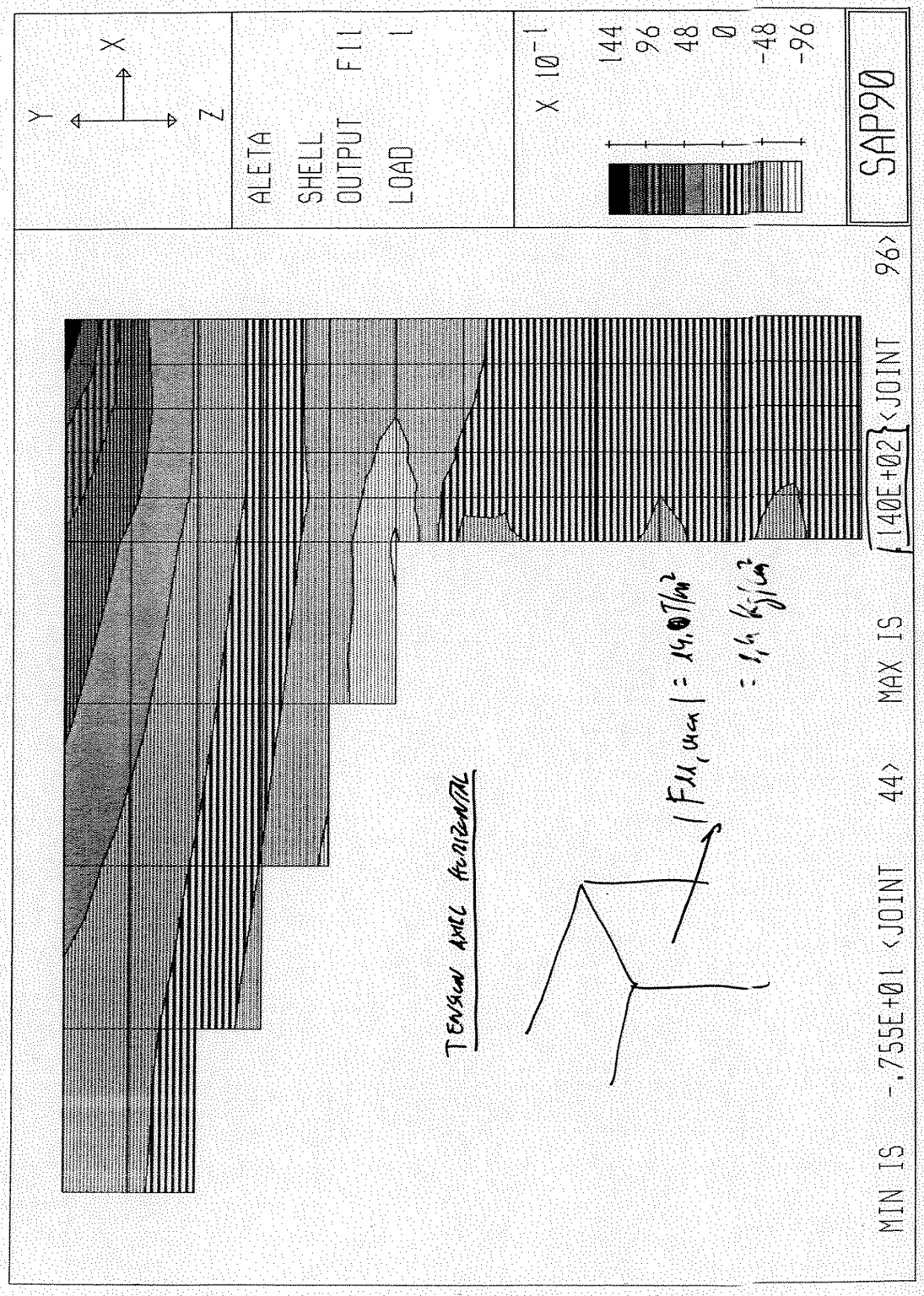
Deformación y tensión de armaduras

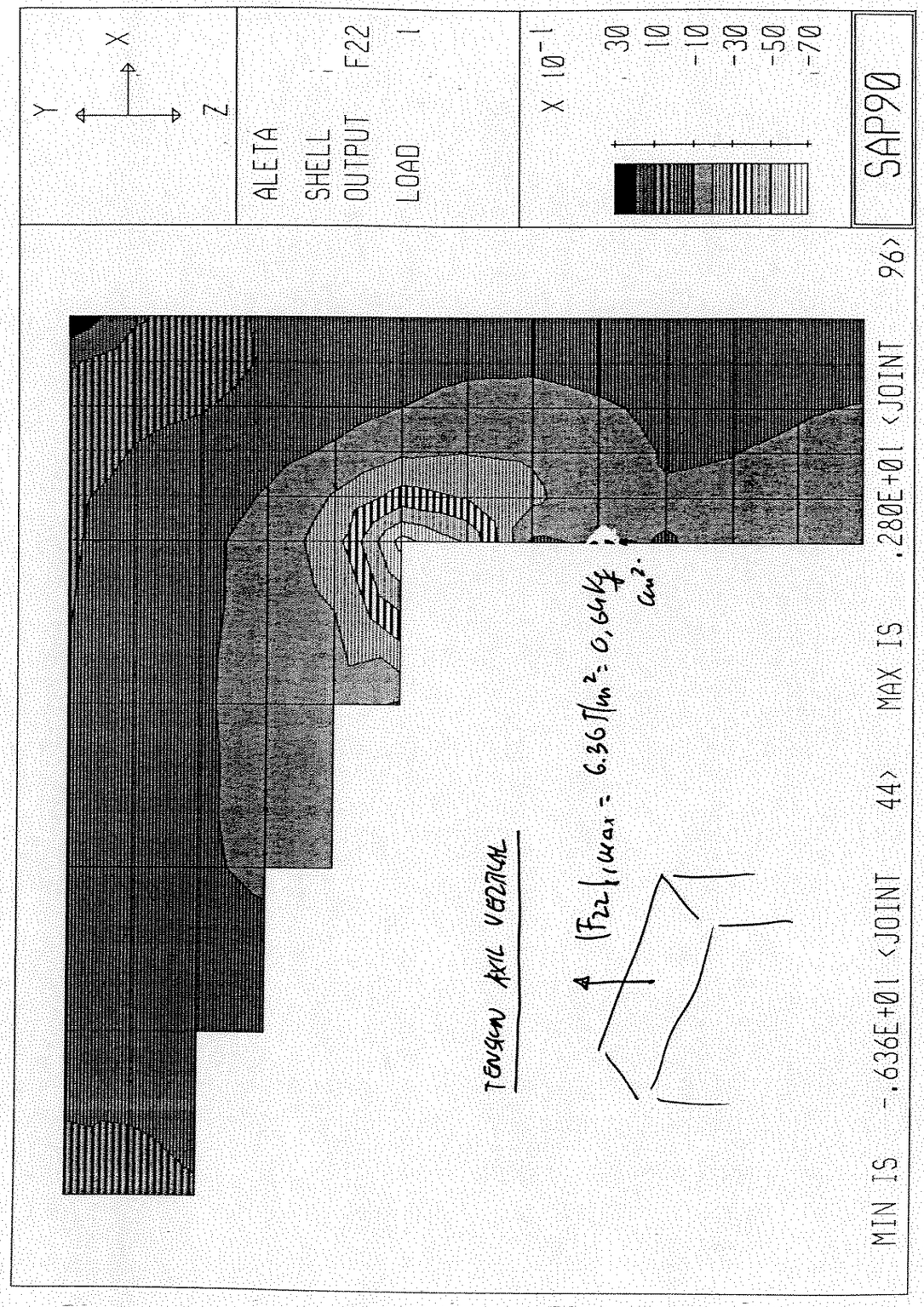
Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	0.5	0.0
0.365	11.2	-10.0	434.8

At_est [cm²] = 11.2

ϕ [mm]	12	14	16	20	25
nºϕ	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]	0.08	0.08	0.09	0.11	0.11

< 0.3 , OK





4.2.- Estribo 2

Reacciones Verticales.

	Viento con SC	CP	SU(I)	SU (II)	VP (I)	VP(II)	(I)	(II)
N_1(KN)	12	474	103	128	265	265 + 333	842	1212
N_2(KN)	-12	474	103	128	265	265 - 333	842	473

Notas: (I), sobrecargas centradas
(II) sobrecargas excéntricas. N_1 y N_2 se modifican en 333 KN (ver apartado 3.2.2.)

El viento con sobrecarga genera N = ± Mx / 2,70, siendo 2,7 m la distancia entre apoyos (ver valores de Mx en apartado 3.3).

Reacciones Horizontales Longitudinales.

	Frenado (KN)
H_1	15
H_2	15

El estribo 2 se ha calculado mediante un modelo tridimensional que modela el conjunto teniendo en cuenta el efecto de las aletas como contrafuertes del muro frontal. En el Anejo 3 podemos siguir los listados y gráficos del cálculo de este modelo.

Armadura vertical Muro Frontal: M_{22} máximo = 106 mt/ml, md = 1590 KN.m

Para e = 1,20,

Armadura Horizontal Muro Frontal: Elemento 64 M_{11} = 56 mt/ml, Amínima.

Corresponde armadura mínima según se observa en listados adjuntos, donde se verifica el estado límite de fisuración. Se adoptan 7 ø 25 pml para la armadura principal.

Para las armaduras mínimas restantes dispondremos (EHE, Tabla 42.3.5.)

Vertical Exterior $\geq 0{,}9\ ^{0}/_{00}$ s/ 120 x 100 = 10,8 cm². Dispondremos 6 ø 16 pml.

Horizontales = $3{,}2\ ^{0}/_{00}$ / 120 x 100 = 38,4 cm²

Estos 38,4 cm² se repartirán a razon de 2/3 en la cara vista (25,6 cm² - 8 ø 20 pml, y 1/3 en el lado tierras (12,8 cm² - 4 ø 20 pml).

Para la parrilla de apoyo vale lo visto en el Estribo 1.

Por lo que concierne al esfuerzo cortante, resulta.

Vadm = 409,8 KN/ml

La carga horizontal en arranque es (reacción máxima fuera del nudo 9 (Nudo 10) es

Vd = 3,7 x 1,5 / 0,875 = 6,34 t/ml = 63,4 KN/ml.

luego no se precisa armadura de cortante.

Se dispone losa de transición con pendiente 1 / 100, de unos 5 metros de longitud, siguiendo las recomendaciones de Leonhardt en "Bases para la construcción de puentes monolíticos". La losa será de 22 cms de espesor con armaduras del $4^{o}/_{oo}$ s/ (22 x 100), esto es 5 ø 16 /ml en ambas caras y direcciones.

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 20:05:34

Dimensionamiento de secciones a flexión simple

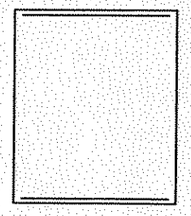
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

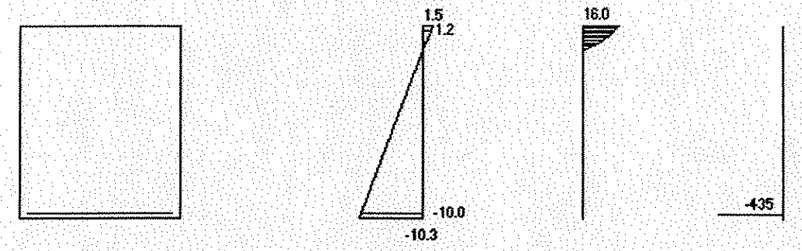
Sección : ESTRIB2
b [m] = 1.00
h [m] = 1.20
ri [m] = 0.035
rs [m] = 0.035



2 Dimensionamiento

Md [kN·m] = 1590

ESTRIBO 2
MURO FRONTAL



Plano de deformación de agotamiento

x [m] = 0.153

1/r [1/m]·1.E-3 = 9.9

εs ·1.E-3 = 1.5

εi ·1.E-3 = -10.3

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	1.2	0.0
1.165	33.6	-10.0	434.8

At_est [cm²] = 33.6

ϕ [mm]	12	14	16	20	25
nºϕ	30	22	17	11	7
nº capas	2	2	1	1	1
At [cm²]	33.9	33.9	34.2	34.6	34.4
wk [mm]	0.16	0.17	0.19	0.22	0.29

4 Armadura.

L 0.3

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 20:13:57

Cálculo de secciones a cortante

1 Datos

- Materiales

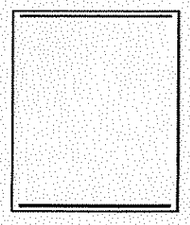
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

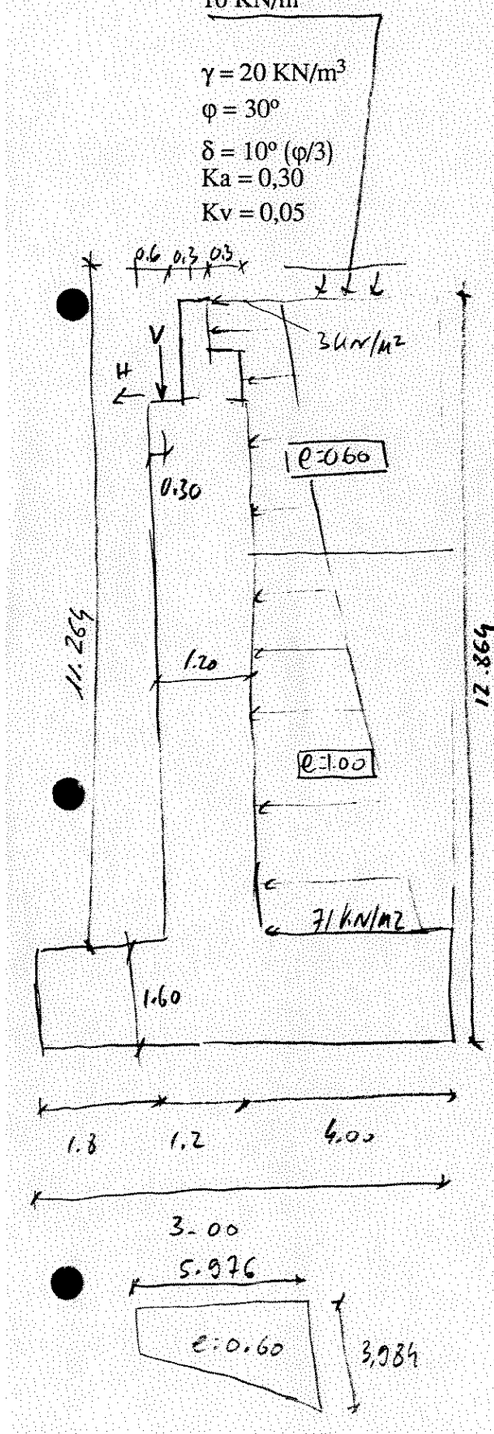
Sección : ESTRIB2
b0 [m] = 1.00
h [m] = 1.20



2 Comprobación

ρl [·1.E-3] = 3
Nd [kN] = 0.0
Vu [kN] = 409.8

4.2.1. Dimensionado de muro.



$(\gamma z + p)\, Ka$

V: 2 x 474 + 2 x 103 + 2 x 265 = 1684 KN

H: 2x15 KN = 30 KN

$Peso_{muro}$ = 1,20 x 9,554 x 8,00 x 25 = 2293 KN e=2,40 m

$Peso_{murete}$ = 0,81x 0,60 x 8,00 x 25 = 97 KN e=2,70 m
= 0,90x 0,30 x 8,00 x 25 = 54 KN e=2,55 m

$Peso_{trasdós}$ = 6,00x 4,00x 11,264 x 20 =5407 KN e=5,00 m
= 2,00x 0,40x 4,00 x 3984 x 20 =255 KN e=5,00 m

$Peso_{alet1}$ = (4,00 x 6245 x 1,00 x 25 x 2)=1249 KN e= 5,00m

$Peso_{alet1'}$ = (4,00 x 3984 x 0,60 x 25 x 2) = 478 KN e= 5,00m

$Peso_{alet2}$ = 5,976 x 0,6 x 0,60 x 2 x 25 = 108 KN e=9,99 m

$Peso_{alet2'}$ = 1/2x3,984x5,976 x 0,60x2x25 = 357KN e= 8,99 m

$Peso_{sobrec}$ = 8 x4,60 x 10 = 368 KN e=4,70 m

Empuje de tierras = 9 x (12,864 m x 3 KN/m² +
+ 0,5 x 12,864 m x 68 KN/m²) = 4257 KN.

Componente vertical del Empuje = (4257 KN/0,30) x 0,05 =
= 710 KN (79 KN/ml).

Nota: las excentricidades se refieren al borde de zapata.

4.2.2. Cimentación.

Podemos dimensionar la cimentación. (ver valores de los pesos aquí no especificados en el apartado 4.2.1).

Calculamos Peso Estribo (exentricidades respecto al centro de la zapata):

			My
Peso Zapata: 1,60 x 9,00 x 7,00 x 25 =	2520 KN	e = 0	0
Peso Muro:	M = 2293 KN	e_1 = 1,10	2522 KN.m
Peso Murete	M_1 = 97 KN	e_2 = 0,80	78 KN.m
	M_2 = 54 KN	e_3 = 0,95	51 KN.m
Peso Aletas:	Aleta, 1 = 1249 KN	e_1 = - 1,50	-1874 KN.m
	Aleta, 1' = 478 KN	$e_{1'}$ = - 1,50	-717 KN.m
	Aleta, 2 = 108 KN	e_2 = - 6,49	-701 KN.m
	Aleta, 2' = 357 KN	$e_{2'}$ = - 5,49	-1960 KN.m
Peso Tierras:	Tierras, 1 = 5407 KN	e = - 1,50	-8111 KN.m
	Tierras, 2 = 255 KN	e = - 1,50	-470 KN.m
Peso propio Estribo:	**12818 KN**		**- 11182 KN.m**
Peso sobrec. en terraplén:	368 KN	e = -1,20	-442 KN.m

	Muro frontal	Contrafuertes

My com.vertical del empuje = (79 KN/ml x 6)x(+1,00) - 2x79 KN/ml x 4,00x0,5=158 KN.m

My empuje tierras: [345 x (12,864/2) + 3912 x (12,864/3)] = 18876 KN.m

My frenado: + 2 x 15 x (9,554 + 1,60) = + 332 m KN

E-1-3

HIP 1 Acciones Verticales máximas.

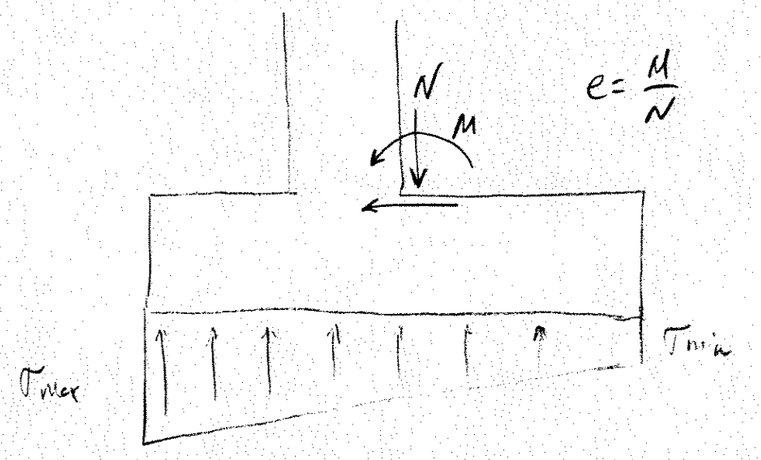
Peso Total = 12818 + 1684 + 368= 14870 KN.

My Total = Exc. Estribo + Exc. Reacciones Verticales Tablero + Exc. sobrec. terraplén
+ Empuje Tierras + Frenado + Rozamiento Muro

= -11182 + 1684 x 1,40 - 442 + 18876 + 332 + 158 = **10100 KN.m**

e = My / Peso = 10100 / 14870 = 0,68 < A / 6 = 7 /6 = 1,17

Luego la ley de tensiones bajo zapata es del tipo



cuya tensión máxima obedece a:

$$\sigma_{max} = \frac{N}{A \cdot B} + \frac{6M}{A^2 \cdot B}$$

$$\sigma_{mín} = \frac{N}{A \cdot B} - \frac{6M}{A^2 \cdot B}$$

que debe ser

$$\sigma_{max} \leq \sigma_{adm}$$

En nuestro caso:

$$\sigma_{máx} = \frac{14870}{7 \times 9} + 6 \times \frac{10100}{7^2 \times 9} = 236 + 137 = 373 \text{ KN/m}^2$$

$$\sigma_{mín} = 236 - 137 = 99 \text{ KN/m}^2$$

Valores válidos al ser $\sigma_{adm} = 4{,}0 \text{ Kg/cm}^2 = 400 \text{ KN/m}^2$

HIP 2 Acciones Verticales mínimas.

Reacciones mínimas = 2 x 474 = 948 Tn.

Así las reacciones del tablero tienen ese valor, y el peso total es, en este caso, considerando la sobrecarga de terraplén que sí produce empuje.

Peso Total = 12818+ 948+ 368 = 14134 KN.

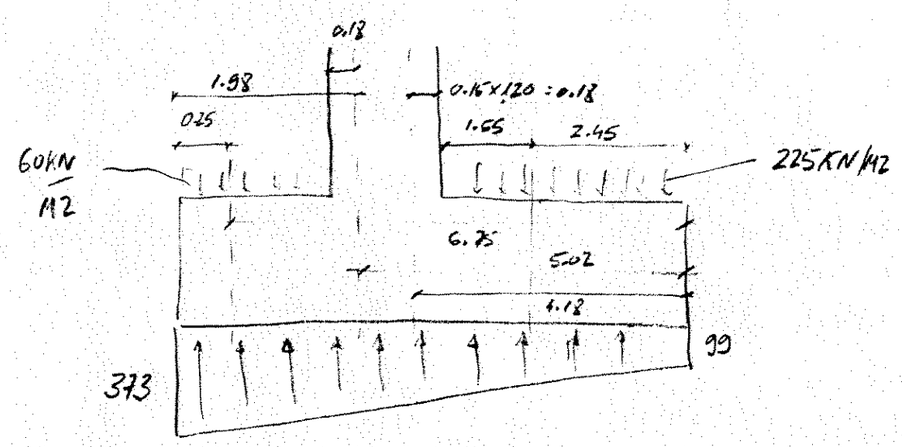
El valor de la flexión valdrá, ahora,

$$M_{y\,TOTAL} = -11182 + 948 \times 1{,}40 - 442 + 18876 + 82 = 8661 \text{ m KN}$$

e= 8661 / 14134 = 0,61

$$\sigma_{max} = \frac{14134}{7 \times 9} + \frac{6 \times 8661}{7^2 \times 9} = 342 \text{ KN/m}^2$$, menor al de la hipótesis 1.

La zapata se dimensionará de acuerdo a:



$\sigma\,(6{,}75) = \frac{373 - 99}{7} \times (6{,}75 + 99) = 363\ \text{KN/m}^2$

$\sigma\,(5{,}02) = \frac{373 - 99}{7} \times 5{,}02 + 99 = 295\ \text{KN/m}^2$ $\quad \sigma(4{,}18) = \frac{373 - 99}{7} \times 4{,}18 + 99 = 262\ \text{KN/m}^2$

$\sigma\,(2{,}45) = \frac{373 - 99}{7} \times 2{,}45 + 99 = 195\ \text{KN/m}^2$

Talón;

$md = 1{,}5 \times (225 + 37{,}5) \times 4{,}18^2 / 2 - 0{,}9 \times [(2 \times 99 + 262) \times 4{,}18^2 / 6] = 2234\ \text{KN.m/ml.}$

$vd = 1{,}5 \times (225 + 37{,}5) \times 2{,}45 - [(195 + 2 \times 99) \times 2{,}45^2 / 6] \times 0{,}9 = 611\ \text{KN/ml}$

Puntera,

$md = [(2 \times 373 + 299 / 6)] \times 1{,}98^2 \times 1{,}5 - 0{,}9 \times (60 + 37{,}5 \times 1{,}98^2 / 2) = 848\ \text{m KN/ml.}$

$vd = (373 + 363) / 2 \times 0{,}35 \times 1{,}5 - 0{,}9 \times (60 + 37{,}5) \times 0{,}35 = 162\ \text{KN/ml.}$

E2-2

En los listados adjuntos se comprueban las secciones, donde se ve que la mínima de 10 ø 25/ml cubre los esfuerzos principales.

Como armadura secundaria dispondremos el 20% de la armadura principal (CALAVERA en "Muros de Contención").

$$At = 0{,}20\ (10 \times 4{,}9) = 9{,}8\ cm^2$$

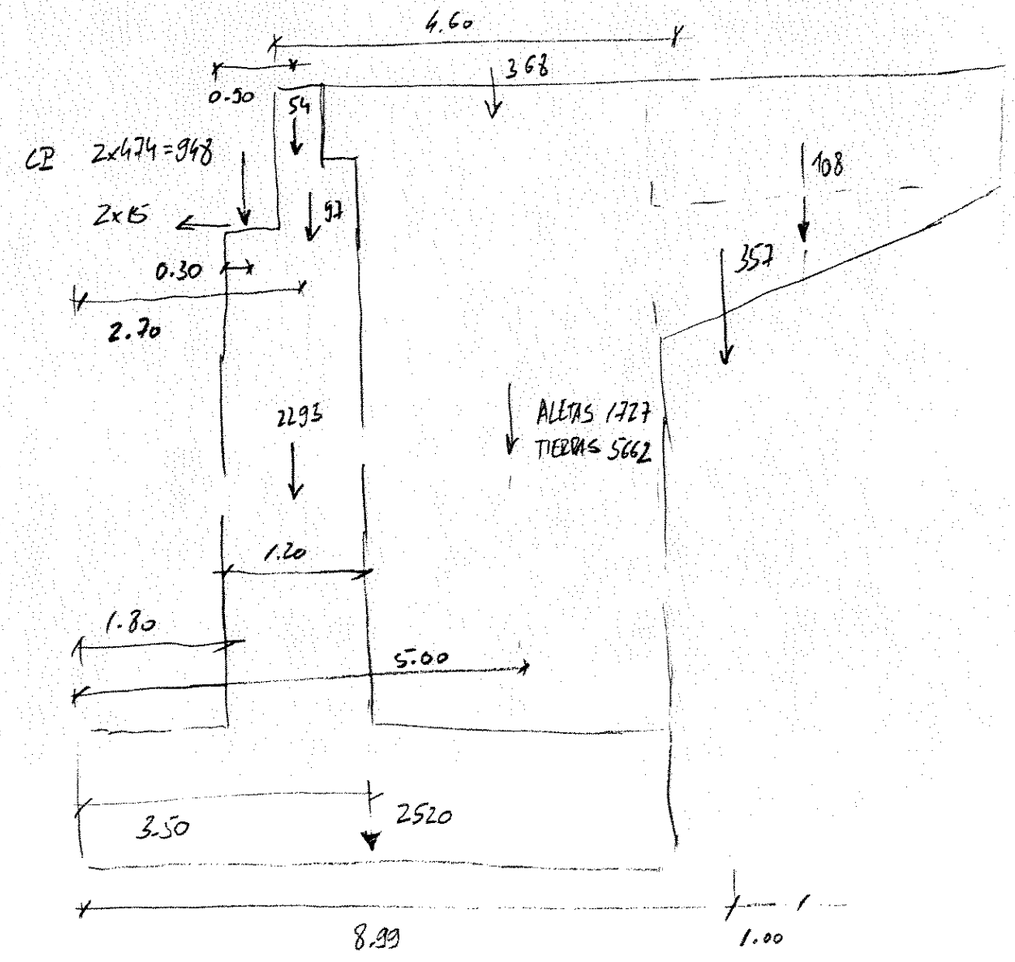
Dispondremos 5 ø 16 pml en ambas caras.

Las armaduras horizontales obedecerán al 1,5 ‰ s / 160 x (160/2) (EHE art. 59.4.1.2.1.2)

Ah = 0,0015 x 160 x 80 = 19,20 cm².

Disponemos 10 ø 16 (8 intermedios).

En cuanto a la seguridad al vuelco:



M_v = Empuje x Altura = 18876 KN. m

M_e = 2520 x 3,50 + 2293 x 2,40+ 97 x 2,70 + 54 x 2,55 +
+ 1727 x 5,50 + 5662 x 5,50+ 368 x 4,70 + 948 x 2,10 + 357 x 8,99 + 108 x
x 9,99 = 63371 mt.

Luego el coeficiente de seguridad al vuelco es:

FS =63371 / 18876 = 3,3, válido.

Deslizamiento:

F_d = Empuje Tierras

F_d = 4257 KN

F_e = Σ Fv tg φ, siendo Σ Fv la de cargas verticales y φ el ángulo de fricción que puede tomarse de 30º (ver Estudio Geotécnico).

F_e = (2520 + 2293+ 97 + 54 + 1727 + 5662+ 368+ 948) tg 30º =
= 13669 x 0,58 = 7892 Tn.

Luego al coeficiente de seguridad el deslizamiento es FS = 7892 / 4257 = 1,8, válido.

ZAPATA ESTRIBOZ

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 18:07:41

Dimensionamiento de secciones a flexión simple

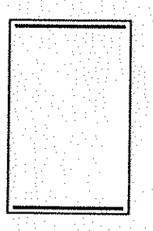
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

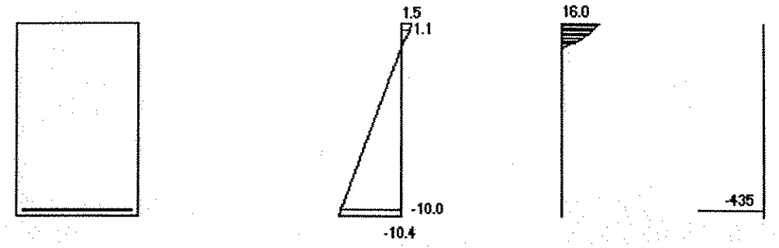
- Sección

Sección : ZAPAT
b [m] = 1.00
h [m] = 1.60
ri [m] = 0.050
rs [m] = 0.050



2 Dimensionamiento

Md [kN·m] = 2234



Plano de deformación de agotamiento

x [m] = 0.203
1/r [1/m]·1.E-3 = 7.4
εs ·1.E-3 = 1.5
εi ·1.E-3 = -10.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	1.1	0.0
1.550	44.8	-10.0	434.8

At_est [cm²] = 44.8

ϕ [mm]	12	14	16	20	25
n°ϕ	----	30	23	15	10
n° capas	----	2	2	1	1
At [cm²]	----	46.2	46.2	47.1	49.1
wk [mm]	----	0.12	0.12	0.13	0.15

↳ Armadura

wk < 0.3

ZAPATA ESTADO 2

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 18:08:47

Cálculo de secciones a cortante

1 Datos

- Materiales

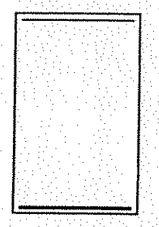
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : ZAPAT
b0 [m] = 1.00
h [m] = 1.60



2 Comprobación

ρl [·1.E-3] = 3
Nd [kN] = 0.0
Vu [kN] = 525.9 > 162 kN/ML

ZAPATA ESTADO 2

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 18:09:06

Cálculo de secciones a cortante

1 Datos

- Materiales

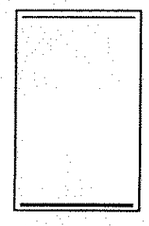
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : ZAPAT
b0 [m] = 1.00
h [m] = 1.60



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 611 > 525.9
Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 3
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	0.10	4	11.3	2	633.3	----
ø 8	0.20	4	10.1	2	563.0	----
ø 10	0.25	4	12.6	2	703.7	----
ø 12	0.25	4	18.1	2	1013.4	----

Área estricta [cm²/m] = 10.0

(Cuantía mínima)

Vu1 [kN] = 9300.0

Vcu [kN] = 438.2

4.2.3.- Aletas.

Del mismo análisis tridimensional mencionado anteriormente, y que figura en el Anejo 3, extraemos los siguientes resultados. (Se han considerado la misma hipótesis de carga de impacto que en el Estribo 1).

(Nudo 9) Reacción mínima, y = - 37 Tn / 0,917 m = - 40,3 T/ml.

Anec = 12,5 cm² / 0,917 m. Disponemos 2 x 5 ø 20/ml

(Nudo 9) Reacción máxima, x = (54,37 + 30,9) / (1,5 x 0,917) = 62,00 t/ml,

Rd = 930 KN/ml

Se precisan estribos dobles ø 10 a 0,15.

Por lo que concierne a la armadura vertical, m_{22}= (106 + 69)/2 = 87,5 mt/ml en elemento 1,

md = 875 KN/ml, que requiere armadura mínima de 6 ø 25/ml.

La armadura vertical en la zona de 0,60 m de espesor coresponde a la mínima geométrica habida cuenta del pequeño valor de los esfuerzos calculados.

La armadura horizontal, en la zona de 0,60 corresponde al elemento 47, nudo 129, md = (88 x 19) x 1,5 = 80 mt/ml, que requiere 8 ø 25/ml. Para la zona de 1,00 corresponde, para m_{22} = 47 mt/ml en el nudo 124, md = 70,5 mt/ml, que requiere, como hemos visto armadura mínima de 6 ø 25/ml.

Hemos evaluado en el análisis del Estribo 1, el cortante de cálculo para la aleta, en la zona de 0,60 m de espesor, bajo la acción del impacto.

En listado adjunto vemos que la capacidad de este elemento sin armadura de cortante es suficiente.

Las armaduras mínimas geométricas serán:

Aleta de 0,60 m de espesor.

A mínima horizontal: $3{,}2^{0}/_{00}$ s/60 x 100 = 19,2 cm².

Cara vista 50% s/19,2 cm² = 9,6 cm² (5 ø 16 pml).

Armadura vertical mínima $\geq 0{,}9^{0}/_{00}$ s/60 x 100 = 5,4 cm² 5 ø 12 pml.

Aleta de 1,00 m de espesor.

A mínima horizontal: $3{,}2^{0}/_{00}$ s/100 x 100 = 32 cm².

Cara vista 50% s/32 cm² =16 cm² (8 ø 16 pml).

Armadura vertical exterior $\geq 0{,}9^{0}/_{00}$ s/100 x 100 = 9 cm² Disponemos 5 ø 16 pml.

ESTRIBO 2
ALETA

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 20:37:04

Dimensionamiento de secciones a flexión simple

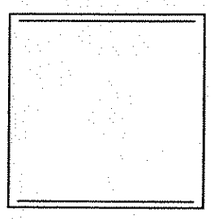
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

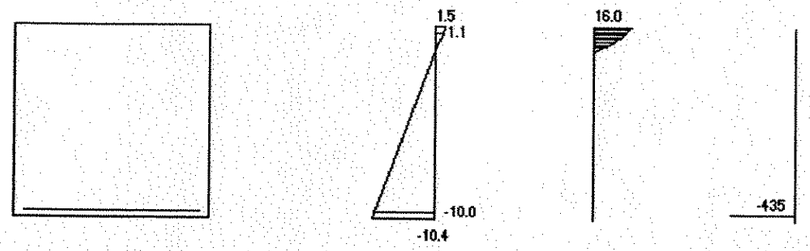
- Sección

Sección : ALETA
b [m] = 1.00
h [m] = 1.00
ri [m] = 0.035
rs [m] = 0.035



2 Dimensionamiento

Md [kN·m] = 875



Plano de deformación de agotamiento

x [m] = 0.127

1/r [1/m]·1.E-3 = 11.9

εs ·1.E-3 = 1.5

εi ·1.E-3 = -10.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	1.1	0.0
0.965	28.0	-10.0	434.8

At_est [cm²] = 28.0

ϕ [mm]	12	14	16	20	25
nºϕ	25	19	14	9	6
nº capas	2	1	1	1	1
At [cm²]	28.3	29.2	28.1	28.3	29.5
wk [mm]	0.09	0.10	0.12	0.14	0.18

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 20:31:09

Cálculo de secciones a cortante

1 Datos

- Materiales

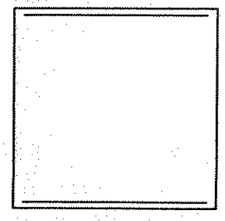
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : ALETA
b0 [m] = 1.00
h [m] = 1.00



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 930

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 2
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0

ESTRIBO 2

ALETA e=0.60

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	—	—	—	—	—	—
ø 8	0.10	4	20.1	2	699.7	955.99
ø 10	0.15	4	20.9	2	728.8	985.15
ø 12	0.20	4	22.6	2	787.2	1043.45

Área estricta [cm²/m] = 19.4

Vu1 [kN] = 5820.0

Vcu [kN] = 256.3

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 20:50:27

Dimensionamiento de secciones a flexión simple

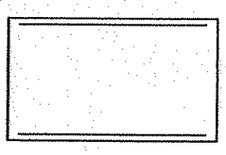
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

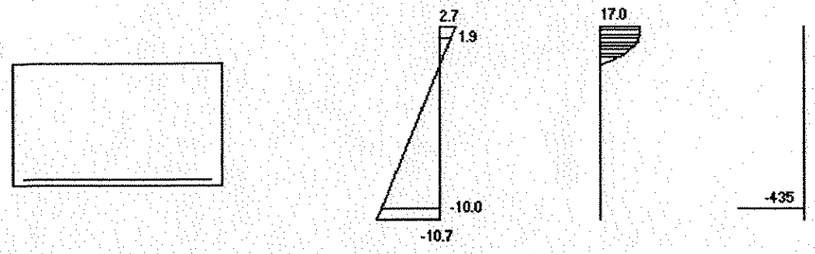
Sección : ALETAF
b [m] = 1.00
h [m] = 0.60
ri [m] = 0.035
rs [m] = 0.035



2 Dimensionamiento

Md [kN·m] = 800

ALETA
e = 0.60



Plano de deformación de agotamiento

x [m] = 0.121

1/r [1/m]·1.E-3 = 22.4

εs ·1.E-3 = 2.7

εi ·1.E-3 = -10.7

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.035	0.0	1.9	0.0
0.565	35.6	-10.0	434.8

At_est [cm²] = 35.6

ϕ [mm]	12	14	16	20	25
nºϕ	32	24	18	12	8
nº capas	2	2	1	1	1
At [cm²]	36.2	36.9	36.2	37.7	39.3
wk [mm]	0.22	0.22	0.24	0.26	0.28

Las 3

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/02/04
Hora: 21:13:14

Cálculo de secciones a cortante

1 Datos

- Materiales

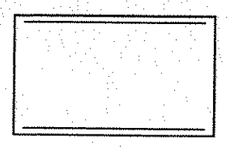
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : ALETAF
b0 [m] = 1.00
h [m] = 0.60



2 Comprobación

ρl [·1.E-3] = 3
Nd [kN] = 0.0
Vu [kN] = 226.6 > Vd = 127,2 kN/ml

5. Pilas.

Para el cálculo de los esfuerzos en los fustes y cimentaciones de pilas, procedemos, para cada una de ellas, a examinar las cargas inducidas apor cada una de las siguientes hipótesis de carga.



Vano i Vano i + 1

Pila i

Ambos vanos cargados



Vano i Vano i + 1

Pila i

Ambos vanos cargados
en un semitablero



Vano i Vano i + 1

Pila i

Vano i cargado
Vano i + 1 descargado



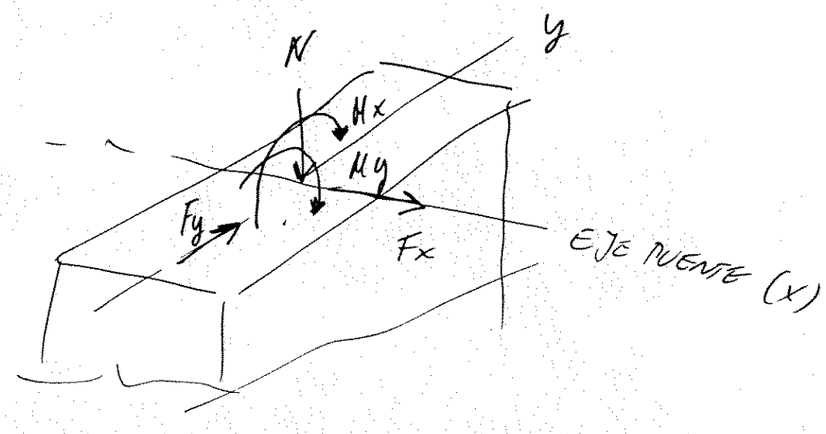
Vano i Vano i + 1

Pila i

Vano i descragado
Vano i + 1 cargado

Los valores para las reacciones en cada uno de los apoyos son los calculados en el apartado 3.2.1.

Se obtienen los siguientes esfuerzos:



$N = N_{11} + N_{12} + N_{21} + N_{22}$. Suma de reacciones por apoyo. (Ver resumen en apartado 3.3).

Fx = Carga de frenado (ver valores en apartado 3.2.3.)

Fy = Viento (ver valores en apartado 3.2.4.)

Mx = Momento torsor provocado po el viento. (ver valores en apartado 3.2.4.) y momento por excentricidad de las sobrecargas.

My = momento flector provocado por desequilibrio de reacciones entre vanos contiguos.

En todos los casos se considera el torsor provocado por el excéntrico, vehículo pesado de valor:

Mx = 900 KN. m (ver apartado 3.2.1.)

Si $N_{11} \neq N_{12}$ y $N_{12} \neq N_{22}$, (HIP 2), se genera torsor de valor:

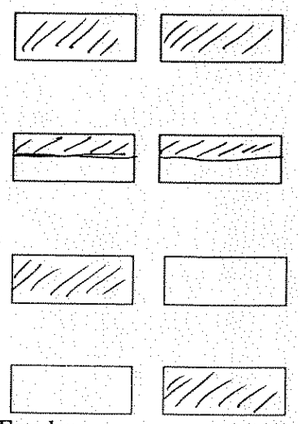
$$Mx = \pm (N_{11} - N_{21}) \times 1{,}35 + (N_{12} - N_{22}) \times 1{,}35$$

Al ser siempre $N_{11} \neq N_{12}$ y $N_{21} \neq N_{22}$, se genera flector.

$$My = (N_{11} - N_{12}) \times (1{,}05/2) + (N_{21} - N_{12}) \times 1{,}05/2$$

5.1. Pila P1.

5.1.1. Cargas en Coronación Pila P1.

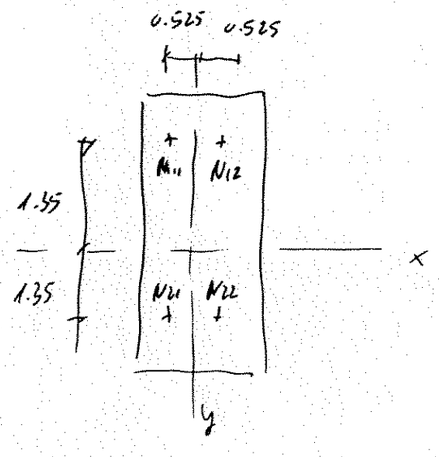


(1)

(2)

(3)

(4)



HIP	Estado Carga	N_{11}	N_{21}	N_{12}	N_{22}	N	Fx	Fy	Mx	My
1	CP	474	474	680	680	2308	----	----	----	- 216
	SC_{UNIF}	103	103	148	148	502	----	----	----	- 47
	VP	89	89	192	192	562	----	----	±900	- 108
	V_{SC}	----	----	----	-----	-----	----	±67	±79	----
	$F_{frenado}$	----	----	----	----	-----	±37	----	----	----
2	CP	474	474	680	680	2308	----	----	----	- 216
	SC_{UNIF}	128	-25	184	-36	251	----	----	±543	- 24
	VP	89	89	192	192	562	----	----	±900	- 108
	V_{SC}	----	----	----	-----	-----	----	±67	±79	----
	$F_{frenado}$	----	----	----	----	-----	±37	----	----	----
3	CP	474	474	680	680	2308	----	----	----	- 216
	SC_{UNIF}	103	103	----	----	206	----	----	----	+108
	VP	200	200	----	----	400	----	----	±900	+ 210
	$V_{NSC/SC}$	----	----	----	----	-----	----	±44	±32	----
	$F_{frenado}$	----	----	----	----	-----	±37	----	----	----
4	CP	474	474	680	680	2308	----	----	----	- 216
	SC_{UNIF}	----	----	148	148	296	----	----	----	-155
	VP	----	----	276	276	552	----	----	±900	- 290
	$V_{NSC/SC}$	----	----	----	-----	-----	----	±51	±47	----
	$F_{frenado}$	----	----	----	----	-----	±37	----	----	----

* VP: Vehículo pesado.

$V_{NSC/SC}$: Representa el efecto del viento, ya sea sin la sobrecarga de uso (NSC) o con la sobrecarga de uso (SC) según corresponda.

N_{11}, N_{12}, N_{21} y N_{22}, son reacciones verticales por apoyo.

5.1.2. Esfuerzos en Arranque de Pila P1.

Peso Pila.

h = 9,20.

Tramo recto : (9,20-5,50) = 3,70; P1 = 3,70 x 2,30 x 1,20 x 25 = 255 KN.

Tramo variable : 5,50 m ; P_2 = [(3,40 x 2,30) + (2,30 x 1,20) / 2] x 5,5 x 25 = 727 KN.

Peso Total : $P = P_1 + P_2 = 255\ KN + 727\ KN = 982\ KN$.

A los efectos de evaluar los efectos de segundo orden, tomaremos, la dimensión mínima de pila (2,30 x 1,20 en la base)

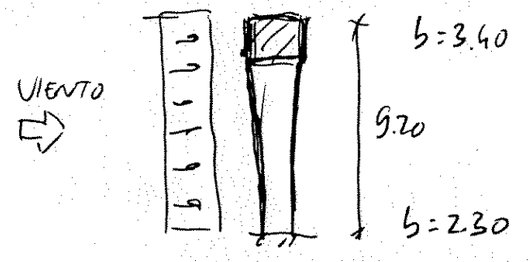
Lk = 2,00 x 9,20 = 18,40 m (ménsula)

$Iymin = 1/12 \times bh^3 = 1/2 \times 2{,}30 \times 1{,}20^3 = 0{,}3312\ m^4$

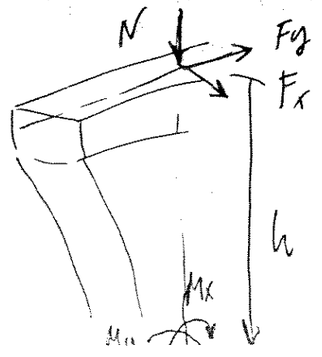
$A = b \times h = 2{,}30 \times 1{,}20 = 2{,}76\ cm^2$ $\qquad i_{min} = \sqrt{\frac{I_y}{A}} = 0{,}34$ m

$\lambda = \frac{1840}{34} = 54$, válido el método aproximado EHE (art. 4.3.5)
(ver listados de comprobación de sección).

Efecto del viento sobre pilas (ver apartado 1.1.2.2.):



$My,d = +1{,}54\ [\ (3{,}40 + 2{,}30)\ /2]\ x\ 9{,}2^2/2\ x\ 1{,}5\ x\ 0{,}6 = 167\ KN.m$



(1) Ncp = (2308 + 982) x 1,35 KN = 4442 KN

Nd = 6038 KN

Nsc = (502 + 562) x 1,5 KN = 1595 KN

$Mx_{,d}$ = (Fy . h + Mxv) x 1,5 x 0,60 + Mx sc x 1,5

(67 x 9,20 + 79) x 1,5 x 0,60 + 1,5 x 900 = 625 + 1350 = 1975 KN . m

$My_{,d}$ = Fx . h x 1,5 + My cp x 1,5 + Mysc x 1,5 + Myvx x 1,5 x 0,6

37 x 9,20 x 1,5 + 216 x 1,35 + (47 + 108) x 1,5 + 167 =

= 510 + 291 + 233 + 167 = 1201

Análogamente para las otras hipótesis de carga consideradas:

(2)

Nd = 4442 + (251+562) x 1,5 = 5662 KN

$Mx_{,d}$ = 625 KN . m + (900 + 543) x 1,5 = 2790 KN . m

$My_{,d}$ = 510 + 291 + (24 + 108) x 1,5 + 167 = 1166 KN . m

(3)

Nd = 4442 + (206 400) x 1,5 = 5351 KN

$Mx_{,d}$ = (44 x 9,20 + 32) x 1,5 x 0,60 + (900 x 1,5) = 1743 KN . m

$My_{,d}$ = 510 - 291 + (108 + 210) x 1,5 + 167 = 863 KN . m

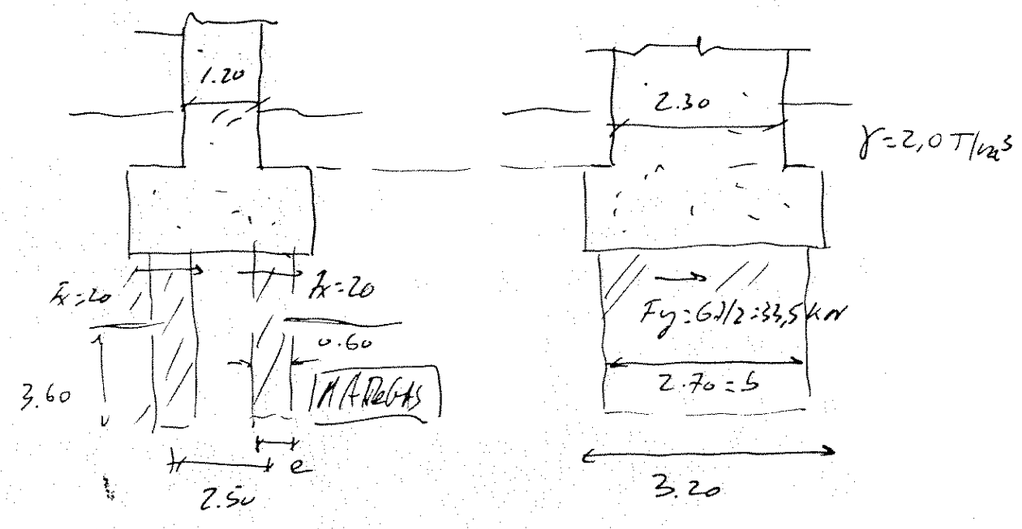
(4)

Nd = 4442 + (296 + 552) x 1,5 = 5714 KN

$Mx_{,d}$ = (51 x 9,20 + 47) x 1,5 x 0,60 + (900 x 1,5) = 1815 KN . m

$My_{,d}$ = 510 + 291 + (155 x 290) x 1,5 + 167 = 1636 KN . m

5.1.3. Cimentación Pila P1.



Evaluamos la capacidad del pilote apantallado.

Tomamos, a partir de las indicaciones del Estudio Geotécnico: qu = 20 Kg/cm²

En pantallas:

qp = (4,5 / 1,3) x 20 Kg/cm² = 69,2 Kg/cm² (NTE CPI-89 y su borrador).

qadm = 69,3 / 2 = 23,1 Kg/cm² (Factor de seguridad = 3).

Tope estructural = 35 Kg/cm²

Luego tomamos

q adm = 23,1 Kg/cm²

Qadm = 23,1 x b x e = 23,1 x 270 x 60 = 374 Tn = 3740 KN.

Esfuerzos principales en cimentación (característicos), añadiendo el peso del encepado y de las tierras:

$$\Delta N = 1{,}5 \times 3{,}60 \times 3{,}20 \times 20 + 3{,}6 \times 3{,}20 \times 1{,}25 \times 25 +$$

$$+ 7{,}10 \times 0{,}6 \times 25 \times 2{,}70 = 993 \text{ KN}$$

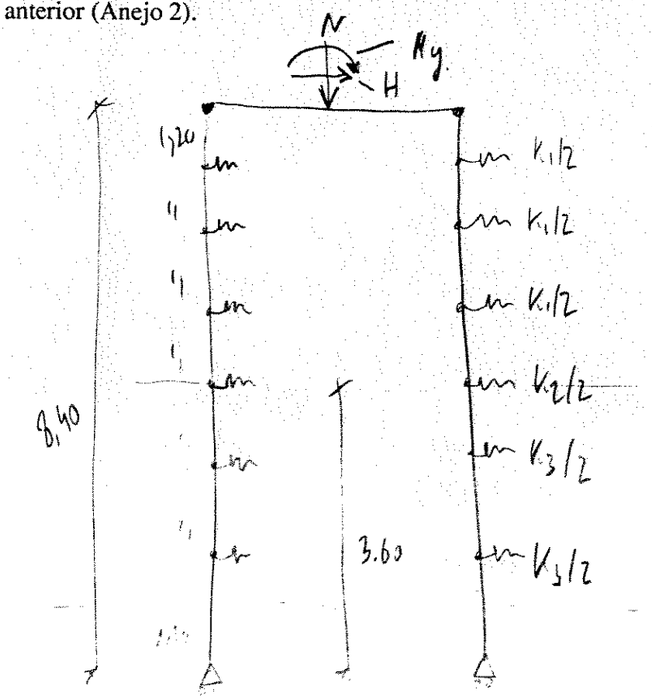
	N(KN)	My (KN m)
HIP 1	2308+502+562+993+982 = 5347	(216+47+108) + (37 x 9,2) = 711
HIP 2	2308+251+562+993+982 = 5096	(216+24+108)+340 = 688
HIP 3	2308+206+400+993+982 = 4889	(-216+108+210) +340 = 442
HIP 4	2308+296+552+993+982 = 5131	(216+155+290)+340 = 1001

Acción horizontal: Hmax ≈ 40 KN / 2 pantallas = 20 KN / pantalla. (Carga de frenado, véase página 25)

El caso más desfavorable, para dimensionado, serán las hipótesis 1 ó 4,

Tomamos el mismo modelo de cimentación para la pila P1 que en el caso del Estribo (ver anejo 2).

Tomamos los mismos criterios para evaluar los valores de K1, K2 y K3 que en el caso anterior (Anejo 2).



En este caso, al ser las pantalllas de 2,7 m únicamente, los valores de K1, K2 y K3 son la mitad de los considerados en el estribo. Como queda dicho en el Anejo 2 estos valores de $K_1 = 1$ Kg/cm³ y $K_3 = 10$ Kg/cm³ se consideran conservadores para los terrenos que aparecen en el emplazamiento de esta obra.

En el Anejo 3 se presenta el análisis para:

HIP 1	N = 534,7 Tn	HIP 4	N = 513,1 Tn
	H = 4,0 Tn		H = 4,0 Tn
	My = 71,1 mt		My = 100,1 mt

El valor máximo obtenido de las reacciones es:

Nmax = 2992 KN. < Nadm = 3740 KN (ver apartado 5).

En los listados que siguen a continuación se justifican las armaduras de flexión (15 ø 20 / 2,70 m) y la ausencia de armadura de cortante.

En la dirección principal resultan 15 ø 20 por cara, mientras que en los lados "cortos" disponemos un mínimo de 1,5‰ sobre la sección de hormigón. Esto es:

$$A' = 0{,}0015 \text{ s/ } (60 \times 270) = 24{,}3 \text{ cm}^2, \quad 5 \text{ ø } 25$$

Como armadura transversal, disponemos:

$Q_t \geq 1/4$ ø max = 6,3 mm., disponemos ø 12
$S_t = 15$ ø mm = 15 x 20 = 300 mm, disponemos $S_t = 30$ cms.

PILAS Y ESTRIBOS / PANTALLAS

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 12:58:38

Dimensionamiento de secciones a flexión simple

1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

Estribo $S = 5{,}40\,m \rightarrow S = 2{,}70\,m$

$A_K : 28{,}7\,cm^2 \rightarrow A_K = 14{,}35\,cm^2$

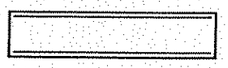
- Sección

Sección : PANT1
b [m] = 2.70
h [m] = 0.60
ri [m] = 0.070
rs [m] = 0.070

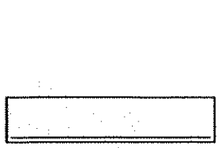
Pilas

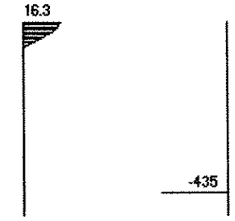
$S = 2{,}70\,m$

$A_K = 16{,}0\,cm^2$



$M_d = 1.5 \times 16{,}0 = 24\,mT = 240\,kN \cdot m$





Plano de deformación de agotamiento

x [m] = 0.073
1/r [1/m]·1.E-3 = 21.9
εs ·1.E-3 = 1.6
εi ·1.E-3 = -11.5

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	0.1	0.0
0.530	45.4	-10.0	434.8

At_est [cm²] = 45.4

ϕ [mm]	12	14	16	20	25
nºϕ	41	30	23	15	10
nº capas	1	1	1	1	1
At [cm²]	46.4	46.2	46.2	47.1	49.1
wk [mm]	0.05	0.05	0.05	0.06	0.06

L 0.3 (OK)

2 Dimensionamiento

Md [kN·m] = 240

PILAS / ESTRIBOS / PANTALLAS

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 05/12/03
Hora: 12:55:12

Cálculo de secciones a cortante

1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

Estribo b = 5,40 m s = 2,70 m

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

Vk = 10,9 Tn → Vk = 5,45 Tn

- Sección

Sección : PANT1
b0 [m] = 2.70
h [m] = 0.60

Pila s = 2,70 m



Vk = 5,1 Tn

Vd = 5,45 x 1,5 = 8,18 Tn = 81,8 KN

2 Comprobación

ρl [·1.E-3] = 3
Nd [kN] = 0.0
Vu [kN] = 576.6 > Vd = 81,8 KN , (OK)

Encepado (Método de las Bielas Art. 40.2.3. y 59.4.1.2.1. de EHE).

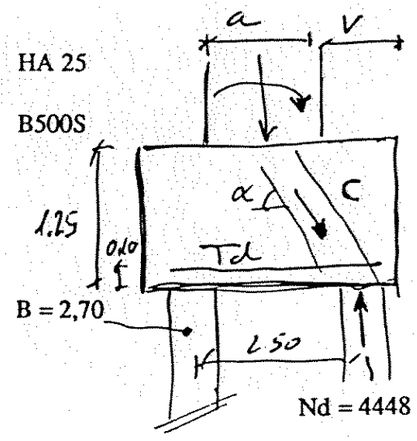
Para el dimensionado del encepado como pieza de hormigón armado se precisa conocer la carga axil máxima mayorada:

Nk = 2992 KN es la carga característica máxima obteniendo del análisis.

Para el estado límite último, tomaremos:

N d= 2992 x 1,5 = 4488 KN

HA 25
B500S



h = 0,6 cos (90 - α) = 0,42

Nu = fc,d x 0,70 x h x b

Nu = 25000/1,5 x 0,70 x 0,42 x 2,70 = 13230 KN

α = 43,83°

C = 4448 / sen α = 6423 KN < 13230 KN, válido

Td = Nd (v+0,25 a) / 0,85 d = (EHE)

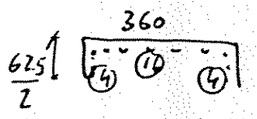
Nd = 4448 KN
a = 1,20 (sección pila dirección x)
v = (2,50 - 1,20) / 2 = 0,65
d = 1,15
Td = 4323 KN
As = 432,3 Tn / (5,1/1,115) = 97,5 cm² (Diponemos 20ø25)

En sentido transversal disponemos de armadura con capacidad mínima de 1/10 de la principal (EHE art. 59.4.1.2.1.2.) o bien 1,5 °/$_{oo}$ s/(125 x 100) (CALAVERA en "Estructuras de Cimentación"), es decir 18,7 cm²/ml.

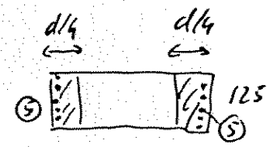
At = 6 ø 20/ml.

La armadura secundaria tendrá un mínimo del 4°/$_{oo}$ (EHE):

Vertical = 4°/$_{oo}$ s/(360 x d/4) = 0,004 x 360 x 120/2 = 86 cm². La armadura transversal (6 ø 20 /ml), cumple, pues es: 2x6x4,14 x 3,60 = 135 cm².



Armadura perimetral : 4°/$_{oo}$ s/(125 x 62,5) = 31,25 cm²



Disponemos 5 ø 20 = 2 x 5 x 3,14 = 31,4 cm² ,válido.

En la cara superior disponemos armaduras con separaciones coherentes con las de las armaduras inferiores, y de cuantía mínima 1,5 °/$_{oo}$ s/ (125 x 100) = 19 cm² . (6 ø 20/ ml y 18 ø 16/ml).

En este caso, no tiene sentido verificar la seguridad al vuelo de la pila.

5.2. Pila P2.

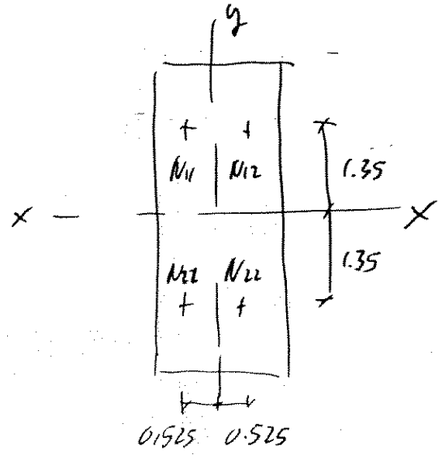
5.2.1. Cargas en Coronación Pila P2.

(1)

(2)

(3)

(4)



HIP	Estado Carga	N_{11}	N_{21}	N_{12}	N_{22}	N	Fx	Fy	Mx	My
1	CP	680	680	848	848	3056	----	----	----	- 176
	SC_{UNIF}	148	148	184	184	664	----	----	----	- 38
	VP	92	92	194	194	572	----	----	±900	- 107
	V_{SC}	----	----	----	-----	-----	----	±88	±105	----
	$F_{frenado}$	----	----	----	----	-----	±49	----	----	----
2	CP	680	680	848	848	3056	----	----	----	- 176
	SC_{UNIF}	184	-36	229	-45	332	----	----	±667	- 19
	VP	92	92	194	194	572	----	----	±900	- 107
	V_{SC}	----	----	----	-----	-----	----	±88	±105	----
	$F_{frenado}$	----	----	----	----	-----	±49	----	----	----
3	CP	680	680	848	848	3056	----	----	----	- 176
	SC_{UNIF}	148	148	----	----	296	----	----	----	+155
	VP	276	276	----	----	552	----	----	±900	+ 290
	$V_{NSC/SC}$	----	----	----	----	-----	----	±60	±47	----
	$F_{frenado}$	----	----	----	----	-----	±49	----	----	----
4	CP	680	680	848	848	3056	----	----	----	- 176
	SC_{UNIF}	----	----	184	184	368	----	----	----	-193
	VP	----	----	281	281	562	----	----	±900	- 295
	$V_{NSC/SC}$	----	----	----	-----	-----	----	±65	±58	----
	$F_{frenado}$	----	----	----	----	-----	±49	----	----	----

* VP: Vehículo pesado.

$V_{NSC/SC}$: Representa el efecto del viento, ya sea sin la sobrecarga de uso (NSC) o con la sobrecarga de uso (SC) según corresponda.

N_{11}, N_{12}, N_{21} y N_{22}, son reacciones verticales por apoyo.

5.2.2. Esfuerzos en Arranque de Pila P2.

A los efectos de evaluar los efectos de segundo orden, tomaremos,

$Lk = 2 \times 10{,}40 = 20{,}8$ m

$Iy = 0{,}3312\ m^4 \quad A = 2{,}76\ m^2 \qquad i_{min} = \sqrt{\frac{I_y}{A}} = 0{,}34$ m

$\lambda = \frac{2080}{34} = 61$, válido método aproximado EHE (art. 43.5)

Peso Pila

h = 10,4

Tramo Recto = (10,4 - 5,5) = 4,9; $P_1 = 4{,}9 \times 2{,}30 \times 1{,}20 \times 25 = 338$ KN

Tramo variable: 5,5 m; $P_2 = \left[\frac{(3{,}40 \times 2{,}30) + (2{,}30 \times 1{,}20)}{2}\right] \times 5{,}5 \times 25 = 727$ KN

Peso Total = $P = P_1 + P_2 = 338$ KN + 727 KN = 1065 KN

(1) Ncp = 3056 x 1,35 + 1065 x 1,35 = 5563 KN

Nsc = (664+572) x 1,5 = 1854 KN

Nd = 7417 KN

$Mx_{,d}$ = (88 x 10,40+ 105) x 1,5 x 0,60 + (900x 1,5) = 918 + 1350 = 2268 KN . m

$My_{,d}$ *= 49 x 10,40 x 1,5 + 176 x 1,35 + (38+107) x 1,5 + 213 = 764 + 238 + 218 + 213 = 1433 KN.m

* Efecto del viento es, análogamente al caso de P1,

$My,dv = (167 / 9{,}2^2) \times 10{,}4^2 = 213$ KN.m

(2)

Nd = 5563 + (332 + 572) x 1,5 = 6919 KN

$Mx_{,d}$ = 918 KN . m + (900+667) x 1,5 = 3269 KN . m

$My_{,d}$ = 764 + 238 + 1,5 (19+107) + 213 = 1404 KN . m

(3)

Nd = 5563 + (296+552) x 1,5 = 6835 KN

$Mx_{,d}$ = (60 x 10,4 + 47) x 1,5 x 0,60 + 900 x 1,5 = 1954 KN . m

$My_{,d}$ = 764 - 238 + 1,5 (155 + 290) + 213 = 1407 KN . m

(4)

Nd = 5563 + (368+562) x 1,5 = 6958 KN

$Mx_{,d}$ = (65 x 10,40 + 58) x 1,5 x 0,60 + 900 x 1,5 = 2011 KN . m

$My_{,d}$ = 764 + 238 + 1,5 (193+295) + 213 = 1947 KN . m

5.2.3. Cimentación Pila P2

De forma inmediata reproducimos los valores indicados en el apartado anterior, sin coeficientes de mayoración (esfuerzos característicos).

Añadiendo el peso del fuste,

(1) Nx = 3056 + 1065 + 664 + 572 = 5357 KN

Mx = 1920 KN . m

My = 1067 KN. m

(2) Nx = 3056 + 1035 + 332 + 572 = 4995 KN

Mx = 2587 KN . m

My = 1048 KN. m

(3) Nx = 3056 + 1035 + 296 + 552 = 4939 KN

Mx = 1571 KN . m

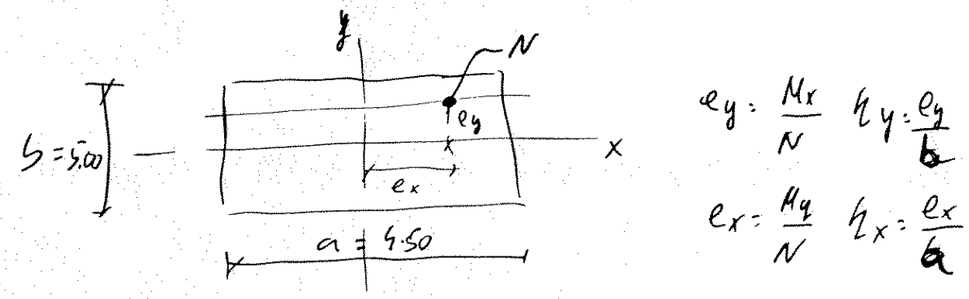
My = 1015 KN. m

(4) Nx = 3056 + 1035 + 368 + 562 = 5021 KN

Mx = 1634 KN . m

My = 1410 KN. m

Predimensionamos una zapata de 5,00 x 4,50 x 1,50, lo cual genera un peso adicional de 845 KN, que junto con relleno de tierras de 1,0 m de valor medio, totalizan una carga vertical añadida de [845 + (450 - 55)] = 1240 KN ($\gamma_{tierras}$ = 20 KN/m²).



Aplicando el ábaco que figura en JIMENEZ MONTOYA et alt., capítulo relativo a Cimentaciones de Hormigón Armado, para el cálculo de zapatas sometidas a cargas verticales biexcéntricas, obtenemos (ver en la copia del ábaco que se adjunta los significados de las distintas variables):

HIPOTESIS	1	2	3	4
Nx	6597	6235	6179	6261
Mx	e_y=0,30 η_x = 0,06	e_y=0,42 η_x = 0,08	e_y= 0,26 η_x = 0,05	e_y= 0,26 η_x = 0,05
My	e_x=0,16 η_y= 0,04	e_x=0,17 η_y = 0,04	e_x= 0,17 η_y = 0,04	e_x= 0,23 η_y = 0,05
σ_{med}	293	277	275	278
λ_5	0,78	0,74	0,77	0,78
σ_{max} (KN/m²)	376	374	348	356

Al estar en el dominio de tensión máxima interior no podemos sobrepasar la tensión admisible recomendada de 400 KN/m², lo cual se cumple en todos los casos.

Comprobamos, por último, la seguridad al vuelco en ambas direcciones.

COMPROBACION AL VUELCO Y DESLIZAMIENTO PILA P2

HIPOTESIS	1					2					3					4					5				
	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx
ESFUERZOS	6597	1920	88	1067	49	6235	2587	88	1048	49	6179	1571	60	1634	49	6261	1634	60	1410	49	4296	0	60	0	0
Mvolcador		2052		1140.5			2719		1121.5			1661		1707.5			1724		1483.5			90		0	
Mestabili.		16493		14843			15588		14029			15448		13903			15653		14087			10740		9666	
Deslizam.			88		49			88		49			60		49			60		49			60		0
Estabilzad.	3777.2					3569.9					3537.9					3584.8					2459.7				
FS vuelco		8.04		13.01			5.73		12.51			9.30		8.14			9.08		9.50			119.33		####	
FS deslizam.		42.92		77.09			40.57		72.86			58.96		72.20			59.75		73.16			41.00		####	

Brazo Estabilizabte según x-x (Mx)	2,50
Brazo Estabilizabte según y-y (My)	2.25
Angulo de Rozamiento	30 Grados Sexagesimales

Valor de Nk, Mx, My → Ver página (36)
añadida en Nx 1240 kN de peso de encepado
Valor de Fx, Fy, ver en página (33)

En estas hipótesis no hay volcadores ni deslizadores según "y" y "x" respectivamente

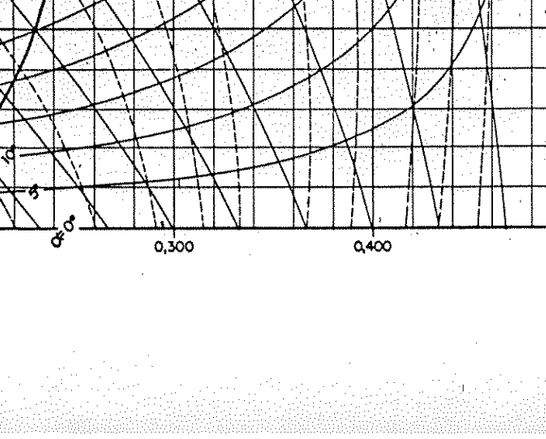
$M_{U,x} = M_x + F_y * 1.5m$

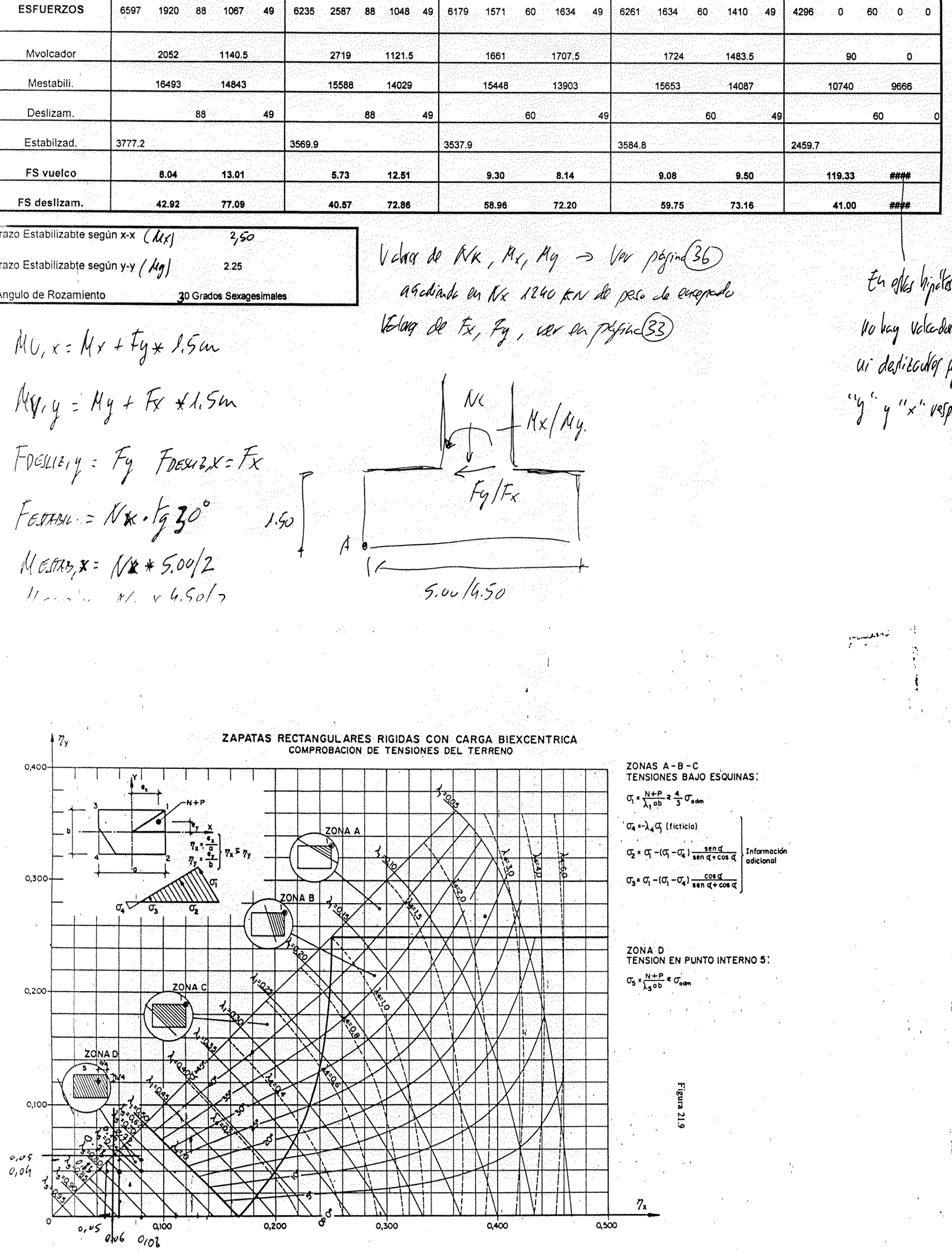
$M_{y,y} = M_y + F_x * 1.5m$

$F_{DESLIZ,y} = F_y \quad F_{DESLIZ,x} = F_x$

$F_{ESTABIL} = N_k \cdot tg\,30^\circ$

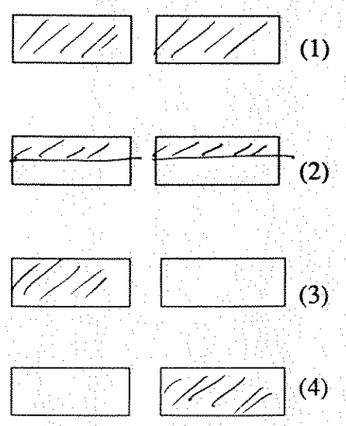
$M_{ESTAB,x} = N_k * 5.00/2$

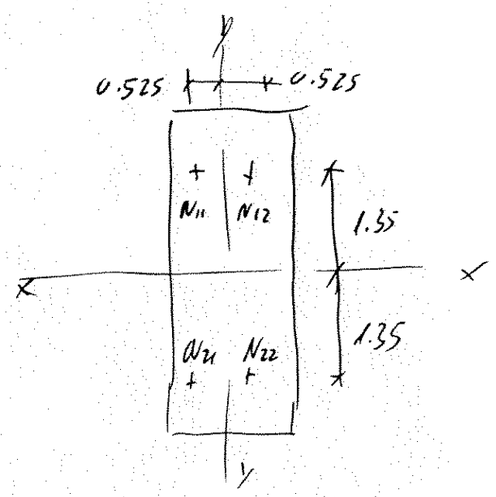




5.3. Pila P3.

5.3.1. Cargas en Coronación Pila P3.





HIP	Estado Carga	N_{11}	N_{21}	N_{12}	N_{22}	N	Fx	Fy	Mx	My
1	CP	848	848	474	474	2644	----	----	----	+ 393
	SC_{UNIF}	184	184	103	103	574	----	----	----	+ 85
	VP	194	194	89	89	566	----	----	±900	- 110
	V_{SC}	----	----	----	-----	-----	----	±77	±90	----
	$F_{frenado}$	----	----	----	----	-----	±43	----	----	----
2	CP	848	848	474	474	2644	----	----	----	+ 393
	SC_{UNIF}	229	-45	128	-25	287	----	----	±576	+ 43
	VP	194	194	89	89	566	----	----	±900	+ 110
	V_{SC}	----	----	----	-----	-----	----	±77	±90	----
	$F_{frenado}$	----	----	----	----	-----	±43	----	----	----
3	CP	848	848	474	474	2644	----	----	----	+ 393
	SC_{UNIF}	184	184	----	----	368	----	----	----	+193
	VP	276	276	----	----	552	----	----	±900	+ 290
	$V_{NSC/SC}$	----	----	----	----	-----	----	±60	±58	----
	$F_{frenado}$	----	----	----	----	-----	±43	----	----	----
4	CP	848	848	474	474	2644	----	----	----	+ 393
	SC_{UNIF}	----	----	103	103	206	----	----	----	- 108
	VP	----	----	281	281	562	----	----	±900	- 295
	$V_{NSC/SC}$	----	----	----	-----	-----	----	±48	±32	----
	$F_{frenado}$	----	----	----	----	-----	±43	----	----	----

* VP: Vehículo pesado.

$V_{NSC/SC}$: Representa el efecto del viento, ya sea sin la sobrecarga de uso (NSC) o con la sobrecarga de uso (SC) según corresponda.

N_{11}, N_{12}, N_{21} y N_{22}, son reacciones verticales por apoyo.

5.3.2. Esfuerzos en Arranque de Pila P3.

Al ser la pila más baja que las anteriores, no es necesario el cálculo de esbeltez anterior.

Peso Pila

h =9,80

Tramo Recto = (9,80 - 5,5) = 4,30; P_1 = 4,30 x 2,30 x 1,20 x 25 = 297 KN

Tramo variable: 5,5 m; $P_2 = \left[\frac{(3,40 \times 2,30) + (2,30 \times 1,20)}{2}\right] \times 5,5 \times 25 = 727$ KN

Peso Total = P = $P_1 + P_2$ = 297 KN + 727 KN = 1024 KN

(1) Ncp = 2644 x 1,35 + 1024 x 1,35 = 4952 KN

Nsc = (574 + 566) x 1,5 = 1710 KN

Nd = 6662 KN

$Mx_{,d}$ = (77 x 9,80 + 90) x 1,5 x 0,60 + 900 x 1,5 = 760 + 1350 = 2110 KN . m

$My_{,d}$ * = 43 x 9,80 x 1,5 + 393 x 1,35 + (85 + 110) x 1,5 + 189

= 632 + 531 + 293 + 189 = 1645 KN.m

* Efecto del viento es, análogamente el caso de P1,

My,dv = (167 / $9,2^2$) x $9,80^2$ = 189 KN.m

(2)

Nd = 4952 + (287 + 566) x 1,5 = 6232 KN

$Mx_{,d}$ = 760 KN . m + (900 + 576) x 1,5 = 2974 KN . m

$My_{,d}$ = 632 + 531 + (43 + 100) x 1,5 + 189 = 1567 KN . m

(3)

Nd = 4952 + (368 + 562) x 1,5 = 6347 KN

$Mx_{,d}$ = (60 x 9,80 + 58) x 1,5 x 0,60 + 900 x 1,5 = 1931 KN . m

$My_{,d}$ = 632 + 531 + (193 + 290) x 1,5 + 189 = 2077 KN . m

(4)

Nd = 4952 + (206 + 562) x 1,5 = 6104 KN

$Mx_{,d}$ = (48 x 9,80 + 32) x 1,5 x 0,60 + 900 x 1,5 = 1802 KN . m

$My_{,d}$ = 632 - 531 + (108 + 295) x 1,5 + 189 = 895 KN . m

5.3.3. Cimentación Pila P3

Esfuerzos de Cimentación (característicos), véase valores en apartado anterior antes de aplicar coeficientes de mayoración.

(1) Nx = 2644 + 1024 + 574 + 566 = 4808 KN

Mx = 844 + 900 = 1744 KN . m

My = 1219 KN. m

(2) Nx = 2644 + 1024 + 287 + 566 = 4521 KN

Mx = 1744 + 576 = 2320 KN . m

My = 1167 KN. m

(3) Nx = 2644 + 1024 + 368 + 552 = 4588 KN

Mx = 1546 KN . m

My = 1507 KN. m

(4) Nx = 2644 + 1024 + 206 + 562 = 4436 KN

Mx = 1402 KN . m

My = 641 KN. m

Tomando la misma zapata que en el caso de la pila P2, tenemos un peso adicional 1240 KN (veáse página 37).

Podemos, pues establecer una tabla para las diferentes hipótesis de carga, de acuerdo al criterio empleado en la pila anterior, para a = 4,50 y b = 5,00. (ver ábaco y valores en apartado anterior).

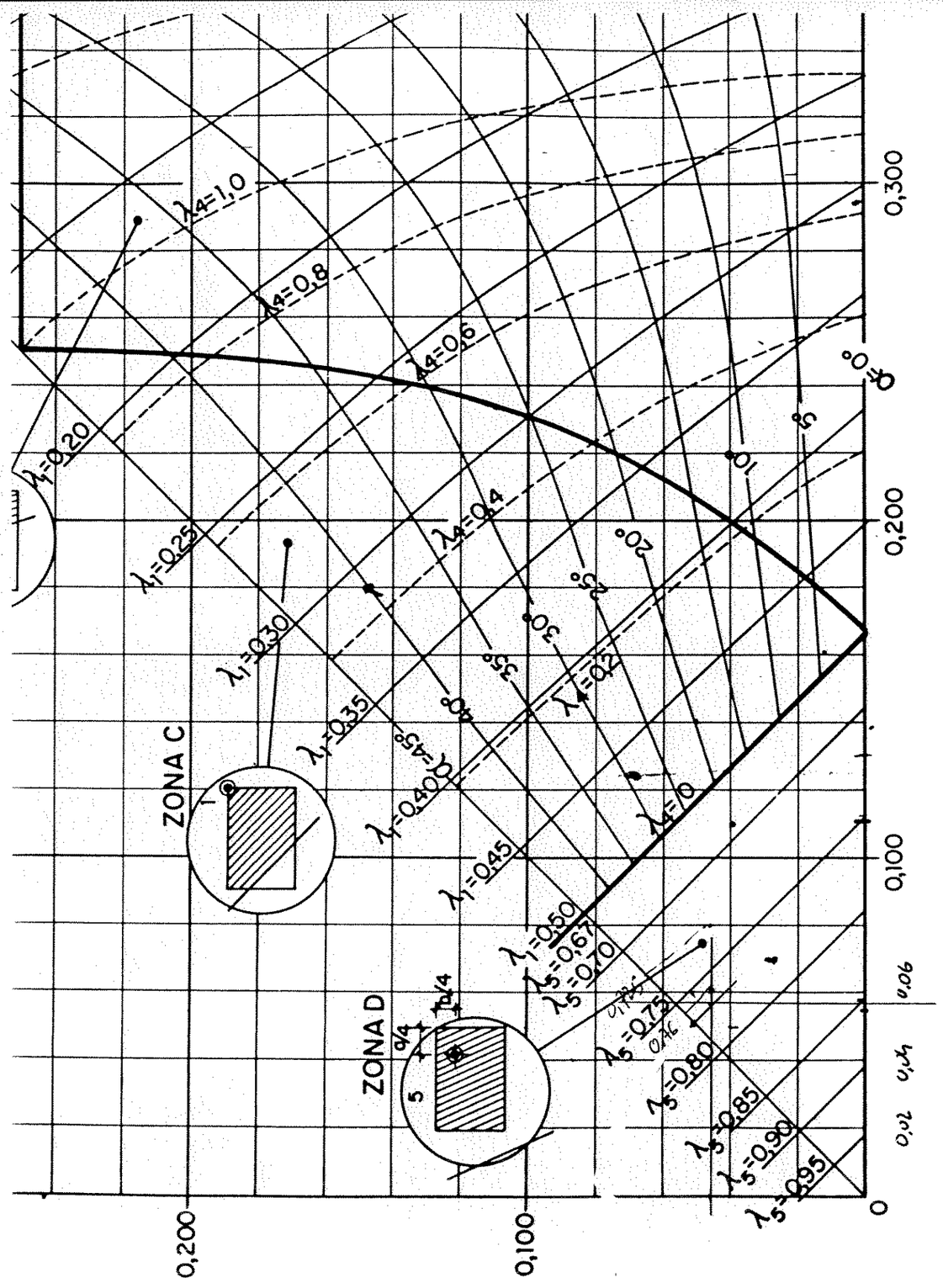
HIPOTESIS	1	2	3	4
Nx	6048	5721	5828	5676
Mx	e_y=0,29 η_y = 0,06	e_y=0,41 η_y = 0,08	e_y= 0,27 η_y = 0,055	e_y= 0,25 η_y = 0,05
My	e_x=0,20 η_x= 0,044	e_x=0,20 η_x = 0,044	e_x= 0,26 η_x = 0,06	e_x= 0,11 η_x = 0,024
$\sigma_{med} = \lambda_5 \sigma$	269	254	259	252
λ_5	0,76	0,725	0,75	0,83
σ_{max}	354	350	345	304

En todos los casos se cumple

$$\sigma_{max} < 400 \frac{KN}{m^2}$$

que es la tensión admisible recomenada.

Comprobamos, por último, la seguridad al vuelco en ambas direcciones.



COMPROBACION AL VUELCO Y DESLIZAMIENTO PILA P3

HIPOTESIS	1				2				3				4				5			
	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx	Nk	Mx	Fy	My	Fx
ESFUERZOS	6048	1744	77	1219	43	5721	2320	77	1167	43	5828	1546	60	1507	43	5676	1402	48	641	43
Mvolcador		1859.5		1283.5			2435.5		1231.5			1636		1571.5			1474		705.5	
Mestabili.		14515		12096			13730		11442			13987		11656			13622		11352	
Deslizam.			77		43			77		43			60		43			48		43
Estabilzad.	3462.9					3275.6					3336.9					3249.9				
FS vuelco		7.81		9.42			5.64		9.29			8.55		7.42			9.24		16.09	
FS deslizam.		44.97		80.53			42.54		76.18			55.61		77.60			67.71		75.58	

Brazo Estabilizabte según x-x	(Mx)	2.5	
Brazo Estabilizabte según y-y	(My)	2.25	
Angulo de Rozamiento		30 Grados Sexagesimales	

	5				
	Nk	Mx	Fy	My	Fx
	4908	0	60	0	0
	2810.1	90		0	
		11779		9816	
		0	60		0
		130.88		####	
		46.84		####	

5.4. Dimensionamiento de fuste de Pilas.

Una vez hallados, en todos los casos, los valores (Nd, Mx,d, My, d), procedemos a la comprobación de la armadura. Se realiza mediante la aplicación informática "Prontuario Informático del Hormigón Estructural" de Hugo Corres et alt.

En primer lugar se comprueba la sección de arranque de pila como soporte aislado, verificando los efectos de segundo orden con la pareja (Nd, My, d).

Seguidamente se desarrolla el diagrama de interacción de la sección para flexión esviada (Nd, Mx,d, My,d).

La armadura dispuesta es de 15 ø 20 /cara, en el lado de 2,30 mínimo (separación 15 cms) y 8 ø 20 /cara, en el lado de 1,20 mínimo (separación 15 cms). Como armadura transversal mínima se dispone ø 8 (8 > 20/4 = 5 mm) y separación 20 cms (20 > 15 x 2 = 30 cms) de acuerdo con EHE, artículo 4.2.3.1.

Como puede verse, en todos los casos obtenemos coeficientes γ mayores de la unidad.

En los listados puede observarse que se cumple el estado límite de servicio de fisuración.

Para la parrilla de apoyo tomaremos Nd como sigue, a partir de los valores de los apartados 5.1.1, 5.2.1. y 5.3.1.

Pila 1 Nd = 1,35 x 680 + 1,5 x (148 + 192) + 1,5 x (900 + 79 + 543) /2,7* = 2274 KN.

Pila 2 Nd = 1,35 x 848 + 1,5 x (184 + 194) + 1,5 x (900 + 105 + 667) /2,7* = 2640 KN.

Pila 3 Nd = 1,35 x 848 + 1,5 x (184 + 276) + 1,5 x (900 + 58) /2,7* = 2367 KN.

* 2,70 m es la distancia entre apoyos para transformar el torsor global en reacción vertical.

Tomaremos Nd = 2640 KN = 264 Tn y, según EHE, Artículo 60,

$$A_s \geq \frac{0{,}25\ Nd}{4{,}0\ T/cm^2} = \frac{0{,}25\ \times 264}{4} = 16{,}5\ cm^2$$

Disponemos 2 capas de 5 ø 16.

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR
Fecha: 18/09/03
Hora: 19:04:28

Cálculo de soportes a pandeo

1 Datos

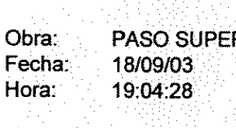
- Materiales

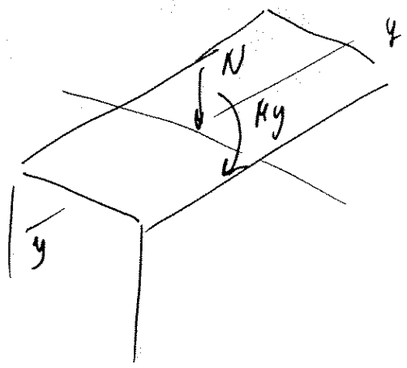
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : PILAPS
b [m] = 2.30
h [m] = 1.20
r [m] = 0.050

nº barras horizontales = 15
nº barras verticales = 8





My, acompañante en el pandeo.

- Estructura

Tipo : Traslacional
L [m] = 10.4

Vinculación de los extremos del soporte :
Vinculación extremo superior de pilar : En ménsula
Vinculación extremo inferior de pilar : Empotramiento

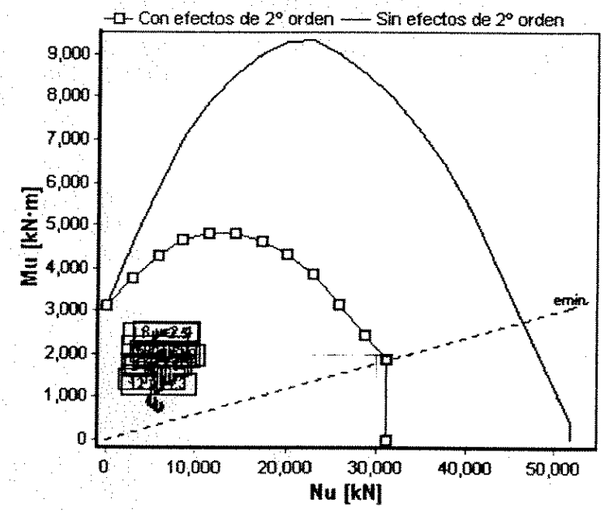
2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

x [cm]	1/r [1/m] ·1.E-3	Nu [kN]	Mxu [kN·m]	M0 [kN·m]
0.135	9.850	-0.0	3131.6	3131.6
0.190	10.412	2870.6	3752.0	4578.7
0.241	10.998	5741.2	4306.8	5913.7
0.305	11.469	8611.8	4671.7	7026.1
0.387	9.051	11482.3	4823.2	7891.6
0.468	7.475	14352.9	4811.6	8557.7
0.550	6.365	17223.5	4644.2	9024.7
0.632	5.537	20094.1	4326.1	9285.9
0.713	4.906	22964.7	3866.3	9333.6
0.783	4.468	25835.3	3153.9	8995.6
0.856	4.089	28705.8	2450.0	8558.2
0.931	3.759	31576.4	1753.8	8001.9
1.008	3.471	34447.0	1066.6	7306.4
1.087	3.219	37317.6	395.1	6459.2
1.168	2.997	40188.2	0.0	5451.5
1.268	2.652	43058.8	0.0	4248.1
1.442	2.155	45929.3	0.0	2990.0
4.298	0.529	51670.5	0.0	429.8
-9999.000	0.000	51670.5	0.0	0.0

Diagrama de interacción. Sección PILAPS ø=20



Coeficientes de seguridad de los pares de esfuerzos de cálculo

PILA - CORTANTE

Punto	Nd [kN]	Md [kN·m]	γ
1	6038.0	1201.0	3.48
2	5662.0	1166.0	3.64
3	5351.0	863.0	4.37
4	5714.0	1636.0	2.87
5	7417.0	1433.0	2.88
6	6919.0	1404.0	3.00
7	6835.0	1407.0	3.02
8	6958.0	1947.0	2.40
9	6521.0	1495.0	2.95
10	6091.0	1432.0	3.11
11	6206.0	1927.0	2.47
12	5963.0	745.0	4.30

} CK

- Parámetros de esbeltez

Longitud de pandeo l0 [m] = 20.80

Esbeltez mecánica λ = 60

ΨA = ∞

ΨB = 0.00

α = 2.00

- Parámetros de cálculo del método aproximado

ic [m] = 0.3464

is [m] = 0.4865

ε = 0.0030

εy = 0.0022

β = 1.28

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 19:08:58

Cálculo de secciones a cortante

1 Datos

- Materiales

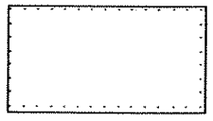
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : PILAPS
b0 [m] = 2.30
h [m] = 1.20



2 Comprobación

ρl [·1.E-3] = 1.7
Nd [kN] = 3290.0 ≈ NCP MINIMA (PILA).
Vu [kN] = 1250.3 // Vd en cualquier dirección.

PILA - FISURACION

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 19:30:43

Comprobación del Estado Límite de Servicio de fisuración debido a solicitaciones normales

1 Datos

- Materiales

Tipo de hormigón: HA-30
Tipo de acero: B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00

- Ambiente

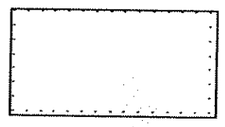
Clase general de exposición : IIa
Clases específicas de exposición :

- Geometría de la sección

Sección : PILA
b [m] = 2.30
h [m] = 1.20

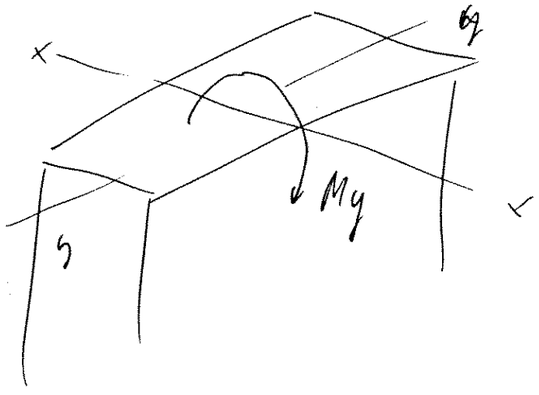
- Armado de la sección

ϕ [mm] = 20



capa	nº barras	Separación [mm]
1	15	50.0

As [cm²] =
Ac,ef [cm²] =



2 Resultados

Mk [kN·m] = 1386 ← Mfisuración = 1664 kN·m

Separación media entre fisuras sm [mm] =
Deformación media de las armaduras εsm [·1.E-3] =
Tensión en las armaduras en el instante de fisuración σsr [MPa] =
Tensión en las armaduras en servicio σs [MPa] =
Abertura característica de fisura wk [mm] = 0.0

Clase de exposición	wk max [mm]	
	Armado	Pretensado
I	0.4	0.2
IIa, IIb, H	0.3	0.2
IIIa, IIIb, IV, F	0.2	Decompresión
IIIc, Qa, Qb, Qc	0.1	

Tomamos Mk de PZ máximo, sin mayorar, pues es un Estado Límite de Servicio.

El cálculo es, además, muy conservador, pues despreciamos las tracciones derivadas del axil N.

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 19:36:57

Comprobación del Estado Límite de Servicio de fisuración debido a solicitaciones normales

1 Datos

- Materiales

Tipo de hormigón: HA-30
Tipo de acero: B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00

- Ambiente

Clase general de exposición : IIa
Clases específicas de exposición :

- Geometría de la sección

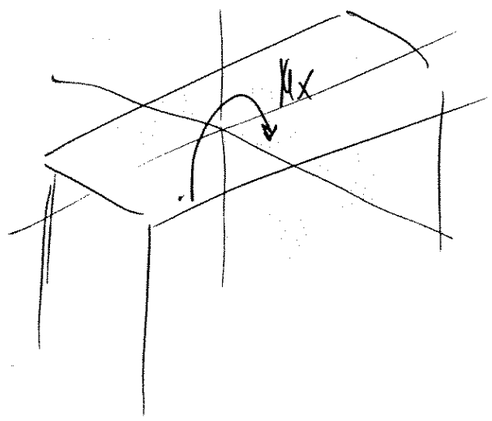
Sección : PILAORT
b [m] = 1.20
h [m] = 2.30

- Armado de la sección

ϕ [mm] = 20

capa	nº barras	Separación [mm]
1	8	50.0

As [cm²] =
Ac,ef [cm²] =



2 Resultados

Mk [kN·m] = 2179

Separación media entre fisuras sm [mm] =
Deformación media de las armaduras εsm [·1.E-3] =
Tensión en las armaduras en el instante de fisuración σsr [MPa] =
Tensión en las armaduras en servicio σs [MPa] =
Abertura característica de fisura wk [mm] = 0.0

Clase de exposición	wk max [mm]	
	Armado	Pretensado
I	0.4	0.2
IIa, IIb, H	0.3	0.2
IIIa, IIIb, IV, F	0.2	Descompresión
IIIc, Qa, Qb, Qc	0.1	

$M_{fisuración} = 3137$ kN·m

Tomamos el $M_{x,k}$ máximo, en P2, sin mayorar, pues es un Estado Límite de Servicio. El cálculo, es, además, muy conservador, pues desprecia las tensiones derivadas del axil N.

PILA PL

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

ESVIADA

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 19:45:31

Cálculo de secciones a flexión compuesta esviada

1 Datos

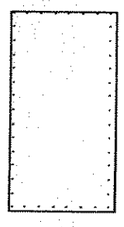
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

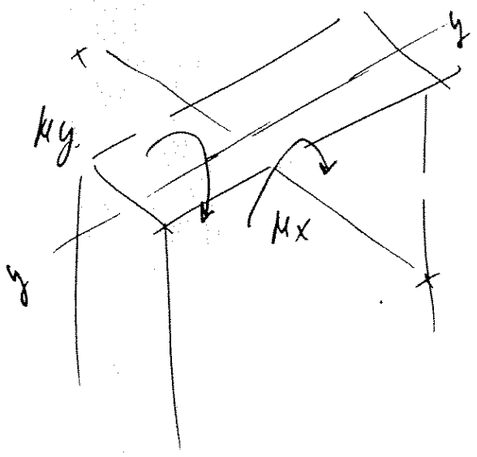
- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15



Para cada axil obtenemos un diagrama de interacción



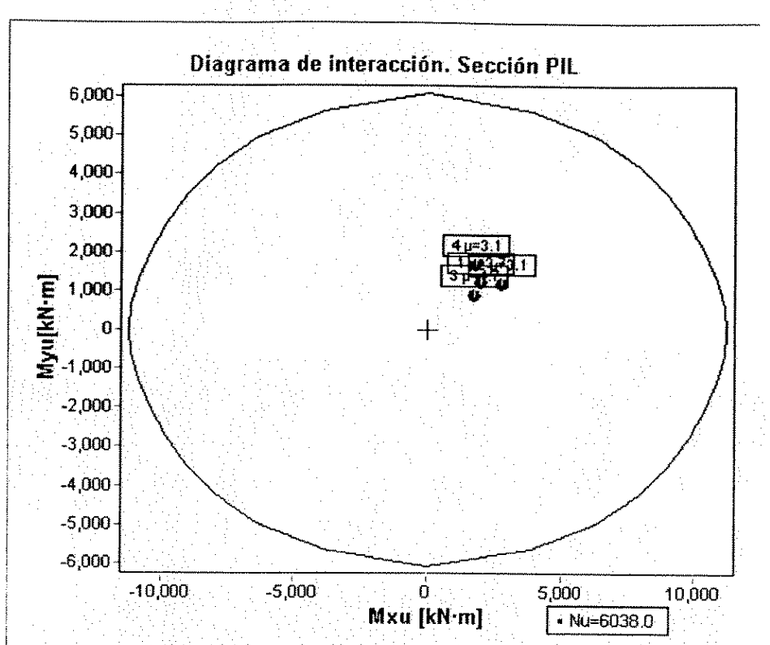
2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6038.0	11202.5	-0.0	0.52	5.7	0.0
-6038.0	11134.7	622.8	0.62	5.5	10.0
-6038.0	10858.4	1297.1	0.72	4.9	20.0
-6038.0	10425.7	2004.0	0.79	4.4	30.0
-6038.0	9815.7	2741.9	0.83	4.2	40.0
-6038.0	9013.6	3478.0	0.83	4.2	50.0
-6038.0	7909.4	4217.1	0.77	4.5	60.0
-6038.0	6351.7	4950.1	0.66	5.3	70.0
-6038.0	3860.5	5647.5	0.48	7.3	80.0
-6038.0	0.0	6087.7	0.25	10.9	90.0
-6038.0	-3860.5	5647.5	0.48	7.3	100.0
-6038.0	-6351.6	4950.2	0.66	5.3	110.0
-6038.0	-7909.4	4217.1	0.77	4.5	120.0
-6038.0	-9013.5	3478.0	0.83	4.2	130.0
-6038.0	-9815.7	2741.9	0.83	4.2	140.0
-6038.0	-10425.7	2004.0	0.79	4.4	150.0
-6038.0	-10858.4	1297.1	0.72	4.9	160.0
-6038.0	-11134.7	622.8	0.62	5.5	170.0
-6038.0	-11202.5	-0.0	0.52	5.7	180.0
-6038.0	-11134.7	-622.8	0.62	5.5	190.0
-6038.0	-10858.4	-1297.2	0.72	4.9	200.0
-6038.0	-10425.7	-2004.0	0.79	4.4	210.0
-6038.0	-9815.7	-2741.9	0.83	4.2	220.0
-6038.0	-9013.5	-3478.0	0.83	4.2	230.0
-6038.0	-7909.4	-4217.1	0.77	4.5	240.0
-6038.0	-6351.6	-4950.2	0.66	5.3	250.0
-6038.0	-3860.5	-5647.5	0.48	7.3	260.0
-6038.0	0.0	-6087.7	0.25	10.9	270.0
-6038.0	3860.5	-5647.5	0.48	7.3	280.0
-6038.0	6351.7	-4950.1	0.66	5.3	290.0
-6038.0	7909.4	-4217.1	0.77	4.5	300.0
-6038.0	9013.6	-3478.0	0.83	4.2	310.0
-6038.0	9815.7	-2741.9	0.83	4.2	320.0
-6038.0	10425.7	-2004.0	0.79	4.4	330.0
-6038.0	10858.4	-1297.2	0.72	4.9	340.0
-6038.0	11134.7	-622.8	0.62	5.5	350.0

NOTAS VALIDAS PARA TODAS LAS PILAS

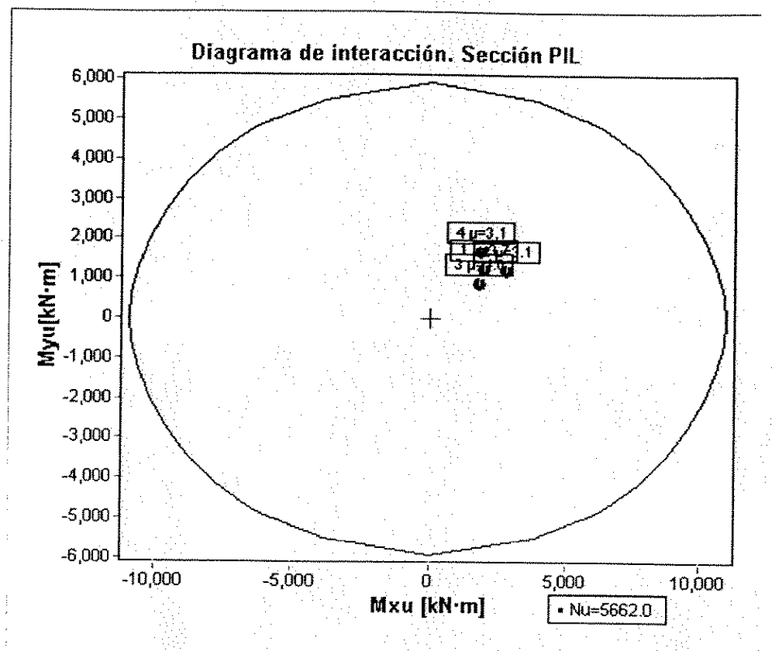


OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	1975	1201	3.73
2	2790	1166	3.14
3	1743	863	4.69
4	1815	1636	3.14

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-5662.0	10922.1	-0.0	0.50	5.7	0.0
-5662.0	10853.3	624.2	0.61	5.5	10.0
-5662.0	10593.0	1295.5	0.70	5.0	20.0
-5662.0	10166.0	1997.9	0.78	4.5	30.0
-5662.0	9576.3	2720.5	0.82	4.3	40.0
-5662.0	8809.7	3429.5	0.81	4.3	50.0
-5662.0	7748.4	4137.0	0.76	4.6	60.0
-5662.0	6249.9	4834.9	0.65	5.4	70.0
-5662.0	3851.3	5503.2	0.47	7.5	80.0
-5662.0	0.0	5927.9	0.24	10.8	90.0
-5662.0	-3851.2	5503.2	0.47	7.5	100.0
-5662.0	-6249.8	4834.9	0.65	5.4	110.0
-5662.0	-7748.3	4137.1	0.76	4.6	120.0
-5662.0	-8809.7	3429.5	0.81	4.3	130.0
-5662.0	-9576.3	2720.5	0.82	4.3	140.0
-5662.0	-10166.0	1997.9	0.78	4.5	150.0
-5662.0	-10593.0	1295.5	0.70	5.0	160.0
-5662.0	-10853.3	624.2	0.61	5.5	170.0
-5662.0	-10922.1	-0.0	0.50	5.7	180.0
-5662.0	-10853.3	-624.2	0.61	5.5	190.0
-5662.0	-10593.0	-1295.5	0.70	5.0	200.0
-5662.0	-10166.0	-1997.9	0.78	4.5	210.0
-5662.0	-9576.2	-2720.5	0.82	4.3	220.0
-5662.0	-8809.7	-3429.5	0.81	4.3	230.0
-5662.0	-7748.3	-4137.1	0.76	4.6	240.0
-5662.0	-6249.8	-4834.9	0.65	5.4	250.0
-5662.0	-3851.2	-5503.2	0.47	7.5	260.0
-5662.0	0.0	-5927.9	0.24	10.8	270.0
-5662.0	3851.3	-5503.2	0.47	7.5	280.0
-5662.0	6249.9	-4834.9	0.65	5.4	290.0
-5662.0	7748.4	-4137.0	0.76	4.6	300.0
-5662.0	8809.7	-3429.5	0.81	4.3	310.0
-5662.0	9576.2	-2720.5	0.82	4.3	320.0
-5662.0	10166.0	-1997.9	0.78	4.5	330.0
-5662.0	10593.0	-1295.5	0.70	5.0	340.0
-5662.0	10853.3	-624.2	0.61	5.5	350.0

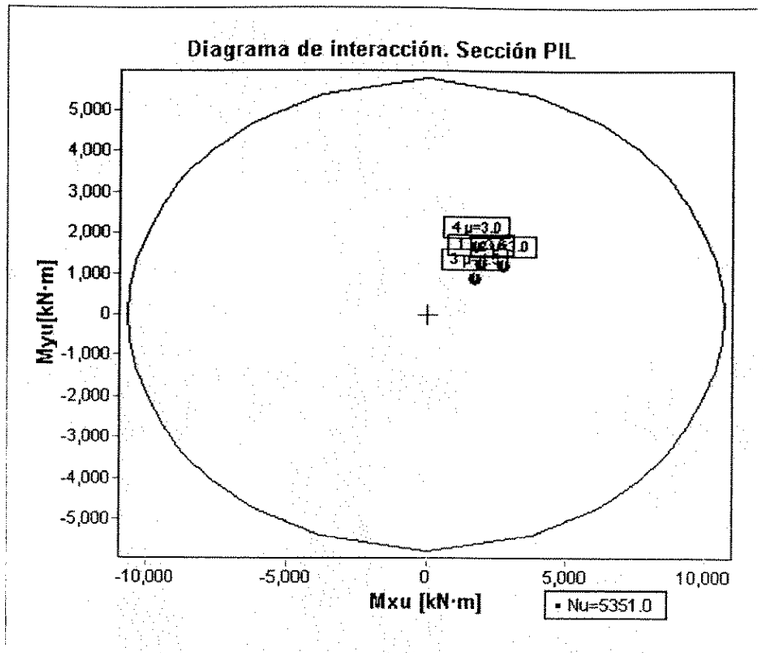


OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	1975	1201	3.65
2	2790	1166	3.07
3	1743	863	4.59
4	1815	1636	3.07

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-5351.0	10686.4	-0.0	0.49	5.7	0.0
-5351.0	10614.7	625.6	0.59	5.5	10.0
-5351.0	10370.1	1294.0	0.69	5.1	20.0
-5351.0	9947.7	1992.0	0.76	4.6	30.0
-5351.0	9376.4	2701.2	0.80	4.4	40.0
-5351.0	8639.3	3384.4	0.80	4.4	50.0
-5351.0	7613.5	4069.5	0.74	4.7	60.0
-5351.0	6162.8	4738.2	0.64	5.5	70.0
-5351.0	3839.5	5381.9	0.46	7.6	80.0
-5351.0	0.0	5787.2	0.23	10.8	90.0
-5351.0	-3839.5	5381.9	0.46	7.6	100.0
-5351.0	-6162.8	4738.2	0.64	5.5	110.0
-5351.0	-7613.4	4069.5	0.74	4.7	120.0
-5351.0	-8639.2	3384.5	0.80	4.4	130.0
-5351.0	-9376.4	2701.2	0.80	4.4	140.0
-5351.0	-9947.7	1992.0	0.76	4.6	150.0
-5351.0	-10370.1	1294.0	0.69	5.1	160.0
-5351.0	-10614.7	625.6	0.59	5.5	170.0
-5351.0	-10686.4	-0.0	0.49	5.7	180.0
-5351.0	-10614.7	-625.6	0.59	5.5	190.0
-5351.0	-10370.1	-1294.1	0.69	5.1	200.0
-5351.0	-9947.7	-1992.1	0.76	4.6	210.0
-5351.0	-9376.3	-2701.2	0.80	4.4	220.0
-5351.0	-8639.2	-3384.5	0.80	4.4	230.0
-5351.0	-7613.4	-4069.5	0.74	4.7	240.0
-5351.0	-6162.8	-4738.2	0.64	5.5	250.0
-5351.0	-3839.5	-5381.9	0.46	7.6	260.0
-5351.0	0.0	-5787.2	0.23	10.8	270.0
-5351.0	3839.5	-5381.9	0.46	7.6	280.0
-5351.0	6162.8	-4738.2	0.64	5.5	290.0
-5351.0	7613.5	-4069.5	0.74	4.7	300.0
-5351.0	8639.3	-3384.4	0.80	4.4	310.0
-5351.0	9376.3	-2701.2	0.80	4.4	320.0
-5351.0	9947.7	-1992.1	0.76	4.6	330.0
-5351.0	10370.1	-1294.1	0.69	5.1	340.0
-5351.0	10614.7	-625.6	0.59	5.5	350.0

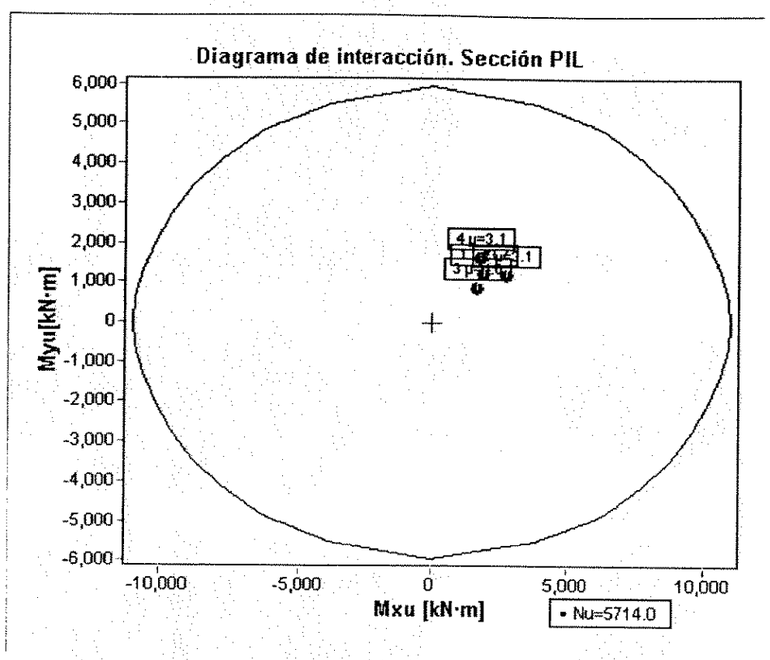


Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	1975	1201	3.59
2	2790	1166	3.02
3	1743	863	4.52
4	1815	1636	3.01

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-5714.0	10961.2	-0.0	0.51	5.7	0.0
-5714.0	10892.7	623.7	0.61	5.5	10.0
-5714.0	10630.0	1295.7	0.70	5.0	20.0
-5714.0	10202.2	1998.7	0.78	4.5	30.0
-5714.0	9609.5	2723.6	0.82	4.3	40.0
-5714.0	8838.1	3436.8	0.81	4.3	50.0
-5714.0	7770.8	4148.2	0.76	4.6	60.0
-5714.0	6264.2	4850.9	0.65	5.4	70.0
-5714.0	3852.7	5523.3	0.47	7.5	80.0
-5714.0	0.0	5951.3	0.24	10.9	90.0
-5714.0	-3852.7	5523.3	0.47	7.5	100.0
-5714.0	-6264.1	4851.0	0.65	5.4	110.0
-5714.0	-7770.7	4148.3	0.76	4.6	120.0
-5714.0	-8838.0	3436.9	0.81	4.3	130.0
-5714.0	-9609.5	2723.6	0.82	4.3	140.0
-5714.0	-10202.2	1998.7	0.78	4.5	150.0
-5714.0	-10630.0	1295.7	0.70	5.0	160.0
-5714.0	-10892.7	623.7	0.61	5.5	170.0
-5714.0	-10961.2	-0.0	0.51	5.7	180.0
-5714.0	-10892.7	-623.7	0.61	5.5	190.0
-5714.0	-10630.0	-1295.8	0.70	5.0	200.0
-5714.0	-10202.2	-1998.8	0.78	4.5	210.0
-5714.0	-9609.5	-2723.6	0.82	4.3	220.0
-5714.0	-8838.0	-3436.9	0.81	4.3	230.0
-5714.0	-7770.7	-4148.3	0.76	4.6	240.0
-5714.0	-6264.1	-4851.0	0.65	5.4	250.0
-5714.0	-3852.7	-5523.3	0.47	7.5	260.0
-5714.0	0.0	-5951.3	0.24	10.9	270.0
-5714.0	3852.7	-5523.3	0.47	7.5	280.0
-5714.0	6264.2	-4850.9	0.65	5.4	290.0
-5714.0	7770.8	-4148.2	0.76	4.6	300.0
-5714.0	8838.1	-3436.8	0.81	4.3	310.0
-5714.0	9609.5	-2723.6	0.82	4.3	320.0
-5714.0	10202.2	-1998.8	0.78	4.5	330.0
-5714.0	10630.0	-1295.8	0.70	5.0	340.0
-5714.0	10892.7	-623.7	0.61	5.5	350.0

PILA P-2



OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	1975	1201	3.66
2	2790	1166	3.08
3	1743	863	4.61
4	1815	1636	3.08

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 18/09/03
Hora: 19:56:33

Cálculo de secciones a flexión compuesta esviada

1 Datos

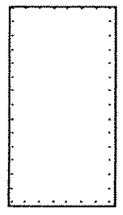
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B·500·S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15

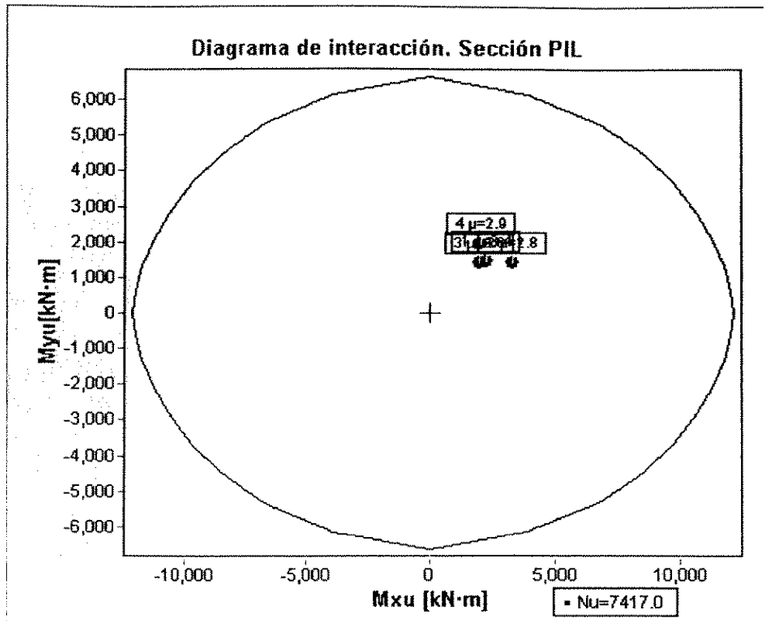


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-7417.0	12184.9	-0.0	0.57	5.9	0.0
-7417.0	12065.8	619.0	0.69	5.1	10.0
-7417.0	11777.8	1292.0	0.78	4.5	20.0
-7417.0	11313.2	2022.1	0.85	4.1	30.0
-7417.0	10648.9	2803.3	0.89	3.9	40.0
-7417.0	9724.7	3637.1	0.88	4.0	50.0
-7417.0	8468.4	4479.1	0.82	4.3	60.0
-7417.0	6688.6	5345.2	0.71	5.0	70.0
-7417.0	3879.4	6156.0	0.52	6.8	80.0
-7417.0	0.0	6633.9	0.28	11.3	90.0
-7417.0	-3879.4	6156.0	0.52	6.8	100.0
-7417.0	-6688.4	5345.3	0.71	5.0	110.0
-7417.0	-8468.4	4479.1	0.82	4.3	120.0
-7417.0	-9724.7	3637.2	0.88	4.0	130.0
-7417.0	-10648.9	2803.3	0.89	3.9	140.0
-7417.0	-11313.2	2022.1	0.85	4.1	150.0
-7417.0	-11777.8	1292.0	0.78	4.5	160.0
-7417.0	-12065.8	619.0	0.69	5.1	170.0
-7417.0	-12184.9	-0.0	0.57	5.9	180.0
-7417.0	-12065.8	-619.0	0.69	5.1	190.0
-7417.0	-11777.8	-1292.1	0.78	4.5	200.0
-7417.0	-11313.1	-2022.2	0.85	4.1	210.0
-7417.0	-10648.8	-2803.4	0.89	3.9	220.0
-7417.0	-9724.7	-3637.2	0.88	4.0	230.0
-7417.0	-8468.4	-4479.1	0.82	4.3	240.0
-7417.0	-6688.4	-5345.3	0.71	5.0	250.0
-7417.0	-3879.4	-6156.0	0.52	6.8	260.0
-7417.0	0.0	-6633.9	0.28	11.3	270.0
-7417.0	3879.4	-6156.0	0.52	6.8	280.0
-7417.0	6688.6	-5345.2	0.71	5.0	290.0
-7417.0	8468.4	-4479.1	0.82	4.3	300.0
-7417.0	9724.7	-3637.1	0.88	4.0	310.0
-7417.0	10648.8	-2803.4	0.89	3.9	320.0
-7417.0	11313.1	-2022.2	0.85	4.1	330.0
-7417.0	11777.8	-1292.1	0.78	4.5	340.0
-7417.0	12065.8	-619.0	0.69	5.1	350.0

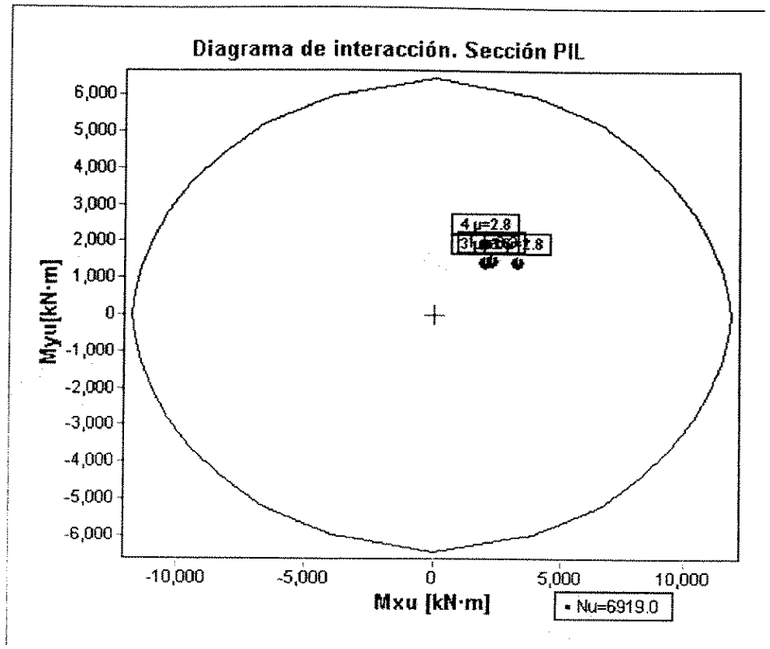


(ok)

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2268	1433	3.39
2	3269	1404	2.82
3	1954	1407	3.65
4	2011	1947	2.88

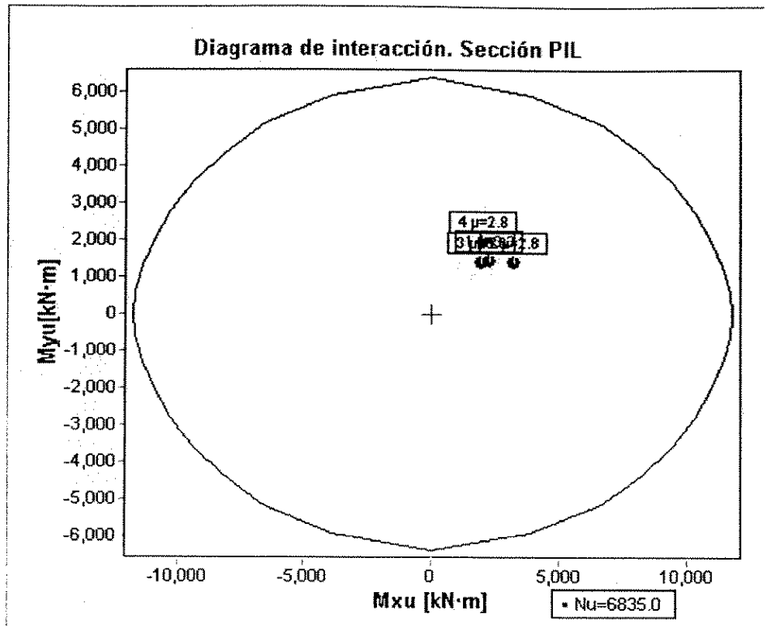
Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6919.0	11839.1	-0.0	0.55	5.9	0.0
-6919.0	11740.4	620.3	0.66	5.3	10.0
-6919.0	11456.8	1292.0	0.76	4.6	20.0
-6919.0	10999.4	2017.0	0.83	4.2	30.0
-6919.0	10358.2	2783.2	0.87	4.0	40.0
-6919.0	9476.4	3582.5	0.86	4.1	50.0
-6919.0	8277.9	4387.0	0.80	4.3	60.0
-6919.0	6576.0	5208.6	0.69	5.1	70.0
-6919.0	3874.5	5976.4	0.50	7.0	80.0
-6919.0	0.0	6441.7	0.27	11.2	90.0
-6919.0	-3874.4	5976.4	0.50	7.0	100.0
-6919.0	-6575.9	5208.7	0.69	5.1	110.0
-6919.0	-8277.8	4387.0	0.80	4.3	120.0
-6919.0	-9476.3	3582.6	0.86	4.1	130.0
-6919.0	-10358.2	2783.2	0.87	4.0	140.0
-6919.0	-10999.4	2017.0	0.83	4.2	150.0
-6919.0	-11456.8	1292.0	0.76	4.6	160.0
-6919.0	-11740.4	620.3	0.66	5.3	170.0
-6919.0	-11839.1	-0.0	0.55	5.9	180.0
-6919.0	-11740.4	-620.3	0.66	5.3	190.0
-6919.0	-11456.7	-1292.1	0.76	4.6	200.0
-6919.0	-10999.3	-2017.1	0.83	4.2	210.0
-6919.0	-10358.2	-2783.3	0.87	4.0	220.0
-6919.0	-9476.3	-3582.6	0.86	4.1	230.0
-6919.0	-8277.8	-4387.0	0.80	4.3	240.0
-6919.0	-6575.9	-5208.7	0.69	5.1	250.0
-6919.0	-3874.4	-5976.4	0.50	7.0	260.0
-6919.0	0.0	-6441.7	0.27	11.2	270.0
-6919.0	3874.5	-5976.4	0.50	7.0	280.0
-6919.0	6576.0	-5208.6	0.69	5.1	290.0
-6919.0	8277.9	-4387.0	0.80	4.3	300.0
-6919.0	9476.4	-3582.5	0.86	4.1	310.0
-6919.0	10358.2	-2783.3	0.87	4.0	320.0
-6919.0	10999.3	-2017.1	0.83	4.2	330.0
-6919.0	11456.7	-1292.1	0.76	4.6	340.0
-6919.0	11740.4	-620.3	0.66	5.3	350.0



Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2268	1433	3.32
2	3269	1404	2.76
3	1954	1407	3.57
4	2011	1947	2.81

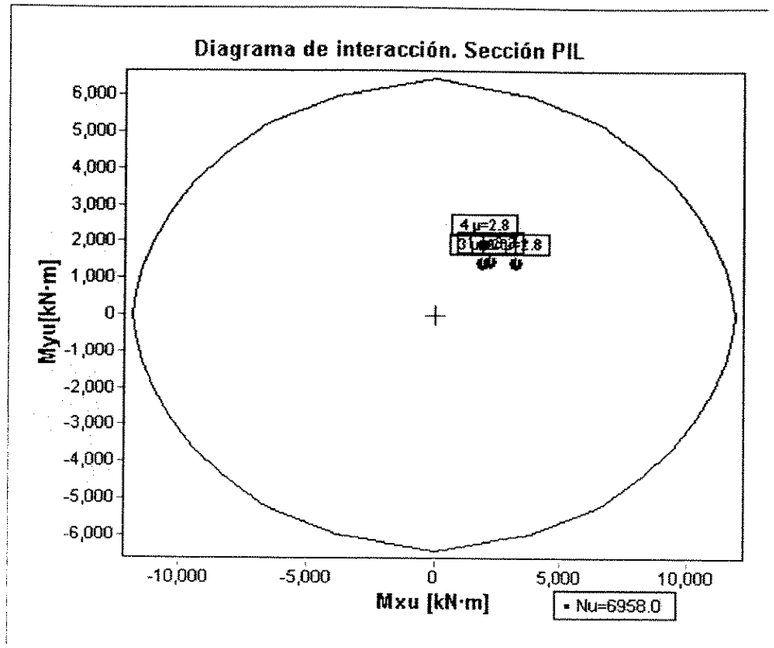
Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6835.0	11779.6	-0.0	0.55	5.8	0.0
-6835.0	11684.8	620.5	0.66	5.3	10.0
-6835.0	11400.9	1292.7	0.76	4.6	20.0
-6835.0	10945.8	2016.1	0.83	4.2	30.0
-6835.0	10308.7	2779.6	0.87	4.0	40.0
-6835.0	9434.1	3572.7	0.86	4.1	50.0
-6835.0	8244.0	4371.3	0.80	4.4	60.0
-6835.0	6556.4	5185.3	0.69	5.1	70.0
-6835.0	3873.6	5945.6	0.50	7.0	80.0
-6835.0	0.0	6408.7	0.26	11.2	90.0
-6835.0	-3873.5	5945.6	0.50	7.0	100.0
-6835.0	-6556.2	5185.4	0.69	5.1	110.0
-6835.0	-8243.9	4371.4	0.80	4.4	120.0
-6835.0	-9434.0	3572.7	0.86	4.1	130.0
-6835.0	-10308.7	2779.6	0.87	4.0	140.0
-6835.0	-10945.8	2016.1	0.83	4.2	150.0
-6835.0	-11400.9	1292.7	0.76	4.6	160.0
-6835.0	-11684.8	620.5	0.66	5.3	170.0
-6835.0	-11779.6	-0.0	0.55	5.8	180.0
-6835.0	-11684.8	-620.5	0.66	5.3	190.0
-6835.0	-11400.9	-1292.7	0.76	4.6	200.0
-6835.0	-10945.8	-2016.1	0.83	4.2	210.0
-6835.0	-10308.7	-2779.7	0.87	4.0	220.0
-6835.0	-9434.0	-3572.7	0.86	4.1	230.0
-6835.0	-8243.9	-4371.4	0.80	4.4	240.0
-6835.0	-6556.2	-5185.4	0.69	5.1	250.0
-6835.0	-3873.5	-5945.6	0.50	7.0	260.0
-6835.0	0.0	-6408.7	0.26	11.2	270.0
-6835.0	3873.6	-5945.6	0.50	7.0	280.0
-6835.0	6556.4	-5185.3	0.69	5.1	290.0
-6835.0	8244.0	-4371.3	0.80	4.4	300.0
-6835.0	9434.1	-3572.7	0.86	4.1	310.0
-6835.0	10308.7	-2779.7	0.87	4.0	320.0
-6835.0	10945.8	-2016.1	0.83	4.2	330.0
-6835.0	11400.9	-1292.7	0.76	4.6	340.0
-6835.0	11684.8	-620.5	0.66	5.3	350.0



Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2268	1433	3.30
2	3269	1404	2.75
3	1954	1407	3.55
4	2011	1947	2.80

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6958.0	11866.6	-0.0	0.56	5.9	0.0
-6958.0	11766.2	620.2	0.66	5.3	10.0
-6958.0	11482.7	1291.7	0.76	4.6	20.0
-6958.0	11024.2	2017.5	0.83	4.2	30.0
-6958.0	10381.2	2784.9	0.87	4.0	40.0
-6958.0	9496.0	3587.0	0.86	4.0	50.0
-6958.0	8292.9	4394.3	0.81	4.3	60.0
-6958.0	6585.0	5219.5	0.69	5.1	70.0
-6958.0	3874.9	5990.6	0.50	7.0	80.0
-6958.0	0.0	6456.9	0.27	11.2	90.0
-6958.0	-3874.8	5990.6	0.50	7.0	100.0
-6958.0	-6585.0	5219.5	0.69	5.1	110.0
-6958.0	-8292.8	4394.4	0.81	4.3	120.0
-6958.0	-9495.8	3587.1	0.86	4.0	130.0
-6958.0	-10381.2	2784.9	0.87	4.0	140.0
-6958.0	-11024.2	2017.5	0.83	4.2	150.0
-6958.0	-11482.7	1291.7	0.76	4.6	160.0
-6958.0	-11766.2	620.2	0.66	5.3	170.0
-6958.0	-11866.6	-0.0	0.56	5.9	180.0
-6958.0	-11766.2	-620.2	0.66	5.3	190.0
-6958.0	-11482.6	-1291.7	0.76	4.6	200.0
-6958.0	-11024.2	-2017.5	0.83	4.2	210.0
-6958.0	-10381.2	-2784.9	0.87	4.0	220.0
-6958.0	-9495.8	-3587.1	0.86	4.0	230.0
-6958.0	-8292.8	-4394.4	0.81	4.3	240.0
-6958.0	-6585.0	-5219.5	0.69	5.1	250.0
-6958.0	-3874.8	-5990.6	0.50	7.0	260.0
-6958.0	0.0	-6456.9	0.27	11.2	270.0
-6958.0	3874.9	-5990.6	0.50	7.0	280.0
-6958.0	6585.0	-5219.5	0.69	5.1	290.0
-6958.0	8292.9	-4394.3	0.81	4.3	300.0
-6958.0	9496.0	-3587.0	0.86	4.0	310.0
-6958.0	10381.2	-2784.9	0.87	4.0	320.0
-6958.0	11024.2	-2017.5	0.83	4.2	330.0
-6958.0	11482.6	-1291.7	0.76	4.6	340.0
-6958.0	11766.2	-620.2	0.66	5.3	350.0



Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2268	1433	3.32
2	3269	1404	2.77
3	1954	1407	3.57
4	2011	1947	2.82

PILA P3

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:34:03

Cálculo de secciones a flexión compuesta esviada

1 Datos

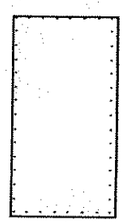
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15

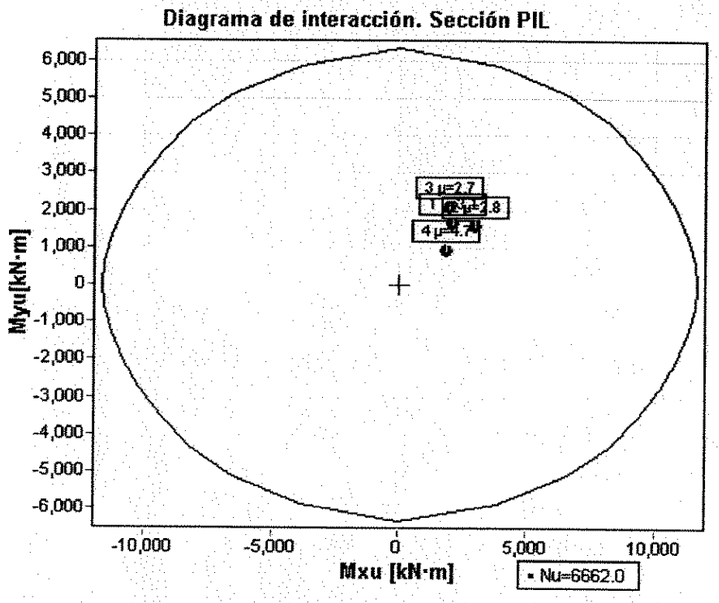


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6662.0	11656.3	-0.0	0.54	5.8	0.0
-6662.0	11569.6	621.0	0.65	5.4	10.0
-6662.0	11285.1	1294.2	0.75	4.7	20.0
-6662.0	10834.9	2014.1	0.82	4.3	30.0
-6662.0	10206.2	2772.0	0.86	4.1	40.0
-6662.0	9346.8	3552.0	0.85	4.1	50.0
-6662.0	8172.2	4339.0	0.80	4.4	60.0
-6662.0	6512.4	5137.0	0.68	5.1	70.0
-6662.0	3871.4	5881.8	0.49	7.1	80.0
-6662.0	0.0	6340.2	0.26	11.1	90.0
-6662.0	-3871.4	5881.8	0.49	7.1	100.0
-6662.0	-6512.3	5137.0	0.68	5.1	110.0
-6662.0	-8172.1	4339.1	0.80	4.4	120.0
-6662.0	-9346.7	3552.1	0.85	4.1	130.0
-6662.0	-10206.2	2772.0	0.86	4.1	140.0
-6662.0	-10834.9	2014.1	0.82	4.3	150.0
-6662.0	-11285.1	1294.2	0.75	4.7	160.0
-6662.0	-11569.6	621.0	0.65	5.4	170.0
-6662.0	-11656.3	-0.0	0.54	5.8	180.0
-6662.0	-11569.6	-621.0	0.65	5.4	190.0
-6662.0	-11285.0	-1294.2	0.75	4.7	200.0
-6662.0	-10834.9	-2014.1	0.82	4.3	210.0
-6662.0	-10206.1	-2772.1	0.86	4.1	220.0
-6662.0	-9346.7	-3552.1	0.85	4.1	230.0
-6662.0	-8172.1	-4339.1	0.80	4.4	240.0
-6662.0	-6512.3	-5137.0	0.68	5.1	250.0
-6662.0	-3871.4	-5881.8	0.49	7.1	260.0
-6662.0	0.0	-6340.2	0.26	11.1	270.0
-6662.0	3871.4	-5881.8	0.49	7.1	280.0
-6662.0	6512.4	-5137.0	0.68	5.1	290.0
-6662.0	8172.2	-4339.0	0.80	4.4	300.0
-6662.0	9346.8	-3552.0	0.85	4.1	310.0
-6662.0	10206.1	-2772.1	0.86	4.1	320.0
-6662.0	10834.9	-2014.1	0.82	4.3	330.0
-6662.0	11285.0	-1294.2	0.75	4.7	340.0
-6662.0	11569.6	-621.0	0.65	5.4	350.0



OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2110	1645	3.11
2	2974	1567	2.76
3	1931	2077	2.66
4	1802	895	4.67

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:35:10

Cálculo de secciones a flexión compuesta esviada

1 Datos

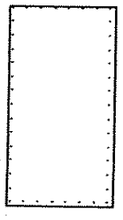
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γ_c = 1.50
γ_s = 1.15

- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15

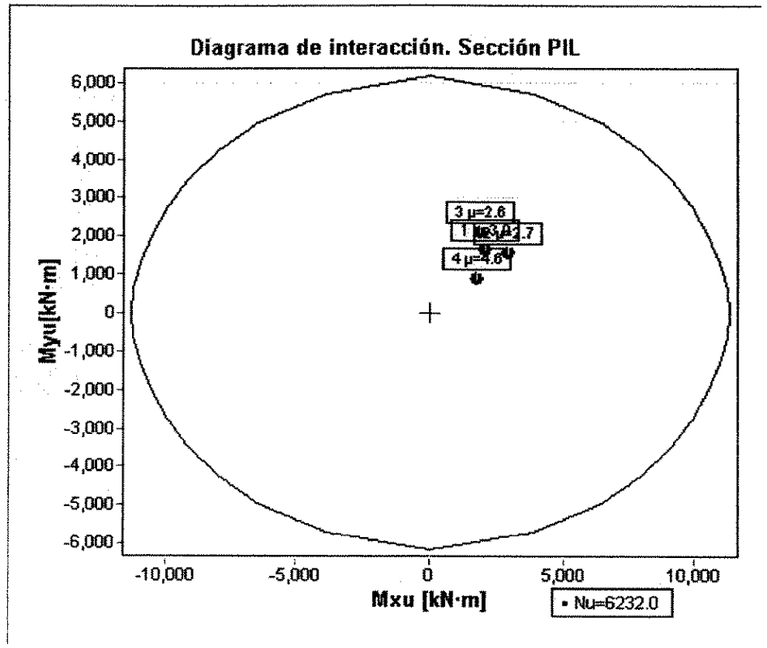


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6232.0	11345.1	-0.0	0.53	5.8	0.0
-6232.0	11277.7	622.4	0.63	5.6	10.0
-6232.0	10993.4	1297.9	0.73	4.8	20.0
-6232.0	10555.8	2008.2	0.80	4.4	30.0
-6232.0	9938.2	2752.2	0.84	4.2	40.0
-6232.0	9118.0	3501.6	0.84	4.2	50.0
-6232.0	7991.4	4257.2	0.78	4.5	60.0
-6232.0	6402.8	5008.8	0.67	5.3	70.0
-6232.0	3864.5	5721.1	0.48	7.3	80.0
-6232.0	0.0	6167.2	0.25	11.0	90.0
-6232.0	-3864.5	5721.1	0.48	7.3	100.0
-6232.0	-6402.7	5008.9	0.67	5.3	110.0
-6232.0	-7991.4	4257.2	0.78	4.5	120.0
-6232.0	-9117.9	3501.7	0.84	4.2	130.0
-6232.0	-9938.2	2752.2	0.84	4.2	140.0
-6232.0	-10555.8	2008.2	0.80	4.4	150.0
-6232.0	-10993.4	1297.9	0.73	4.8	160.0
-6232.0	-11277.7	622.4	0.63	5.6	170.0
-6232.0	-11345.1	-0.0	0.53	5.8	180.0
-6232.0	-11277.7	-622.4	0.63	5.6	190.0
-6232.0	-10993.4	-1297.9	0.73	4.8	200.0
-6232.0	-10555.7	-2008.3	0.80	4.4	210.0
-6232.0	-9938.1	-2752.2	0.84	4.2	220.0
-6232.0	-9117.9	-3501.7	0.84	4.2	230.0
-6232.0	-7991.4	-4257.2	0.78	4.5	240.0
-6232.0	-6402.7	-5008.9	0.67	5.3	250.0
-6232.0	-3864.5	-5721.1	0.48	7.3	260.0
-6232.0	0.0	-6167.2	0.25	11.0	270.0
-6232.0	3864.5	-5721.1	0.48	7.3	280.0
-6232.0	6402.8	-5008.8	0.67	5.3	290.0
-6232.0	7991.4	-4257.2	0.78	4.5	300.0
-6232.0	9118.0	-3501.6	0.84	4.2	310.0
-6232.0	9938.1	-2752.2	0.84	4.2	320.0
-6232.0	10555.7	-2008.3	0.80	4.4	330.0
-6232.0	10993.4	-1297.9	0.73	4.8	340.0
-6232.0	11277.7	-622.4	0.63	5.6	350.0



OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2110	1645	3.04
2	2974	1567	2.70
3	1931	2077	2.60
4	1802	895	4.57

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:35:34

Cálculo de secciones a flexión compuesta esviada

1 Datos

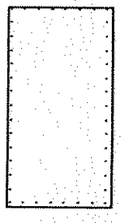
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15

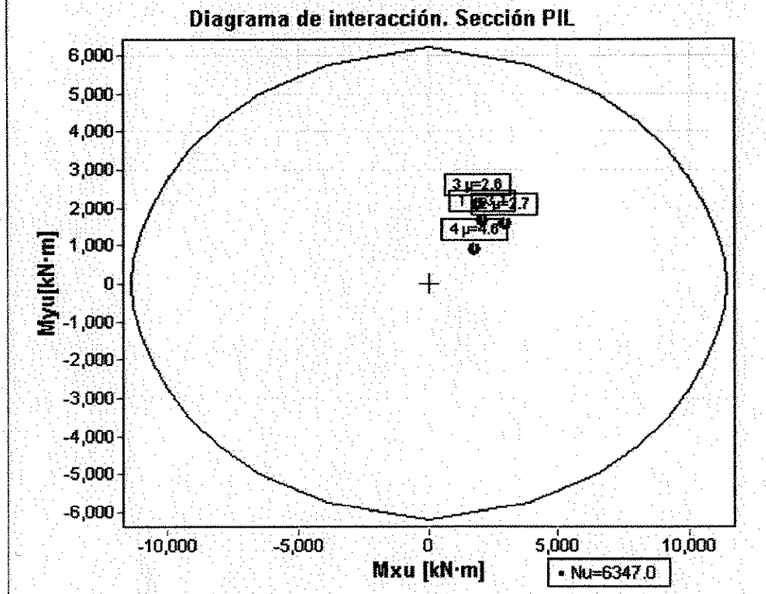


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6347.0	11429.0	-0.0	0.53	5.8	0.0
-6347.0	11357.5	622.0	0.63	5.5	10.0
-6347.0	11071.9	1296.9	0.73	4.8	20.0
-6347.0	10631.0	2010.1	0.81	4.3	30.0
-6347.0	10010.4	2758.1	0.85	4.1	40.0
-6347.0	9179.6	3515.4	0.84	4.2	50.0
-6347.0	8040.1	4279.3	0.78	4.5	60.0
-6347.0	6432.5	5043.4	0.67	5.2	70.0
-6347.0	3866.7	5764.4	0.49	7.2	80.0
-6347.0	0.0	6213.9	0.25	11.0	90.0
-6347.0	-3866.6	5764.4	0.49	7.2	100.0
-6347.0	-6432.4	5043.5	0.67	5.2	110.0
-6347.0	-8040.0	4279.3	0.78	4.5	120.0
-6347.0	-9179.5	3515.4	0.84	4.2	130.0
-6347.0	-10010.4	2758.1	0.85	4.1	140.0
-6347.0	-10631.0	2010.1	0.81	4.3	150.0
-6347.0	-11071.9	1296.9	0.73	4.8	160.0
-6347.0	-11357.5	622.0	0.63	5.5	170.0
-6347.0	-11429.0	-0.0	0.53	5.8	180.0
-6347.0	-11357.4	-622.0	0.63	5.5	190.0
-6347.0	-11071.9	-1296.9	0.73	4.8	200.0
-6347.0	-10630.9	-2010.1	0.81	4.3	210.0
-6347.0	-10010.4	-2758.1	0.85	4.1	220.0
-6347.0	-9179.5	-3515.4	0.84	4.2	230.0
-6347.0	-8040.0	-4279.3	0.78	4.5	240.0
-6347.0	-6432.4	-5043.5	0.67	5.2	250.0
-6347.0	-3866.6	-5764.4	0.49	7.2	260.0
-6347.0	0.0	-6213.9	0.25	11.0	270.0
-6347.0	3866.7	-5764.4	0.49	7.2	280.0
-6347.0	6432.5	-5043.4	0.67	5.2	290.0
-6347.0	8040.1	-4279.3	0.78	4.5	300.0
-6347.0	9179.6	-3515.4	0.84	4.2	310.0
-6347.0	10010.4	-2758.1	0.85	4.1	320.0
-6347.0	10630.9	-2010.1	0.81	4.3	330.0
-6347.0	11071.9	-1296.9	0.73	4.8	340.0
-6347.0	11357.4	-622.0	0.63	5.5	350.0



OK

Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2110	1645	3.06
2	2974	1567	2.72
3	1931	2077	2.62
4	1802	895	4.60

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:35:58

Cálculo de secciones a flexión compuesta esviada

1 Datos

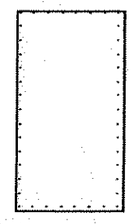
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : PIL
b [m] = 1.20
h [m] = 2.30
r [m] = 0.040

nº barras horizontales = 8
nº barras verticales = 15

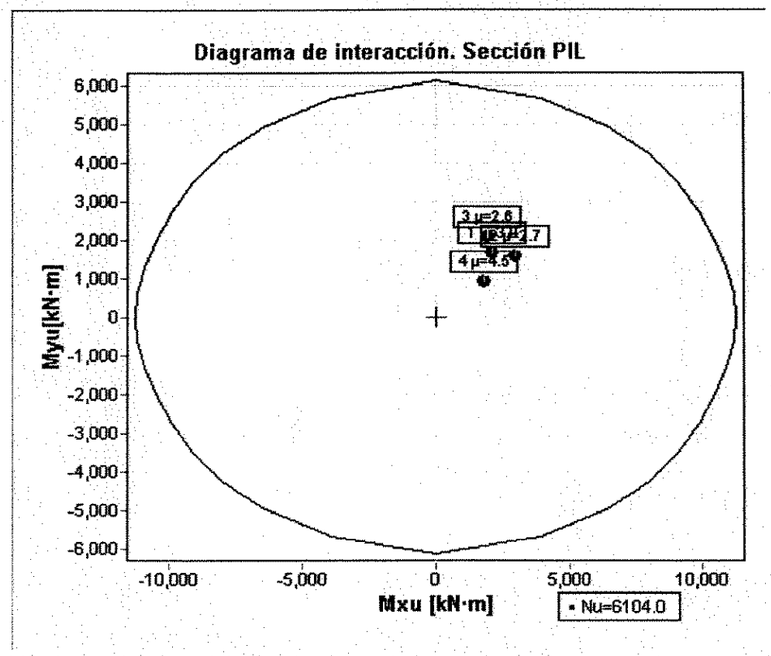


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

Nu [kN]	Mxu [kN·m]	Myu [kN·m]	x [cm]	1/r [1/m] ·1.E-3	β [°]
-6104.0	11251.1	-0.0	0.52	5.8	0.0
-6104.0	11183.5	622.7	0.62	5.5	10.0
-6104.0	10904.5	1297.4	0.72	4.8	20.0
-6104.0	10470.9	2005.0	0.80	4.4	30.0
-6104.0	9857.5	2745.5	0.84	4.2	40.0
-6104.0	9049.2	3486.1	0.83	4.2	50.0
-6104.0	7937.4	4230.8	0.77	4.5	60.0
-6104.0	6369.2	4970.1	0.66	5.3	70.0
-6104.0	3861.9	5672.6	0.48	7.3	80.0
-6104.0	0.0	6114.9	0.25	11.0	90.0
-6104.0	-3861.9	5672.6	0.48	7.3	100.0
-6104.0	-6369.1	4970.2	0.66	5.3	110.0
-6104.0	-7937.3	4230.9	0.77	4.5	120.0
-6104.0	-9049.0	3486.2	0.83	4.2	130.0
-6104.0	-9857.5	2745.5	0.84	4.2	140.0
-6104.0	-10470.9	2005.0	0.80	4.4	150.0
-6104.0	-10904.5	1297.4	0.72	4.8	160.0
-6104.0	-11183.5	622.7	0.62	5.5	170.0
-6104.0	-11251.1	-0.0	0.52	5.8	180.0
-6104.0	-11183.5	-622.7	0.62	5.5	190.0
-6104.0	-10904.5	-1297.4	0.72	4.8	200.0
-6104.0	-10470.9	-2005.1	0.80	4.4	210.0
-6104.0	-9857.4	-2745.5	0.84	4.2	220.0
-6104.0	-9049.0	-3486.2	0.83	4.2	230.0
-6104.0	-7937.3	-4230.9	0.77	4.5	240.0
-6104.0	-6369.1	-4970.2	0.66	5.3	250.0
-6104.0	-3861.9	-5672.6	0.48	7.3	260.0
-6104.0	0.0	-6114.9	0.25	11.0	270.0
-6104.0	3861.9	-5672.6	0.48	7.3	280.0
-6104.0	6369.2	-4970.1	0.66	5.3	290.0
-6104.0	7937.4	-4230.8	0.77	4.5	300.0
-6104.0	9049.2	-3486.1	0.83	4.2	310.0
-6104.0	9857.4	-2745.5	0.84	4.2	320.0
-6104.0	10470.9	-2005.1	0.80	4.4	330.0
-6104.0	10904.5	-1297.4	0.72	4.8	340.0
-6104.0	11183.5	-622.7	0.62	5.5	350.0



OK

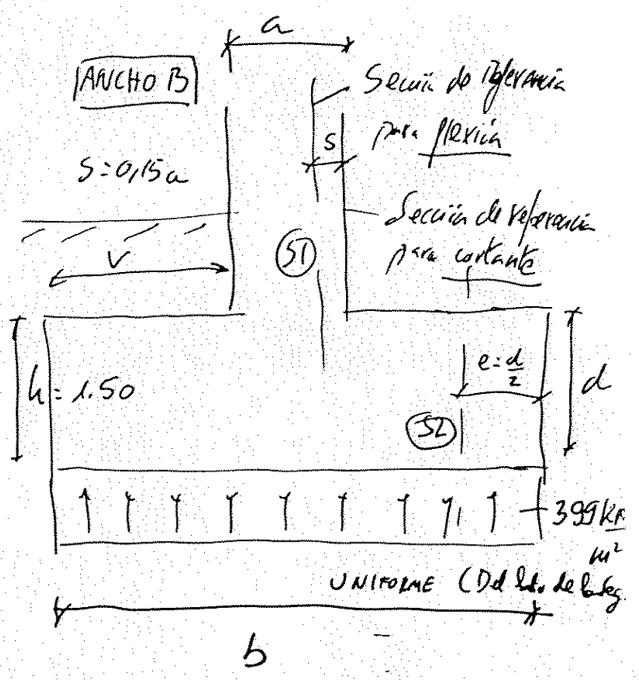
Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Mxd [kN·m]	Myd [kN·m]	γ
1	2110	1645	3.02
2	2974	1567	2.68
3	1931	2077	2.58
4	1802	895	4.54

5.5 Dimensionado de Zapatas de Pilas.

Tomando el caso más desfavorable que hemos visto ($\sigma = 399$ KN/m²), aplicado a la zapata de la Pila 1 (la de mayor tensión).

	x	y
a	1,20	2,30
s	0,18	0,34
b	4,50	5,00
B	5,00	4,50
v	1,65	1,35
s + v	1,83	1,69
e	0,75	0,75
m (KN/ml)	630	537
v (KN/ml)	282	282



$$M = 376\,(S+V)^2 / 2$$

V < 2 h RIGIDA

$$V = 376\,.e$$

Tomamos pues:

Md = 1,5 x 630 = 945 KN.m/ml.

Vd = 1,5 x 282 = 423 KN/ml.

Corresponden armaduras 9 ø 25 ml en ambas direcciones (véase listados de comprobación de secciones adjunto).

Como armadura superior disponemos el 1,5 °/₀₀ s/(150 x 100) = 22,5 cm², con separaciones acordes con las barras inferiores (9 ø 20/ml). Al igula que en los encepados disponemos una armadura perimetral de 6 ø 20 (ver apartado 4.2.).

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:43:39

Dimensionamiento de secciones a flexión simple

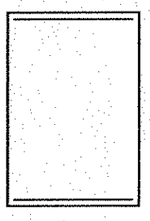
1 Datos

- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

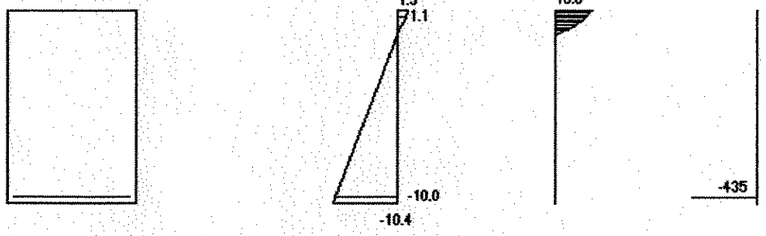
- Sección

Sección : ZAPAT
b [m] = 1.00
h [m] = 1.50
ri [m] = 0.050
rs [m] = 0.050



2 Dimensionamiento

Md [kN·m] = 945



Plano de deformación de agotamiento

x [m] = 0.191

1/r [1/m]·1.E-3 = 7.9

εs ·1.E-3 = 1.5

εi ·1.E-3 = -10.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	1.1	0.0
1.450	42.0	-10.0	434.8

At_est [cm²] = 42.0

ϕ [mm]	12	14	16	20	25
nºϕ	38	28	21	14	9
nº capas	2	2	2	1	1
At [cm²]	43.0	43.1	42.2	44.0	44.2
wk [mm]	0.04	0.05	0.05	0.06	0.07

< 0.3 mm

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: PASO SUPERIOR 4+300
Fecha: 02/12/03
Hora: 20:45:23

Cálculo de secciones a cortante

1 Datos

- Materiales

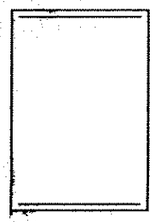
Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : ZAPAT
b0 [m] = 1.00
h [m] = 1.50



2 Comprobación

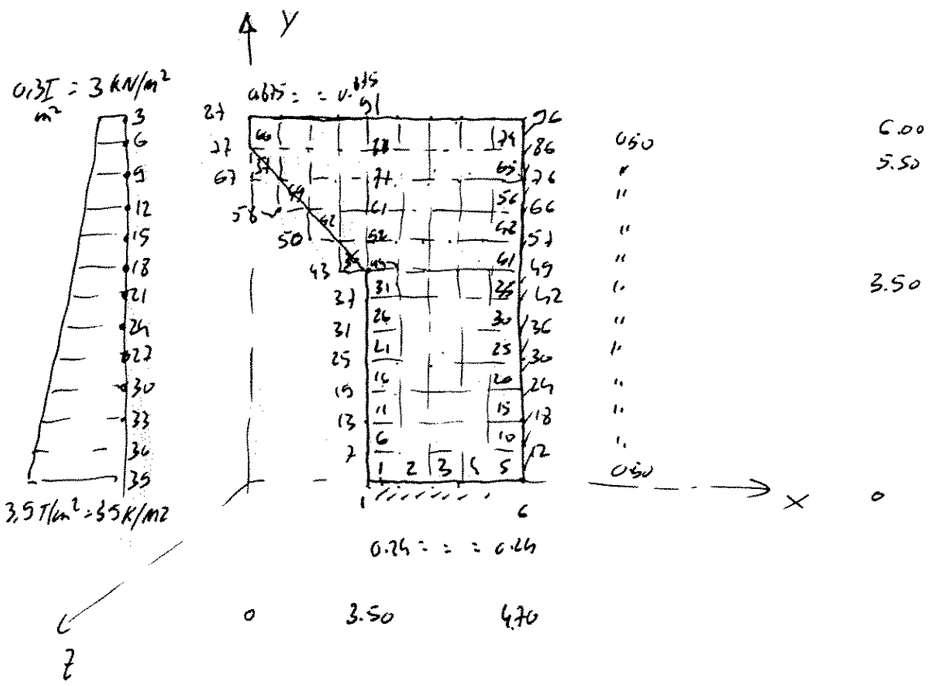
ρl [·1.E-3] = 3
Nd [kN] = 0.0
Vu [kN] = 496.4 > 423, vale sin armadura de cortante.

ANEJO Nº 1

LISTADOS MODELOS SAP

ALETA ESTRIBO

Aleta PS 4+300



Discretización

50 x: 2.50 y: 6.00
52 x: 3.50 y: 5.0
57 x: 4,70 y: 4.0
58 x: 4.750 y: 5.50
61 x: 3,50 y: 4,50
66 x: 4,70 y: 6,50
67 x: 0 y: 5.00
71 x: 3.50 y: 5.00
76 x: 4,70 y: 5.00
77 x: 0 y: 5.50
81 x: 3.50 y: 5.50
86 x: 4,70 y: 5,50
87 x: 0 y: 6.00
56 x: 3,50 y: 6.00
56 x: 4,70 y: 6.00

G: 50, 52, 1
G: 52, 57, 1
G: 58, 61, 1
G: 66, 66, 1
G: 67, 71, 1
G: 71, 76, 1
G: 77, 81, 1
G: 81, 86, 1
G: 87, 56, 1
G: 56, 56, 1

RESTRICCIONS

1, 6, 1 R: 1, 1, 1, 1, 1, 1
12, 62, 6 R: 1, 1, 1, 1, 1, 1
49, 52, 6 R: 1, 1, 1, 1, 1, 1
66, 76, 10 R: 1, 1, 1, 1, 1, 1
86, 56, 10 R: 1, 1, 1, 1, 1, 1

PROYECTO ..... IOC OFICINA CONSULTORA Hoja nº. ..... de .....

CONCEPTO ..... Fecha .....

SHELL

NA = 2 Y=-2

1 E= 3500 000 U=0.20 W= 2.5

1 JQ= 1,2,7,8 ETYPE=2.0 N=1 TH=0.60 CP=0 G=5,6

31 JQ= 32,38,65,65 G=5,1

36 JQ= 43,44,51,52 G=6,1

47 JQ= 50,51,55,56 G=7,1

59 JQ= 58,59,68,69 G=8,1

51 JQ= 67,68,72,78 G=9,2

66 JQ= 72,72,82,88 G=5,2

CARGAS

67,91,1	F=0,08	32,41,2	F=0,35 V
92,95,1	F=0,07	31,35,2	F=0,29 V
72,81,1	F=0,25	25,29,2	F=0,32 V
82,85,1	F=0,09 V	15,25,2	F=0,35 V
62,71,1	F=0,39	13,12,2	F=0,40 V
72,75,1	F=0,18 V	2,11,2	F=0,43 V
58,61,1	F=0,53		
62,65,1	F=0,14 V	81	F=0,0,4,5,3,6,0,0
50,52,1	F=0,66		
53,56,1	F=0,18 V		
43,45,1	F=0,28		
45,48,1	F=0,22 V		

PROYECTO ..... IOC OFICINA CONSULTORA Hoja nº. ..... de .....

CONCEPTO ..... Fecha .....

CARGAS EN NUDOS

	F (KN)		(Tn)
3 ·	→ $\frac{3+6}{2}$ · 0,24 × 0,5 × 0,5 = 0,27		
6 ·	→ 6 × 0,24 × 0,5	= 0,72	= 0,07
9 ·	→ 9 × 0,24 × 0,5	= 1,08	= 0,11
12 ·	→ 12 × 0,24 × 0,5	= 1,44	= 0,14
15 ·	→ 15 × 0,24 × 0,5	= 1,80	= 0,18
18 ·	→ 18 × 0,24 × 0,5	= 2,16	= 0,22
21 ·	→ 21 × 0,24 × 0,5	= 2,52	= 0,25
24 ·	→ 24 × 0,24 × 0,5	= 2,88	= 0,29
27 ·	→ 27 × 0,24 × 0,5	= 3,24	= 0,32
30 ·	→ 30 × 0,24 × 0,5	= 3,60	= 0,36
33 ·	→ 33 × 0,24 × 0,5	= 3,96	= 0,40
36 ·	→ 36 × 0,24 × 0,5	= 4,32	= 0,43

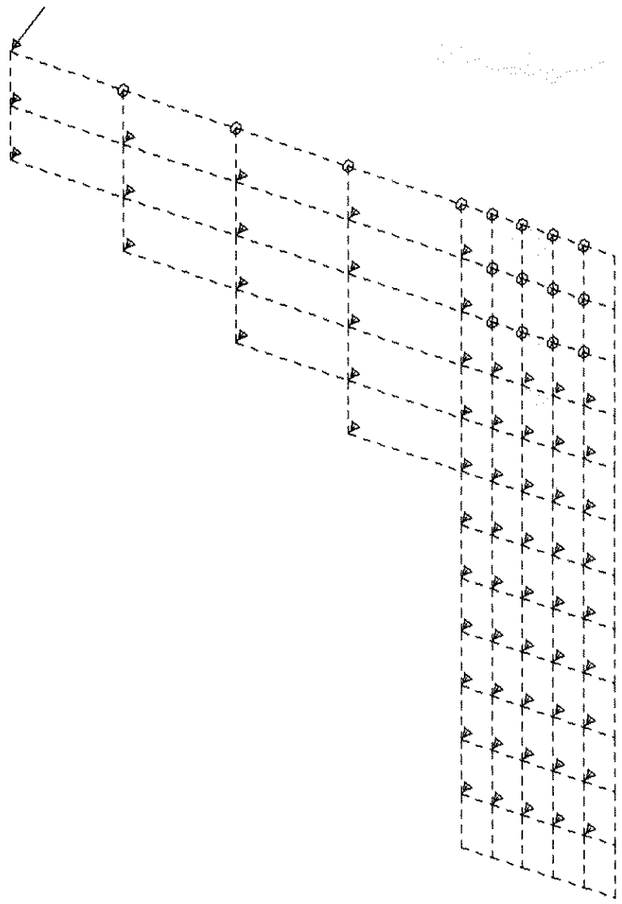
↑

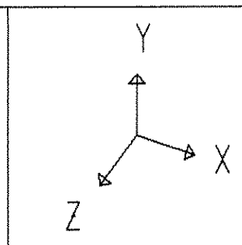
Empujes kN/m².

Además en nudo 81

F_z = 45kN = 4,5Tn

Mx = 36 kN·m = 3,6mT





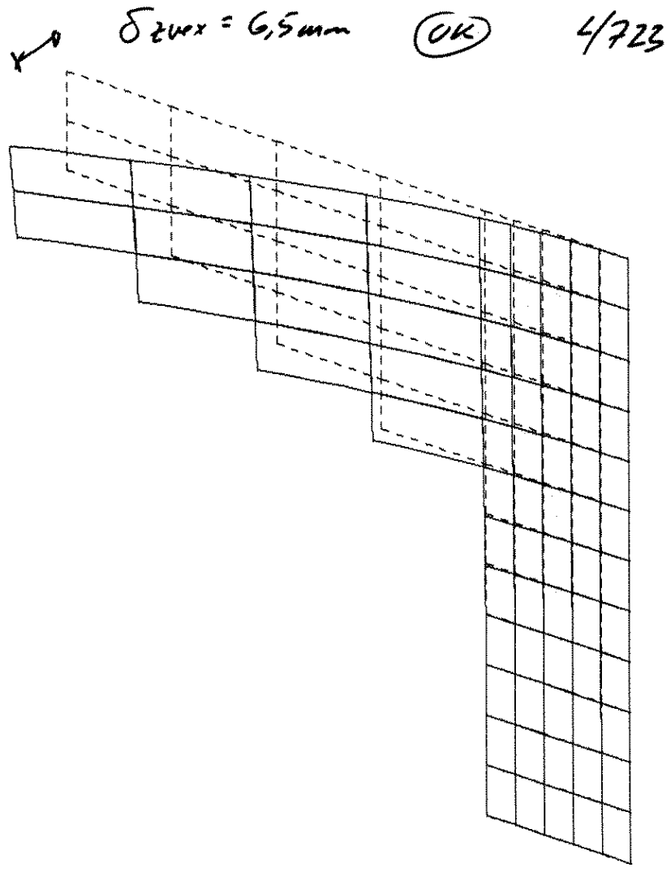
ALETA

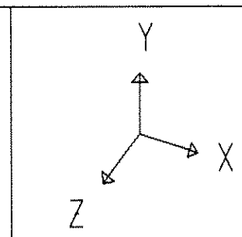
JOINT
LOADS

LOAD 1

MINIMA
P .2700E-01
MAXIMA
P .4598E+01

SAP90





ALETA

DEFORMED
SHAPE

LOAD 1

MINIMA
X -.1713E-04
Y -.5369E-04
Z .0000E+00
MAXIMA
X .8112E-05
Y .0000E+00
Z .6529E-02

SAP90

```
        ALETA PS 4+300
SYSTEM
L=1

JOINTS
1  X=3.5    Y=0    Z=0
6  X=4.7    Y=0    G=1,6,1
31 X=3.5    Y=2.5  G=1,31,6
37 X=3.5    Y=3    F=1,5,6,1,6
43 X=2.625  Y=3.5
44 X=3.50   Y=3.5
49 X=4.7    Y=3.5  G=44,49,1
50 X=1.75   Y=4
52 X=3.5    Y=4    G=50,52,1
57 X=4.7    Y=4    G=52,57,1
58 X=0.875  Y=4.5
61 X=3.5    Y=4.5  G=58,61,1
66 X=4.7    Y=4.5  G=61,66,1
67 X=0      Y=5
71 X=3.5    Y=5    G=67,71,1
76 X=4.7    Y=5    G=71,76,1
77 X=0      Y=5.5
81 X=3.5    Y=5.5  G=77,81,1
86 X=4.7    Y=5.5  G=81,86,1
8  X=0      Y=6
91 X=3.5    Y=6    G=87,91,1
96 X=4.7    Y=6    G=91,96,1

RESTRAINTS
1,6,1      R=1,1,1,1,1,1
12,42,6    R=1,1,1,1,1,1
49,57,8    R=1,1,1,1,1,1
66,76,10   R=1,1,1,1,1,1
86,96,10   R=1,1,1,1,1,1

SHELL
NM=1   Y=-1
1  E=3500000 U=0.2   W=2.5
1    JQ=1,2,7,8       ETYPE=0    M=1   TH=0.4     LP=0   G=5,6
31   JQ=37,38,44,45                                      G=5,1
36   JQ=43,44,51,52                                      G=6,1
42   JQ=50,51,59,60                                      G=7,1
49   JQ=58,59,68,69                                      G=8,1
5    JQ=67,68,77,78                                      G=9,1
66   JQ=77,78,87,88                                      G=9,1

LOADS
87,91,1    F=0,0,0.098
92,95,1    F=0,0,0.027
77,81,1    F=0,0,0.26
82,85,1    F=0,0,0.07
67,71,1    F=0,0,0.39
72,75,1    F=0,0,0.11
58,61,1    F=0,0,0.53
62,65,1    F=0,0,0.14
50,52,1    F=0,0,0.66
53,56,1    F=0,0,0.18
43,44,1    F=0,0,0.78
45,48,1    F=0,0,0.22
37,41,1    F=0,0,0.25
31,35,1    F=0,0,0.29
25,29,1    F=0,0,0.32
1 23,1     F=0,0,0.36
13,17,1    F=0,0,0.40
7,11,1     F=0,0,0.43
87         F=0,0,4.5,3.6,0,0
```

ALETA PS 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.000000	.000000	.000000	.000000	.000000	.000000
2	.000000	.000000	.000000	.000000	.000000	.000000
3	.000000	.000000	.000000	.000000	.000000	.000000
4	.000000	.000000	.000000	.000000	.000000	.000000
5	.000000	.000000	.000000	.000000	.000000	.000000
6	.000000	.000000	.000000	.000000	.000000	.000000
7	-.4051E-07	-.5262E-06	.1345E-04	.4152E-04	.1572E-04	.2342E-06
8	.1527E-07	-.5025E-06	.9536E-05	.3037E-04	.1616E-04	-.1086E-06
9	.5571E-07	-.4537E-06	.5900E-05	.1911E-04	.1399E-04	.2149E-06
10	.7462E-07	-.3632E-06	.2900E-05	.9600E-05	.1085E-04	.1111E-07
11	.6283E-07	-.2159E-06	.8018E-06	.2792E-05	.6356E-05	.6187E-06
12	.000000	.000000	.000000	.000000	.000000	.000000
13	.3058E-08	-.9438E-06	.3574E-04	.4605E-04	.4229E-04	-.4218E-06
14	.3491E-07	-.9298E-06	.2570E-04	.3320E-04	.4105E-04	.3370E-06
15	.6232E-07	-.8109E-06	.1624E-04	.2105E-04	.3722E-04	.2936E-06
16	.7617E-07	-.6359E-06	.8122E-05	.1050E-04	.2979E-04	.3597E-06
17	.5475E-07	-.3447E-06	.2297E-05	.2940E-05	.1793E-04	.1075E-05
18	.000000	.000000	.000000	.000000	.000000	.000000
19	-.4420E-08	-.1343E-05	.5952E-04	.5080E-04	.7064E-04	.8561E-06
20	.3451E-07	-.1272E-05	.4268E-04	.3577E-04	.6906E-04	-.3140E-06
21	.6948E-07	-.1151E-05	.2679E-04	.2188E-04	.6242E-04	.6148E-06
22	.7372E-07	-.8760E-06	.1323E-04	.1036E-04	.4939E-04	.4769E-06
23	.5590E-07	-.4773E-06	.3667E-05	.2674E-05	.2900E-04	.1403E-05
24	.000000	.000000	.000000	.000000	.000000	.000000
25	.7327E-07	-.1641E-05	.8855E-04	.6857E-04	.1058E-03	-.1605E-05
26	.1012E-06	-.1694E-05	.6306E-04	.4759E-04	.1047E-03	.6138E-06
27	.1013E-06	-.1477E-05	.3911E-04	.2866E-04	.9340E-04	.5815E-06
28	.1192E-06	-.1190E-05	.1900E-04	.1331E-04	.7244E-04	.2733E-06
29	.9176E-07	-.6610E-06	.5153E-05	.3400E-05	.4128E-04	.1979E-05
30	.000000	.000000	.000000	.000000	.000000	.000000
31	.2530E-06	-.2125E-05	.1308E-03	.1041E-03	.1632E-03	.2384E-05
32	.2771E-06	-.2044E-05	.9233E-04	.7135E-04	.1568E-03	-.1323E-05
33	.3887E-06	-.2071E-05	.5652E-04	.4184E-04	.1388E-03	-.2727E-06
34	.3667E-06	-.1644E-05	.2698E-04	.1875E-04	.1050E-03	.6429E-06
35	.2276E-06	-.8927E-06	.7181E-05	.4717E-05	.5808E-04	.2396E-05
36	.000000	.000000	.000000	.000000	.000000	.000000
37	.1246E-05	-.2239E-05	.1964E-03	.1679E-03	.2426E-03	-.9119E-05
38	.1509E-05	-.3292E-05	.1361E-03	.1022E-03	.2477E-03	-.2247E-05
39	.1319E-05	-.2787E-05	.8098E-04	.5533E-04	.2080E-03	.1158E-05
40	.9465E-06	-.2049E-05	.3772E-04	.2387E-04	.1502E-03	.1185E-06
41	.4928E-06	-.1089E-05	.9837E-05	.5873E-05	.8032E-04	.3307E-05
42	.000000	.000000	.000000	.000000	.000000	.000000
43	.8112E-05	-.1554E-04	.9603E-03	.3277E-03	.8500E-03	.1093E-04
44	.4232E-05	-.5705E-05	.2961E-03	.2164E-03	.4872E-03	.5506E-05
45	.3151E-05	-.4100E-05	.1924E-03	.1192E-03	.3831E-03	.1678E-05
46	.2208E-05	-.3179E-05	.1110E-03	.6452E-04	.2958E-03	.1530E-05
47	.1407E-05	-.2179E-05	.5069E-04	.2797E-04	.2053E-03	.1966E-05
48	.6789E-06	-.1069E-05	.1303E-04	.6967E-05	.1071E-03	.3199E-05
49	.000000	.000000	.000000	.000000	.000000	.000000
50	.000008	-.000027	.002211	.000441	.001314	.000013

ALETA PS 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
51	.000005	-.000015	.001125	.000334	.001031	.000008
52	.2581E-05	-.6568E-05	.3898E-03	.1604E-03	.6443E-03	.6613E-05
53	.2154E-05	-.4778E-05	.2515E-03	.1116E-03	.5105E-03	.4816E-05
54	.1657E-05	-.3303E-05	.1438E-03	.6508E-04	.3880E-03	.4359E-05
55	.1094E-05	-.2100E-05	.6528E-04	.2961E-04	.2658E-03	.2316E-05
56	.5320E-06	-.9756E-06	.1671E-04	.7677E-05	.1376E-03	.3547E-05
57	.000000	.000000	.000000	.000000	.000000	.000000
58	.000004	-.000040	.003848	.000557	.001674	.000016
59	.000002	-.000027	.002432	.000452	.001461	.000012
60	.000001	-.000016	.001284	.000299	.001152	.000009
61	.5685E-06	-.7029E-05	.4624E-03	.1349E-03	.7240E-03	.6266E-05
62	.4743E-06	-.5156E-05	.3030E-03	.9463E-04	.6015E-03	.5403E-05
63	.3825E-06	-.3518E-05	.1746E-03	.5778E-04	.4668E-03	.4509E-05
64	.2710E-06	-.2120E-05	.7967E-04	.2748E-04	.3230E-03	.3564E-05
65	.1396E-06	-.9126E-06	.2049E-04	.7240E-05	.1682E-03	.3348E-05
66	.000000	.000000	.000000	.000000	.000000	.000000
67	-.000002	-.000054	.005775	.000689	.001923	.000016
68	-.000003	-.000040	.004129	.000583	.001785	.000015
69	-.000003	-.000027	.002655	.000432	.001570	.000012
70	-.000003	-.000016	.001426	.000270	.001229	.000010
71	-.1793E-05	-.7388E-05	.5255E-03	.1173E-03	.8107E-03	.6831E-05
72	-.1445E-05	-.5448E-05	.3469E-03	.8159E-04	.6765E-03	.5842E-05
73	-.1076E-05	-.3688E-05	.2016E-03	.5055E-04	.5319E-03	.5378E-05
74	-.7077E-06	-.2186E-05	.9271E-04	.2501E-04	.3731E-03	.3172E-05
75	-.3602E-06	-.9341E-06	.2396E-04	.6904E-05	.1965E-03	.3734E-05
76	.000000	.000000	.000000	.000000	.000000	.000000
77	-.000010	-.000054	.006123	.000724	.001962	.000016
78	-.000009	-.000040	.004425	.000597	.001892	.000014
79	-.000009	-.000027	.002865	.000407	.001656	.000013
80	-.000007	-.000016	.001553	.000239	.001324	.000010
81	-.4763E-05	-.7805E-05	.5788E-03	.9340E-04	.8839E-03	.7820E-05
82	-.3907E-05	-.5806E-05	.3835E-03	.6239E-04	.7408E-03	.6982E-05
83	-.2973E-05	-.4013E-05	.2242E-03	.3729E-04	.5843E-03	.5724E-05
84	-.1968E-05	-.2378E-05	.1043E-03	.1985E-04	.4126E-03	.5296E-05
85	-.9339E-06	-.9274E-06	.2766E-04	.9150E-05	.2227E-03	.3702E-05
86	.000000	.000000	.000000	.000000	.000000	.000000
87	-.000017	-.000054	.006529	.000949	.002070	.000014
88	-.000017	-.000040	.004716	.000546	.002012	.000016
89	-.000015	-.000028	.003062	.000386	.001760	.000013
90	-.000012	-.000017	.001664	.000198	.001418	.000011
91	-.8499E-05	-.8266E-05	.6153E-03	.4822E-04	.9546E-03	.8070E-05
92	-.7209E-05	-.6337E-05	.4046E-03	.1491E-04	.7988E-03	.7106E-05
93	-.5783E-05	-.4518E-05	.2332E-03	-.1084E-04	.6266E-03	.7288E-05
94	-.4183E-05	-.2922E-05	.1054E-03	-.2681E-04	.4347E-03	.4362E-05
95	-.2305E-05	-.1420E-05	.2626E-04	-.3582E-04	.2208E-03	.6691E-05
96	.000000	.000000	.000000	.000000	.000000	.000000

ALETA PS 4+300

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1	.0446	.2040	-1.6273	-.3423	.0872	.0001
2	-.0111	.3836	-.8992	-.5068	-.0010	.0002
3	-.0350	.3504	-.3112	-.3081	-.0002	.0020
4	-.0582	.2925	.0724	-.1504	-.0003	.0027
5	-.0687	.1962	.3587	-.0440	-.0004	.0034
6	-.0825	.1262	.1972	-.0025	-.0475	.0004
7	.0000	.0000	.4300	.0000	.0000	.0000
8	.0000	.0000	.4300	.0000	.0000	.0000
9	.0000	.0000	.4300	.0000	.0000	.0000
10	.0000	.0000	.4300	.0000	.0000	.0000
11	.0000	.0000	.4300	.0000	.0000	.0000
12	-.2200	.3180	-.1958	-.0025	-.3419	-.0055
13	.0000	.0000	.4000	.0000	.0000	.0000
14	.0000	.0000	.4000	.0000	.0000	.0000
15	.0000	.0000	.4000	.0000	.0000	.0000
16	.0000	.0000	.4000	.0000	.0000	.0000
17	.0000	.0000	.4000	.0000	.0000	.0000
18	-.2262	.5065	-1.1659	-.0005	-.8590	-.0090
19	.0000	.0000	.3600	.0000	.0000	.0000
20	.0000	.0000	.3600	.0000	.0000	.0000
21	.0000	.0000	.3600	.0000	.0000	.0000
22	.0000	.0000	.3600	.0000	.0000	.0000
23	.0000	.0000	.3600	.0000	.0000	.0000
24	-.2561	.7088	-1.4974	.0010	-1.3668	-.0127
25	.0000	.0000	.3200	.0000	.0000	.0000
26	.0000	.0000	.3200	.0000	.0000	.0000
27	.0000	.0000	.3200	.0000	.0000	.0000
28	.0000	.0000	.3200	.0000	.0000	.0000
29	.0000	.0000	.3200	.0000	.0000	.0000
30	-.4233	.9722	-1.5090	.0005	-1.9032	-.0171
31	.0000	.0000	.2900	.0000	.0000	.0000
32	.0000	.0000	.2900	.0000	.0000	.0000
33	.0000	.0000	.2900	.0000	.0000	.0000
34	.0000	.0000	.2900	.0000	.0000	.0000
35	.0000	.0000	.2900	.0000	.0000	.0000
36	-.8590	1.2962	-1.5452	-.0001	-2.5977	-.0234
37	.0000	.0000	.2500	.0000	.0000	.0000
38	.0000	.0000	.2500	.0000	.0000	.0000
39	.0000	.0000	.2500	.0000	.0000	.0000
40	.0000	.0000	.2500	.0000	.0000	.0000
41	.0000	.0000	.2500	.0000	.0000	.0000
42	-1.4884	1.4738	-1.4901	.0002	-3.4827	-.0257
43	.0000	.0000	.7800	.0000	.0000	.0000
44	.0000	.0000	.7800	.0000	.0000	.0000
45	.0000	.0000	.2200	.0000	.0000	.0000
46	.0000	.0000	.2200	.0000	.0000	.0000
47	.0000	.0000	.2200	.0000	.0000	.0000
48	.0000	.0000	.2200	.0000	.0000	.0000
49	-1.8428	1.4241	-1.4084	.0000	-4.5494	-.0268
50	.0000	.0000	.6600	.0000	.0000	.0000

ALETA PS 4+300

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
51	.0000	.0000	.6600	.0000	.0000	.0000
52	.0000	.0000	.6600	.0000	.0000	.0000
53	.0000	.0000	.1800	.0000	.0000	.0000
54	.0000	.0000	.1800	.0000	.0000	.0000
55	.0000	.0000	.1800	.0000	.0000	.0000
56	.0000	.0000	.1800	.0000	.0000	.0000
57	-1.4407	1.2019	-1.7927	-.0010	-5.7918	-.0228
58	.0000	.0000	.5300	.0000	.0000	.0000
59	.0000	.0000	.5300	.0000	.0000	.0000
60	.0000	.0000	.5300	.0000	.0000	.0000
61	.0000	.0000	.5300	.0000	.0000	.0000
62	.0000	.0000	.1400	.0000	.0000	.0000
63	.0000	.0000	.1400	.0000	.0000	.0000
64	.0000	.0000	.1400	.0000	.0000	.0000
65	.0000	.0000	.1400	.0000	.0000	.0000
66	-.3532	1.0701	-2.5888	.0004	-7.0989	-.0218
67	.0000	.0000	.3900	.0000	.0000	.0000
68	.0000	.0000	.3900	.0000	.0000	.0000
69	.0000	.0000	.3900	.0000	.0000	.0000
70	.0000	.0000	.3900	.0000	.0000	.0000
71	.0000	.0000	.3900	.0000	.0000	.0000
72	.0000	.0000	.1100	.0000	.0000	.0000
73	.0000	.0000	.1100	.0000	.0000	.0000
74	.0000	.0000	.1100	.0000	.0000	.0000
75	.0000	.0000	.1100	.0000	.0000	.0000
76	1.1333	1.0025	-3.7778	.0064	-8.4106	-.0207
77	.0000	.0000	.2600	.0000	.0000	.0000
78	.0000	.0000	.2600	.0000	.0000	.0000
79	.0000	.0000	.2600	.0000	.0000	.0000
80	.0000	.0000	.2600	.0000	.0000	.0000
81	.0000	.0000	.2600	.0000	.0000	.0000
82	.0000	.0000	.0700	.0000	.0000	.0000
83	.0000	.0000	.0700	.0000	.0000	.0000
84	.0000	.0000	.0700	.0000	.0000	.0000
85	.0000	.0000	.0700	.0000	.0000	.0000
86	3.2051	1.0284	-7.5641	-.0828	-9.4987	-.0234
87	.0000	.0000	4.5980	3.6000	.0000	.0000
88	.0000	.0000	.0980	.0000	.0000	.0000
89	.0000	.0000	.0980	.0000	.0000	.0000
90	.0000	.0000	.0980	.0000	.0000	.0000
91	.0000	.0000	.0980	.0000	.0000	.0000
92	.0000	.0000	.0270	.0000	.0000	.0000
93	.0000	.0000	.0270	.0000	.0000	.0000
94	.0000	.0000	.0270	.0000	.0000	.0000
95	.0000	.0000	.0270	.0000	.0000	.0000
96	2.9823	.7695	-.3935	.3180	-4.5633	-.0157
TOTAL	-.3464E-13	.1332E+02	.6035E-11	.2485E+01	-.5043E+02	-.2157E+00

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

MEMBRANE FORCES ARE IN FORCE PER UNIT LENGTH
BENDING MOMENTS ARE IN MOMENTS PER UNIT LENGTH

ELEMENT ID 1 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
1	-3.0694E-01	-1.5347E+00	2.1060E-02	-3.0658E-01	-1.5351E+00	.98
2	-2.9314E-01	-1.4657E+00	-1.3866E-02	-2.9297E-01	-1.4658E+00	-.68
7	3.1974E-02	-1.4669E+00	4.1931E-02	3.3147E-02	-1.4681E+00	1.60
8	4.5777E-02	-1.3979E+00	7.0054E-03	4.5811E-02	-1.3979E+00	.28

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
1	6.0929E-01	3.0464E+00	-2.4459E-01	3.0708E+00	5.8498E-01	-84.33
2	4.1769E-01	2.0885E+00	-2.5137E-01	2.1255E+00	3.8069E-01	-81.63
7	-1.7390E-01	1.4116E-01	-6.0620E-01	6.0996E-01	-6.4270E-01	-52.28
8	1.9465E-01	3.0138E-01	-6.1297E-01	8.6331E-01	-3.6728E-01	-47.49

ELEMENT ID 2 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
2	-2.9314E-01	-1.4657E+00	-1.3866E-02	-2.9297E-01	-1.4658E+00	-.68
3	-2.6465E-01	-1.3232E+00	1.2767E-01	-2.4947E-01	-1.3384E+00	6.78
8	-4.7388E-02	-1.4165E+00	7.3831E-02	-4.3418E-02	-1.4205E+00	3.08
9	-1.8903E-02	-1.2741E+00	2.1537E-01	1.7022E-02	-1.3100E+00	9.47

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
2	4.1769E-01	2.0885E+00	-2.5137E-01	2.1255E+00	3.8069E-01	-81.63
3	2.5334E-01	1.2667E+00	-2.1760E-01	1.3115E+00	2.0860E-01	-78.38
8	1.9194E-01	3.0084E-01	-6.1613E-01	8.6492E-01	-3.7214E-01	-47.53
9	2.5847E-01	2.6262E-01	-5.8236E-01	8.4290E-01	-3.2182E-01	-45.10

ELEMENT ID 3 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
3	-2.6465E-01	-1.3232E+00	1.2767E-01	-2.4947E-01	-1.3384E+00	6.78
4	-2.1185E-01	-1.0592E+00	9.0297E-02	-2.0233E-01	-1.0688E+00	6.02
9	-1.4974E-01	-1.3003E+00	2.8176E-01	-8.4448E-02	-1.3656E+00	13.05
10	-9.6946E-02	-1.0363E+00	2.4438E-01	-3.7170E-02	-1.0960E+00	13.74

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
3	2.5334E-01	1.2667E+00	-2.1760E-01	1.3115E+00	2.0860E-01	-78.38
4	1.2137E-01	6.0684E-01	-1.6873E-01	6.5972E-01	6.8482E-02	-72.60
9	2.6008E-01	2.6294E-01	-5.2582E-01	7.8734E-01	-2.6432E-01	-45.08
10	3.2081E-01	1.9841E-01	-4.7696E-01	7.4048E-01	-2.2127E-01	-41.34

ELEMENT ID 4 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
4	-2.1185E-01	-1.0592E+00	9.0297E-02	-2.0234E-01	-1.0688E+00	6.02
5	-1.2594E-01	-6.2968E-01	2.5376E-01	-2.0274E-02	-7.3534E-01	22.61
10	-2.8347E-01	-1.0736E+00	2.6457E-01	-2.0306E-01	-1.1540E+00	16.91
11	-1.9756E-01	-6.4401E-01	4.2803E-01	6.1954E-02	-9.0352E-01	31.23

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 4 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
4	1.2137E-01	6.0684E-01	-1.6873E-01	6.5972E-01	6.8482E-02	-72.60
5	3.1401E-02	1.5700E-01	-9.8872E-02	2.1133E-01	-2.2929E-02	-61.21
10	3.2255E-01	1.9876E-01	-3.8936E-01	6.5491E-01	-1.3360E-01	-40.48
11	4.4517E-01	1.4679E-01	-3.1950E-01	6.4860E-01	-5.6640E-02	-32.48

ELEMENT ID 5 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
5	-1.2593E-01	-6.2968E-01	2.5376E-01	-2.0270E-02	-7.3534E-01	22.61
6	2.2444E-06	-7.1526E-08	-4.5174E-07	2.3294E-06	-1.5652E-07	-10.66
11	-5.0772E-01	-7.0603E-01	5.9803E-01	-6.8347E-04	-1.2131E+00	40.29
12	-3.8180E-01	-7.6359E-02	3.4428E-01	1.4755E-01	-6.0571E-01	56.96

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
5	3.1401E-02	1.5700E-01	-9.8872E-02	2.1133E-01	-2.2929E-02	-61.21
6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	.00
11	4.4789E-01	1.4733E-01	-1.8936E-01	5.3935E-01	5.5866E-02	-25.78
12	5.9406E-01	1.1881E-01	-9.0485E-02	6.1070E-01	1.0217E-01	-10.42

ELEMENT ID 6 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
7	9.5331E-02	-1.1501E+00	1.7007E-02	9.5563E-02	-1.1504E+00	.78
8	8.9658E-02	-1.1785E+00	1.1040E-01	9.9198E-02	-1.1880E+00	4.94
13	-5.0019E-02	-1.1792E+00	5.4746E-02	-4.7371E-02	-1.1818E+00	2.77
14	-5.5692E-02	-1.2076E+00	1.4814E-01	-3.6946E-02	-1.2263E+00	7.21

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
7	-1.3840E-01	3.1866E-01	-7.7488E-01	8.9801E-01	-7.1774E-01	-53.22
8	1.8750E-01	2.6565E-01	-7.4884E-01	9.7644E-01	-5.2328E-01	-46.49
13	2.3189E-02	-3.6076E-03	-8.2993E-01	8.3983E-01	-8.2025E-01	-44.54
14	1.7220E-01	1.7536E-02	-8.0390E-01	9.0247E-01	-7.1274E-01	-42.25

ELEMENT ID 7 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
8	-3.5058E-03	-1.1971E+00	1.7722E-01	2.2252E-02	-1.2229E+00	8.27
9	3.7364E-02	-9.9278E-01	2.4372E-01	9.2116E-02	-1.0475E+00	12.66
14	-8.2730E-02	-1.2130E+00	1.9459E-01	-5.0166E-02	-1.2455E+00	9.50
15	-4.1862E-02	-1.0086E+00	2.6109E-01	2.4143E-02	-1.0746E+00	14.19

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
8	1.8479E-01	2.6511E-01	-7.5199E-01	9.7802E-01	-5.2811E-01	-46.53
9	2.5769E-01	2.5871E-01	-7.2617E-01	9.8437E-01	-4.6797E-01	-45.02
14	1.7326E-01	1.7749E-02	-7.8069E-01	8.8006E-01	-6.8905E-01	-42.16
15	4.3108E-01	2.4165E-02	-7.5487E-01	1.0094E+00	-5.5419E-01	-37.46

ELEMENT ID 8 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
9	-9.3481E-02	-1.0189E+00	3.1011E-01	8.2304E-04	-1.1132E+00	16.91
10	-4.4169E-02	-7.7239E-01	2.6404E-01	4.1489E-02	-8.5804E-01	17.97
15	-1.2421E-01	-1.0251E+00	3.9095E-01	2.1792E-02	-1.1711E+00	20.48
16	-7.4899E-02	-7.7853E-01	3.4488E-01	6.5948E-02	-9.1938E-01	22.21

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 8

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
9	2.5930E-01	2.5903E-01	-6.6964E-01	9.2881E-01	-4.1047E-01	-44.99
10	3.1822E-01	1.8545E-01	-6.0288E-01	8.5836E-01	-3.5469E-01	-41.86
15	4.3083E-01	2.4115E-02	-7.0352E-01	9.5979E-01	-5.0485E-01	-36.94
16	7.4922E-01	9.5099E-02	-6.3676E-01	1.1380E+00	-2.9369E-01	-31.41

ELEMENT ID 9
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
10	-2.3070E-01	-8.0969E-01	2.8423E-01	-1.1449E-01	-9.2590E-01	22.24
11	-1.4678E-01	-3.9008E-01	6.5883E-01	4.0154E-01	-9.3840E-01	39.77
16	-2.8921E-01	-8.2140E-01	3.9917E-01	-7.5578E-02	-1.0350E+00	28.16
17	-2.0530E-01	-4.0179E-01	7.7376E-01	4.7643E-01	-1.0835E+00	41.38
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
10	3.1996E-01	1.8580E-01	-5.1528E-01	7.7251E-01	-2.6675E-01	-41.29
11	4.4006E-01	1.2122E-01	-4.0068E-01	7.1187E-01	-1.5059E-01	-34.15
16	7.4870E-01	9.4995E-02	-5.3960E-01	1.0527E+00	-2.0903E-01	-29.40
17	1.1568E+00	2.0917E-01	-4.2500E-01	1.3194E+00	4.6488E-02	-20.95

ELEMENT ID 10
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
11	-4.5694E-01	-4.5212E-01	8.2884E-01	3.7431E-01	-1.2834E+00	45.08
12	-3.8179E-01	-7.6359E-02	3.4428E-01	1.4755E-01	-6.0570E-01	56.96
17	-4.0785E-01	-4.4229E-01	1.0089E+00	5.8396E-01	-1.4341E+00	44.51
18	-3.3270E-01	-6.6537E-02	5.2433E-01	3.4134E-01	-7.4058E-01	52.12
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
11	4.4278E-01	1.2176E-01	-2.7053E-01	5.9683E-01	-3.2296E-02	-29.66
12	5.9406E-01	1.1881E-01	-9.0484E-02	6.1071E-01	1.0217E-01	-10.42
17	1.1547E+00	2.0875E-01	-2.7532E-01	1.2290E+00	1.3445E-01	-15.10
18	1.7462E+00	3.4923E-01	-9.5273E-02	1.7526E+00	3.4276E-01	-3.88

ELEMENT ID 11
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
13	-3.9324E-02	-1.1257E+00	1.7657E-01	-1.1348E-02	-1.1537E+00	9.00
14	-5.8911E-03	-9.5857E-01	6.4836E-02	-1.4988E-03	-9.6296E-01	3.88
19	3.6337E-03	-1.1171E+00	1.3302E-01	1.9206E-02	-1.1327E+00	6.68
20	3.7066E-02	-9.4998E-01	2.1298E-02	3.7525E-02	-9.5044E-01	1.24
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
13	2.1950E-02	-9.8057E-03	-8.5760E-01	8.6382E-01	-8.5168E-01	-44.47
14	1.7147E-01	1.3878E-02	-8.5230E-01	9.4861E-01	-7.6326E-01	-42.36
19	4.3147E-02	3.7724E-01	-9.2807E-01	1.1532E+00	-7.3279E-01	-50.10
20	3.3380E-01	2.7925E-01	-9.2276E-01	1.2297E+00	-6.1664E-01	-44.15

ELEMENT ID 12
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
14	-3.2935E-02	-9.6398E-01	1.1129E-01	-1.9817E-02	-9.7710E-01	6.72
15	-3.1576E-02	-9.5718E-01	3.7839E-01	1.0342E-01	-1.0922E+00	19.63
20	1.3085E-02	-9.5478E-01	2.1314E-01	5.7942E-02	-9.9964E-01	11.89
21	1.4443E-02	-9.4798E-01	4.8023E-01	2.1307E-01	-1.1466E+00	22.47

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 12

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
14	1.7253E-01	1.4091E-02	-8.2910E-01	9.2619E-01	-7.3956E-01	-42.27
15	4.3267E-01	3.2097E-02	-7.8537E-01	1.0429E+00	-5.7813E-01	-37.85
20	3.4154E-01	2.8080E-01	-8.8558E-01	1.1973E+00	-5.7493E-01	-44.02
21	8.0322E-01	2.7702E-01	-8.4186E-01	1.4221E+00	-3.4189E-01	-36.32

ELEMENT ID 13
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
15	-1.1392E-01	-9.7365E-01	5.0825E-01	1.2187E-01	-1.2094E+00	24.89
16	-5.5883E-02	-6.8346E-01	4.7606E-01	2.0051E-01	-9.3985E-01	28.31
21	-1.7234E-01	-9.8534E-01	6.2220E-01	1.6438E-01	-1.3221E+00	28.42
22	-1.1431E-01	-6.9514E-01	5.9002E-01	2.5289E-01	-1.0623E+00	31.90
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
15	4.3241E-01	3.2046E-02	-7.3402E-01	9.9306E-01	-5.2860E-01	-37.37
16	7.4989E-01	9.8444E-02	-6.4703E-01	1.1486E+00	-3.0022E-01	-31.64
21	8.0319E-01	2.7701E-01	-7.6552E-01	1.3496E+00	-2.6937E-01	-35.52
22	1.3402E+00	3.0893E-01	-6.7853E-01	1.6768E+00	-2.7657E-02	-26.38

ELEMENT ID 14
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
16	-2.7020E-01	-7.2632E-01	5.3035E-01	7.9041E-02	-1.0756E+00	33.37
17	-2.0746E-01	-4.1264E-01	1.0134E+00	7.0853E-01	-1.3286E+00	42.11
22	-2.4836E-01	-7.2196E-01	6.6178E-01	2.1771E-01	-1.1880E+00	35.16
23	-1.8563E-01	-4.0827E-01	1.1448E+00	8.5327E-01	-1.4472E+00	42.22
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
16	7.4936E-01	9.8339E-02	-5.4987E-01	1.0628E+00	-2.1514E-01	-29.69
17	1.1562E+00	2.0654E-01	-4.1718E-01	1.3135E+00	4.9315E-02	-20.65
22	1.3400E+00	3.0890E-01	-5.5387E-01	1.5811E+00	6.7774E-02	-23.53
23	1.9732E+00	3.9947E-01	-4.2119E-01	2.0788E+00	2.9384E-01	-14.08

ELEMENT ID 15
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
17	-4.1002E-01	-4.5315E-01	1.2485E+00	8.1712E-01	-1.6803E+00	44.51
18	-3.3270E-01	-6.6540E-02	5.2433E-01	3.4133E-01	-7.4057E-01	52.12
23	-4.1698E-01	-4.5453E-01	1.4749E+00	1.0393E+00	-1.9108E+00	44.64
24	-3.3966E-01	-6.7926E-02	7.5072E-01	5.5912E-01	-9.6671E-01	50.13
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
17	1.1541E+00	2.0612E-01	-2.6750E-01	1.2244E+00	1.3585E-01	-14.72
18	1.7462E+00	3.4923E-01	-9.5271E-02	1.7526E+00	3.4277E-01	-3.88
23	1.9727E+00	3.9938E-01	-2.5888E-01	2.0142E+00	3.5787E-01	-9.11
24	2.7278E+00	5.4556E-01	-8.6650E-02	2.7313E+00	5.4213E-01	-2.27

ELEMENT ID 16
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
19	6.2753E-02	-8.2152E-01	-1.1270E-01	7.6890E-02	-8.3565E-01	-7.15
20	-9.7688E-03	-1.1841E+00	1.8026E-01	1.7279E-02	-1.2112E+00	8.53
25	-4.3405E-03	-8.3495E-01	3.2328E-02	-3.0842E-03	-8.3620E-01	2.23
26	-7.6861E-02	-1.1975E+00	3.2528E-01	1.0710E-02	-1.2851E+00	15.07

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 16

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
19	2.8009E-02	3.0156E-01	-1.0338E+00	1.2076E+00	-8.7800E-01	-48.77
20	3.3856E-01	3.0305E-01	-1.0410E+00	1.3620E+00	-7.2034E-01	-44.51
25	-1.6726E-01	9.9769E-01	-1.2267E+00	1.7732E+00	-9.4275E-01	-57.70
26	6.9754E-01	7.8676E-01	-1.2339E+00	1.9769E+00	-4.9258E-01	-46.04

ELEMENT ID 17
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
20	-3.3744E-02	-1.1889E+00	3.7210E-01	7.5739E-02	-1.2984E+00	16.40
21	2.2333E-02	-9.0853E-01	5.9302E-01	3.1075E-01	-1.1970E+00	25.94
26	-2.4510E-01	-1.2312E+00	3.4487E-01	-1.3646E-01	-1.3398E+00	17.49
27	-1.8903E-01	-9.5081E-01	5.6578E-01	1.1213E-01	-1.2520E+00	28.03

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
20	3.4630E-01	3.0460E-01	-1.0038E+00	1.3295E+00	-6.7858E-01	-44.41
21	8.0253E-01	2.7357E-01	-9.3197E-01	1.5068E+00	-4.3072E-01	-37.08
26	6.7530E-01	7.8231E-01	-1.1673E+00	1.8974E+00	-4.3977E-01	-46.31
27	1.3660E+00	6.6594E-01	-1.0955E+00	2.1660E+00	-1.3410E-01	-36.14

ELEMENT ID 18
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
21	-1.6446E-01	-9.4589E-01	7.3499E-01	2.7722E-01	-1.3876E+00	31.00
22	-1.5717E-01	-9.0948E-01	6.2070E-01	1.9245E-01	-1.2591E+00	29.39
27	-8.2017E-02	-9.2940E-01	8.3441E-01	4.3011E-01	-1.4415E+00	31.54
28	-7.4737E-02	-8.9299E-01	7.2012E-01	3.4436E-01	-1.3121E+00	30.20

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
21	8.0249E-01	2.7357E-01	-8.5564E-01	1.4336E+00	-3.5755E-01	-36.41
22	1.3412E+00	3.1414E-01	-7.3222E-01	1.7220E+00	-6.6679E-02	-27.48
27	1.3684E+00	6.6642E-01	-9.7959E-01	2.0580E+00	-2.3159E-02	-35.14
28	2.1459E+00	6.0352E-01	-8.5617E-01	2.5270E+00	2.2242E-01	-23.99

ELEMENT ID 19
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
22	-2.9123E-01	-9.3629E-01	6.9245E-01	1.5012E-01	-1.3776E+00	32.51
23	-2.1549E-01	-5.5757E-01	1.4490E+00	1.0725E+00	-1.8456E+00	41.63
28	-3.4936E-01	-9.4793E-01	8.9956E-01	2.9940E-01	-1.5967E+00	35.80
29	-2.7362E-01	-5.6921E-01	1.6561E+00	1.2412E+00	-2.0841E+00	42.45

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
22	1.3411E+00	3.1410E-01	-6.0757E-01	1.6231E+00	3.2095E-02	-24.90
23	1.9748E+00	4.0753E-01	-4.3990E-01	2.0898E+00	2.9250E-01	-14.65
28	2.1467E+00	6.0368E-01	-6.7963E-01	2.4034E+00	3.4703E-01	-20.69
29	2.9485E+00	6.3132E-01	-5.1196E-01	3.0566E+00	5.2325E-01	-11.92

ELEMENT ID 20
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
23	-4.4684E-01	-6.0384E-01	1.7791E+00	1.2555E+00	-2.3061E+00	43.74
24	-3.3966E-01	-6.7932E-02	7.5071E-01	5.5911E-01	-9.6670E-01	50.13
29	-6.6475E-01	-6.4741E-01	2.0578E+00	1.4017E+00	-2.7139E+00	45.12
30	-5.5758E-01	-1.1151E-01	1.0294E+00	7.1878E-01	-1.3879E+00	51.11

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 24

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
28	2.1496E+00	6.1817E-01	-8.2685E-01	2.5109E+00	2.5695E-01	-23.60
29	2.9500E+00	6.3877E-01	-5.8243E-01	3.0885E+00	5.0029E-01	-13.37
34	3.3619E+00	8.9055E-01	-9.6056E-01	3.6913E+00	5.6111E-01	-18.93
35	4.2901E+00	9.0760E-01	-7.1615E-01	4.4355E+00	7.6223E-01	-11.47

ELEMENT ID 25
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
29	-6.9273E-01	-7.8727E-01	2.4639E+00	1.7243E+00	-3.2043E+00	44.45
30	-5.5758E-01	-1.1152E-01	1.0294E+00	7.1877E-01	-1.3879E+00	51.11
35	-1.5184E+00	-9.5238E-01	2.9054E+00	1.6838E+00	-4.1546E+00	47.78
36	-1.3832E+00	-2.7663E-01	1.4710E+00	7.4173E-01	-2.4016E+00	55.31

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
29	2.9501E+00	6.3880E-01	-3.7159E-01	3.0084E+00	5.8053E-01	-8.91
30	3.7485E+00	7.4970E-01	-1.1017E-01	3.7525E+00	7.4566E-01	-2.10
35	4.2885E+00	9.0728E-01	-4.1427E-01	4.3385E+00	8.5726E-01	-6.88
36	5.1334E+00	1.0267E+00	-1.5286E-01	5.1390E+00	1.0210E+00	-2.13

ELEMENT ID 26
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
31	7.9984E-02	-3.0121E-01	-9.1650E-01	8.2549E-01	-1.0467E+00	-39.13
32	-5.8227E-01	-3.6125E+00	2.8474E-01	-5.5575E-01	-3.6390E+00	5.32
37	1.5287E+00	-1.1514E-02	-5.1041E-02	1.5304E+00	-1.3203E-02	-1.90
38	8.6649E-01	-3.3228E+00	1.1502E+00	1.1615E+00	-3.6178E+00	14.39

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
31	6.1224E-01	1.3940E+00	-2.2962E+00	3.3324E+00	-1.3261E+00	-49.83
32	9.7692E-01	1.5279E+00	-2.4762E+00	3.7438E+00	-1.2390E+00	-48.17
37	-2.5139E+00	2.9907E+00	-3.3644E+00	4.5851E+00	-4.1083E+00	-64.64
38	2.6167E+00	1.4950E+00	-3.5443E+00	5.6442E+00	-1.5325E+00	-40.50

ELEMENT ID 27
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
32	-5.0228E-02	-3.5061E+00	7.9387E-01	1.2341E-01	-3.6797E+00	12.34
33	2.6074E-01	-1.9512E+00	1.7423E+00	1.2184E+00	-2.9089E+00	28.80
38	-1.8788E+00	-3.8718E+00	1.9420E+00	-6.9255E-01	-5.0580E+00	31.42
39	-1.5678E+00	-2.3170E+00	2.8904E+00	9.7216E-01	-4.8570E+00	41.31

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
32	1.0445E+00	1.5414E+00	-2.3706E+00	3.6766E+00	-1.0907E+00	-47.99
33	2.2758E+00	1.0331E+00	-2.0332E+00	3.7805E+00	-4.7158E-01	-36.50
38	2.4874E+00	1.4691E+00	-2.9335E+00	4.9556E+00	-9.9914E-01	-40.08
39	4.2417E+00	1.2777E+00	-2.5961E+00	5.7490E+00	-2.2965E-01	-30.14

ELEMENT ID 28
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
33	-5.5086E-01	-2.1136E+00	2.2751E+00	1.0733E+00	-3.7377E+00	35.52
34	-3.7005E-01	-1.2095E+00	1.8295E+00	1.0872E+00	-2.6668E+00	38.54
39	-2.6834E+00	-2.5401E+00	2.7641E+00	1.5334E-01	-5.3768E+00	45.74
40	-2.5026E+00	-1.6360E+00	2.3186E+00	2.8942E-01	-4.4280E+00	50.29

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 20

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
23	1.9743E+00	4.0743E-01	-2.7759E-01	2.0220E+00	3.5970E-01	-9.76
24	2.7278E+00	5.4557E-01	-8.6649E-02	2.7313E+00	5.4213E-01	-2.27
29	2.9487E+00	6.3135E-01	-3.0111E-01	2.9871E+00	5.9287E-01	-7.28
30	3.7485E+00	7.4970E-01	-1.1017E-01	3.7525E+00	7.4565E-01	-2.10

ELEMENT ID 21
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
25	-1.1321E-01	-1.3793E+00	5.9706E-01	1.2393E-01	-1.6165E+00	21.66
26	-3.4576E-02	-9.8617E-01	1.5850E-01	-8.8705E-03	-1.0119E+00	9.21
31	-1.3655E-01	-1.3840E+00	3.2606E-01	-5.6470E-02	-1.4641E+00	13.80
32	-5.7920E-02	-9.9083E-01	-1.1249E-01	-4.4549E-02	-1.0042E+00	-6.78

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
25	-1.8997E-01	8.8418E-01	-1.5740E+00	2.0102E+00	-1.3160E+00	-54.42
26	7.0360E-01	8.1700E-01	-1.4909E+00	2.2523E+00	-7.3167E-01	-46.09
31	7.0815E-01	1.8736E+00	-1.9559E+00	3.3317E+00	-7.4999E-01	-53.30
32	9.2807E-01	1.2836E+00	-1.8727E+00	2.9870E+00	-7.7531E-01	-47.71

ELEMENT ID 22
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
26	-2.0283E-01	-1.0198E+00	1.7809E-01	-1.6570E-01	-1.0569E+00	11.78
27	-3.4573E-01	-1.7343E+00	6.0494E-01	-1.1916E-01	-1.9609E+00	20.53
32	4.7411E-01	-8.8444E-01	3.9666E-01	5.8144E-01	-9.9177E-01	15.14
33	3.3121E-01	-1.5990E+00	8.2350E-01	6.3480E-01	-1.9025E+00	20.24

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
26	6.8135E-01	8.1255E-01	-1.4243E+00	2.1728E+00	-6.7887E-01	-46.32
27	1.3665E+00	6.6845E-01	-1.3189E+00	2.3818E+00	-3.4685E-01	-37.59
32	9.9569E-01	1.2972E+00	-1.7672E+00	2.9201E+00	-6.2722E-01	-47.44
33	2.2781E+00	1.0447E+00	-1.6619E+00	3.4340E+00	-1.1119E-01	-34.82

ELEMENT ID 23
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
27	-2.3873E-01	-1.7129E+00	8.7357E-01	1.6717E-01	-2.1188E+00	24.92
28	-1.5680E-01	-1.3033E+00	1.0043E+00	4.2637E-01	-1.8865E+00	30.14
33	-4.8040E-01	-1.7613E+00	1.3563E+00	3.7903E-01	-2.6207E+00	32.36
34	-3.9848E-01	-1.3517E+00	1.4870E+00	6.8646E-01	-2.4366E+00	36.11

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
27	1.3689E+00	6.6893E-01	-1.2030E+00	2.2718E+00	-2.3397E-01	-36.89
28	2.1488E+00	6.1800E-01	-1.0034E+00	2.6454E+00	1.2141E-01	-26.33
33	2.2788E+00	1.0448E+00	-1.4538E+00	3.2411E+00	8.2521E-02	-33.50
34	3.3649E+00	8.9116E-01	-1.2542E+00	3.8895E+00	3.6655E-01	-22.70

ELEMENT ID 24
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
28	-4.3143E-01	-1.3582E+00	1.1838E+00	3.7641E-01	-2.1661E+00	34.31
29	-3.0159E-01	-7.0904E-01	2.0622E+00	1.5669E+00	-2.5775E+00	42.18
34	-1.1099E+00	-1.4939E+00	1.4954E+00	2.0583E-01	-2.8096E+00	41.34
35	-9.8004E-01	-8.4474E-01	2.3738E+00	1.4624E+00	-3.2872E+00	45.82

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 44

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
52	1.1236E+01	7.7544E-01	-2.8210E+00	1.1948E+01	6.3173E-02	-14.17
53	9.9901E+00	1.3373E+00	-2.9964E+00	1.0926E+01	4.0097E-01	-17.35
61	9.1618E+00	1.4013E+00	-2.5441E+00	9.9214E+00	6.4166E-01	-16.63
62	1.0467E+01	1.4894E+00	-2.7194E+00	1.1226E+01	7.2985E-01	-15.60

ELEMENT ID 45
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
53	-3.2359E+00	-1.7045E+00	1.9299E+00	-3.9401E-01	-4.5464E+00	55.82
54	-3.1410E+00	-1.2299E+00	2.0076E+00	3.8025E-02	-4.4089E+00	57.73
62	-7.7805E-01	-1.2130E+00	2.1104E+00	1.1261E+00	-3.1171E+00	42.06
63	-6.8312E-01	-7.3829E-01	2.1882E+00	1.4776E+00	-2.8990E+00	44.64

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
53	9.9893E+00	1.3371E+00	-2.9216E+00	1.0883E+01	4.4294E-01	-17.02
54	9.6895E+00	1.7211E+00	-2.7329E+00	1.0537E+01	8.7391E-01	-17.22
62	1.0440E+01	1.4841E+00	-2.6095E+00	1.1145E+01	7.7933E-01	-15.11
63	1.1193E+01	1.9099E+00	-2.4207E+00	1.1786E+01	1.3165E+00	-13.77

ELEMENT ID 46
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
54	-3.5453E+00	-1.3107E+00	2.0771E+00	-6.9495E-02	-4.7866E+00	59.14
55	-3.4314E+00	-7.4125E-01	1.7324E+00	1.0693E-01	-4.2796E+00	63.91
63	-8.0307E-01	-7.6227E-01	2.1439E+00	1.3613E+00	-2.9267E+00	45.27
64	-6.8918E-01	-1.9280E-01	1.7992E+00	1.3753E+00	-2.2572E+00	48.93

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
54	9.7001E+00	1.7232E+00	-2.3761E+00	1.0354E+01	1.0691E+00	-15.39
55	1.0044E+01	1.9850E+00	-2.0395E+00	1.0531E+01	1.4983E+00	-13.42
63	1.1187E+01	1.9087E+00	-2.2083E+00	1.1686E+01	1.4099E+00	-12.73
64	1.2018E+01	2.2686E+00	-1.8717E+00	1.2365E+01	1.9216E+00	-10.50

ELEMENT ID 47
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
55	-3.4293E+00	-7.4083E-01	1.7772E+00	1.4324E-01	-4.3134E+00	63.55
56	-3.3811E+00	-4.9969E-01	2.5757E+00	1.0108E+00	-4.8916E+00	59.61
64	-8.1006E-01	-2.1698E-01	1.6722E+00	1.1848E+00	-2.2119E+00	50.03
65	-7.6184E-01	2.4147E-02	2.4707E+00	2.1329E+00	-2.8706E+00	49.52

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
55	1.0049E+01	1.9860E+00	-1.6005E+00	1.0355E+01	1.6799E+00	-10.83
56	1.0726E+01	2.1491E+00	-1.1878E+00	1.0888E+01	1.9876E+00	-7.74
64	1.2020E+01	2.2691E+00	-1.5457E+00	1.2260E+01	2.0300E+00	-8.79
65	1.3022E+01	2.5680E+00	-1.1330E+00	1.3144E+01	2.4466E+00	-6.12

ELEMENT ID 48
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
56	-3.1956E+00	-4.6260E-01	2.8899E+00	1.3676E+00	-5.0258E+00	57.65
57	-3.2324E+00	-6.4648E-01	1.3369E+00	-7.9591E-02	-3.7993E+00	67.02
65	-8.1137E-01	1.4266E-02	2.7947E+00	2.4265E+00	-3.2236E+00	49.20
66	-8.4814E-01	-1.6961E-01	1.2417E+00	7.7836E-01	-1.7961E+00	52.64

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 40

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
47	7.6385E+00	1.6754E+00	-1.6211E+00	8.0507E+00	1.2632E+00	-14.27
48	8.3224E+00	1.7014E+00	-1.1547E+00	8.5180E+00	1.5058E+00	-9.61
55	1.0049E+01	1.9843E+00	-1.6511E+00	1.0374E+01	1.6594E+00	-11.13
56	1.0729E+01	2.1619E+00	-1.1848E+00	1.0890E+01	2.0011E+00	-7.73

ELEMENT ID 41
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
48	-4.0707E+00	-5.5264E-01	3.4613E+00	1.5710E+00	-6.1943E+00	58.47
49	-4.1252E+00	-8.2504E-01	1.6653E+00	-1.3075E-01	-4.8195E+00	67.37
56	-3.1779E+00	-3.7406E-01	3.1329E+00	1.6563E+00	-5.2083E+00	57.05
57	-3.2324E+00	-6.4646E-01	1.3369E+00	-7.9554E-02	-3.7993E+00	67.02

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
48	8.3234E+00	1.7016E+00	-6.9988E-01	8.3966E+00	1.6285E+00	-5.97
49	9.0345E+00	1.8069E+00	-2.2579E-01	9.0415E+00	1.7999E+00	-1.79
56	1.0733E+01	2.1627E+00	-7.2289E-01	1.0794E+01	2.1022E+00	-4.79
57	1.1559E+01	2.3117E+00	-2.4881E-01	1.1565E+01	2.3051E+00	-1.54

ELEMENT ID 42
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
50	-5.1911E+00	-1.1563E+00	2.2632E+00	-1.4189E-01	-6.2056E+00	65.86
51	-5.3558E+00	-1.9799E+00	2.5250E+00	-6.3058E-01	-6.7051E+00	61.88
59	-1.8309E+00	-4.8435E-01	2.2155E+00	1.1579E+00	-3.4732E+00	53.45
60	-1.9956E+00	-1.3079E+00	2.4773E+00	8.4932E-01	-4.1528E+00	48.95

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
50	-3.0037E+00	-1.1119E+00	-3.2331E+00	1.3108E+00	-5.4264E+00	-53.15
51	1.5256E+01	2.1040E+00	-2.8226E+00	1.5836E+01	1.5238E+00	-11.62
59	6.3665E+00	2.6466E+00	-3.6520E+00	8.6049E+00	4.0819E-01	-31.51
60	7.2924E+00	-2.5159E-01	-3.2415E+00	8.4939E+00	-1.4531E+00	-20.34

ELEMENT ID 43
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
51	-3.5505E+00	-1.6188E+00	2.8254E+00	4.0124E-01	-5.5705E+00	54.44
52	-3.6302E+00	-2.0177E+00	2.9068E+00	1.9255E-01	-5.8405E+00	52.75
60	-1.3248E+00	-1.1737E+00	2.5408E+00	1.2927E+00	-3.7911E+00	45.85
61	-1.4046E+00	-1.5726E+00	2.6222E+00	1.1350E+00	-4.1121E+00	44.08

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
51	8.0267E+00	6.5811E-01	-3.4244E+00	9.3724E+00	-6.8759E-01	-21.45
52	8.6572E+00	2.5967E-01	-2.7876E+00	9.4983E+00	-5.8145E-01	-16.79
60	8.9450E+00	7.8921E-02	-3.3346E+00	1.0059E+01	-1.0353E+00	-18.48
61	9.6163E+00	1.4922E+00	-2.6978E+00	1.0431E+01	6.7795E-01	-16.80

ELEMENT ID 44
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
52	-2.8690E+00	-1.8655E+00	2.4249E+00	1.0905E-01	-4.8435E+00	50.85
53	-2.8202E+00	-1.6214E+00	2.0384E+00	-9.6076E-02	-4.3455E+00	53.19
61	-8.4129E-01	-1.4599E+00	2.5583E+00	1.4263E+00	-3.7275E+00	41.55
62	-7.9248E-01	-1.2158E+00	2.1718E+00	1.1779E+00	-3.1863E+00	42.22

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 36

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
43	-4.0086E+00	-8.6760E-01	-3.8057E+00	1.6789E+00	-6.5551E+00	-56.21
44	1.9628E+01	1.5757E+00	-3.4329E+00	2.0259E+01	9.4494E-01	-10.41
51	8.3433E+00	2.2414E+00	-4.3639E+00	1.0617E+01	-3.2253E-02	-27.52
52	8.5821E+00	-1.1572E-01	-3.9911E+00	1.0136E+01	-1.6695E+00	-21.27

ELEMENT ID 37
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
44	-7.0744E+00	-3.8306E+00	3.4154E+00	-1.6716E+00	-9.2334E+00	57.70
45	-6.9667E+00	-3.2922E+00	2.5372E+00	-1.9969E+00	-8.2620E+00	62.96
52	-3.1032E+00	-3.0363E+00	2.6261E+00	-4.4347E-01	-5.6961E+00	45.36
53	-2.9955E+00	-2.4980E+00	1.7479E+00	-9.8120E-01	-4.5123E+00	49.05

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
44	9.3833E+00	-4.7321E-01	-5.5919E+00	1.1909E+01	-2.9986E+00	-24.30
45	7.0700E+00	1.7586E+00	-5.1312E+00	1.0192E+01	-1.3634E+00	-31.32
52	1.1161E+01	4.0003E-01	-4.0245E+00	1.2500E+01	-9.3860E-01	-18.40
53	9.9371E+00	1.0720E+00	-3.5638E+00	1.1192E+01	-1.8296E-01	-19.40

ELEMENT ID 38
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
45	-6.1209E+00	-3.1230E+00	2.0333E+00	-2.0959E+00	-7.1480E+00	63.20
46	-5.7977E+00	-1.5074E+00	2.3768E+00	-4.5084E-01	-6.8543E+00	66.03
53	-3.4112E+00	-2.5811E+00	1.6394E+00	-1.3051E+00	-4.6873E+00	52.10
54	-3.0881E+00	-9.6547E-01	1.9829E+00	2.2227E-01	-4.2759E+00	59.08

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
45	7.1655E+00	1.7777E+00	-3.7552E+00	9.0931E+00	-1.4994E-01	-27.17
46	7.0894E+00	1.6347E+00	-3.2057E+00	8.5709E+00	1.5313E-01	-24.80
53	9.9363E+00	1.0719E+00	-3.4891E+00	1.1145E+01	-1.3665E-01	-19.11
54	9.6983E+00	1.7652E+00	-2.9396E+00	1.0669E+01	7.9465E-01	-18.27

ELEMENT ID 39
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
46	-4.9439E+00	-1.3366E+00	2.4860E+00	-6.8901E-02	-6.2116E+00	62.98
47	-4.8254E+00	-7.4426E-01	2.2963E+00	2.8714E-01	-5.8568E+00	65.81
54	-3.4925E+00	-1.0463E+00	2.0524E+00	1.1978E-01	-4.6586E+00	60.40
55	-3.3740E+00	-4.5398E-01	1.8627E+00	4.5273E-01	-4.2807E+00	64.04

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
46	7.1020E+00	1.6372E+00	-2.6175E+00	8.1534E+00	5.8575E-01	-21.89
47	7.6365E+00	1.6750E+00	-2.1248E+00	8.3163E+00	9.9519E-01	-17.74
54	9.7089E+00	1.7673E+00	-2.5828E+00	1.0475E+01	1.0012E+00	-16.52
55	1.0044E+01	1.9833E+00	-2.0901E+00	1.0554E+01	1.4736E+00	-13.71

ELEMENT ID 40
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
47	-4.3766E+00	-6.5450E-01	2.0757E+00	2.7229E-01	-5.3034E+00	65.94
48	-4.3681E+00	-6.1211E-01	2.9869E+00	1.0381E+00	-6.0183E+00	61.08
55	-3.3719E+00	-4.5357E-01	1.9075E+00	4.8890E-01	-4.3143E+00	63.71
56	-3.3634E+00	-4.1118E-01	2.8186E+00	1.2945E+00	-5.0691E+00	58.82

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 28

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
33	2.2765E+00	1.0332E+00	-1.8252E+00	3.5830E+00	-2.7324E-01	-35.60
34	3.3669E+00	9.0127E-01	-1.4525E+00	4.0392E+00	2.2897E-01	-24.84
39	4.2225E+00	1.2738E+00	-2.0962E+00	5.3109E+00	1.8540E-01	-27.44
40	5.2570E+00	1.2063E+00	-1.7235E+00	5.8910E+00	5.7222E-01	-20.20

ELEMENT ID 29
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
34	-1.0815E+00	-1.3518E+00	1.8379E+00	6.2625E-01	-3.0595E+00	42.90
35	-9.5959E-01	-7.4249E-01	2.9119E+00	2.0629E+00	-3.7650E+00	46.07
40	-2.9933E+00	-1.7342E+00	2.2330E+00	-4.3705E-02	-4.6837E+00	52.87
41	-2.8714E+00	-1.1249E+00	3.3069E+00	1.4221E+00	-5.4184E+00	52.40
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
34	3.3639E+00	9.0066E-01	-1.1589E+00	3.8234E+00	4.4118E-01	-21.63
35	4.2897E+00	9.0512E-01	-8.0068E-01	4.4695E+00	7.2526E-01	-12.66
40	5.2540E+00	1.2057E+00	-1.2875E+00	5.6288E+00	8.3092E-01	-16.23
41	6.1137E+00	1.2619E+00	-9.2934E-01	6.2856E+00	1.0900E+00	-10.48

ELEMENT ID 30
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
35	-1.4979E+00	-8.5016E-01	3.4435E+00	2.2847E+00	-4.6328E+00	47.69
36	-1.3832E+00	-2.7665E-01	1.4710E+00	7.4171E-01	-2.4016E+00	55.31
41	-3.1092E+00	-1.1724E+00	3.6557E+00	1.6411E+00	-5.9226E+00	52.42
42	-2.9945E+00	-5.9887E-01	1.6833E+00	2.6930E-01	-3.8626E+00	62.72
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
35	4.2880E+00	9.0479E-01	-4.9880E-01	4.3600E+00	8.3278E-01	-8.21
36	5.1334E+00	1.0267E+00	-1.5286E-01	5.1390E+00	1.0210E+00	-2.13
41	6.1131E+00	1.2618E+00	-5.3628E-01	6.1717E+00	1.2032E+00	-6.23
42	6.9102E+00	1.3820E+00	-1.9034E-01	6.9168E+00	1.3755E+00	-1.97

ELEMENT ID 31
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
37	-4.2728E-01	-9.7916E+00	3.1842E+00	5.5287E-01	-1.0772E+01	17.11
38	1.1237E+00	-2.0365E+00	2.5041E+00	2.5046E+00	-3.4174E+00	28.87
44	-8.5932E+00	-1.1425E+01	4.2359E+00	-5.5428E+00	-1.4475E+01	35.76
45	-7.0423E+00	-3.6697E+00	3.5558E+00	-1.4206E+00	-9.2914E+00	57.69
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
37	-2.5180E+00	2.9706E+00	-5.9349E+00	6.7650E+00	-6.3124E+00	-57.41
38	2.6351E+00	1.5868E+00	-4.2359E+00	6.3791E+00	-2.1572E+00	-41.47
44	9.9024E+00	2.1226E+00	-6.9535E+00	1.3980E+01	-1.9550E+00	-30.39
45	7.0420E+00	1.6183E+00	-5.2544E+00	1.0243E+01	-1.5828E+00	-31.35

ELEMENT ID 32
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
38	-1.6215E+00	-2.5856E+00	3.2959E+00	1.2274E+00	-5.4345E+00	40.84
39	-1.3793E+00	-1.3743E+00	3.3675E+00	1.9907E+00	-4.7442E+00	45.02
45	-6.1964E+00	-3.5005E+00	3.0519E+00	-1.5121E+00	-8.1847E+00	56.91
46	-5.9541E+00	-2.2892E+00	3.1234E+00	-5.0039E-01	-7.7429E+00	60.20

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 32

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
38	2.5057E+00	1.5609E+00	-3.6251E+00	5.6891E+00	-1.6224E+00	-41.29
39	4.2264E+00	1.2013E+00	-2.8858E+00	5.9720E+00	-5.4436E-01	-31.17
45	7.1374E+00	1.6374E+00	-3.8784E+00	9.1418E+00	-3.6704E-01	-27.33
46	7.1130E+00	1.7526E+00	-3.1391E+00	8.5604E+00	3.0513E-01	-24.75

ELEMENT ID 33
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
39	-2.4948E+00	-1.5974E+00	3.2412E+00	1.2260E+00	-5.3182E+00	48.94
40	-2.3415E+00	-8.3075E-01	2.5651E+00	1.0879E+00	-4.2602E+00	53.20
46	-5.1002E+00	-2.1184E+00	3.2326E+00	-4.9516E-02	-7.1691E+00	57.38
47	-4.9469E+00	-1.3518E+00	2.5565E+00	-2.4140E-02	-6.2746E+00	62.56
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
39	4.2072E+00	1.1974E+00	-2.3859E+00	5.5232E+00	-1.1857E-01	-28.88
40	5.2573E+00	1.2080E+00	-1.8767E+00	5.9933E+00	4.7200E-01	-21.41
46	7.1255E+00	1.7551E+00	-2.5510E+00	8.1441E+00	7.3658E-01	-21.77
47	7.6368E+00	1.6766E+00	-2.0417E+00	8.2691E+00	1.0442E+00	-17.21

ELEMENT ID 34
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
40	-2.8322E+00	-9.2889E-01	2.4795E+00	7.7531E-01	-4.5364E+00	55.50
41	-2.7449E+00	-4.9212E-01	3.4490E+00	2.0097E+00	-5.2467E+00	54.04
47	-4.4981E+00	-1.2621E+00	2.3359E+00	-3.8526E-02	-5.7217E+00	62.35
48	-4.4108E+00	-8.2531E-01	3.3054E+00	1.1422E+00	-6.3783E+00	59.24
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
40	5.2543E+00	1.2074E+00	-1.4407E+00	5.7148E+00	7.4691E-01	-17.73
41	6.1121E+00	1.2538E+00	-9.9956E-01	6.3097E+00	1.0562E+00	-11.18
47	7.6388E+00	1.6770E+00	-1.5379E+00	8.0121E+00	1.3036E+00	-13.65
48	8.3252E+00	1.7153E+00	-1.0968E+00	8.5024E+00	1.5380E+00	-9.18

ELEMENT ID 35
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
41	-2.9826E+00	-5.3967E-01	3.7978E+00	2.2282E+00	-5.7505E+00	53.91
42	-2.9945E+00	-5.9889E-01	1.6833E+00	2.6926E-01	-3.8626E+00	62.72
48	-4.1134E+00	-7.6579E-01	3.7798E+00	1.6943E+00	-6.5734E+00	56.94
49	-4.1252E+00	-8.2502E-01	1.6654E+00	-1.3070E-01	-4.8195E+00	67.37
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
41	6.1115E+00	1.2537E+00	-6.0650E-01	6.1860E+00	1.1791E+00	-7.01
42	6.9102E+00	1.3820E+00	-1.9034E-01	6.9168E+00	1.3755E+00	-1.97
48	8.3262E+00	1.7155E+00	-6.4195E-01	8.3880E+00	1.6537E+00	-5.50
49	9.0345E+00	1.8069E+00	-2.2579E-01	9.0415E+00	1.7998E+00	-1.79

ELEMENT ID 36
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
43	-6.3924E+00	-9.1920E-01	3.3206E+00	6.4718E-01	-7.9588E+00	64.75
44	-6.9705E+00	-3.8098E+00	3.3730E+00	-1.6653E+00	-9.1150E+00	57.55
51	-3.2863E+00	-2.9803E-01	3.0556E+00	1.6092E+00	-5.1936E+00	58.03
52	-3.8644E+00	-3.1886E+00	3.1080E+00	-4.0023E-01	-6.6528E+00	48.10

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 48 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
56	1.0731E+01	2.1499E+00	-7.2593E-01	1.0792E+01	2.0889E+00	-4.80
57	1.1559E+01	2.3117E+00	-2.4881E-01	1.1565E+01	2.3051E+00	-1.54
65	1.3018E+01	2.5671E+00	-7.1176E-01	1.3066E+01	2.5188E+00	-3.88
66	1.4233E+01	2.8467E+00	-2.3464E-01	1.4238E+01	2.8419E+00	-1.18

ELEMENT ID 49 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
58	-3.4369E+00	-5.0246E-01	1.2489E+00	-4.2908E-02	-3.8964E+00	69.80
59	-3.6576E+00	-1.6063E+00	1.5862E+00	-7.4304E-01	-4.5209E+00	61.44
68	-2.9200E-01	1.2649E-01	1.2853E+00	1.2195E+00	-1.3850E+00	49.62
69	-5.1275E-01	-9.7729E-01	1.6226E+00	8.9409E-01	-2.3841E+00	40.93
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
58	-2.1376E+00	-1.1016E+00	-2.6435E+00	1.0742E+00	-4.3134E+00	-50.54
59	1.1460E+01	2.0855E+00	-2.6374E+00	1.2151E+01	1.3944E+00	-14.68
68	4.2806E+00	3.4795E+00	-3.0554E+00	6.9616E+00	7.9848E-01	-41.27
69	5.5171E+00	-2.0079E-01	-3.0493E+00	6.8380E+00	-1.5218E+00	-23.42

ELEMENT ID 50 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
59	-1.9886E+00	-1.2724E+00	2.0513E+00	4.5178E-01	-3.7128E+00	49.95
60	-2.0170E+00	-1.4148E+00	2.1872E+00	4.9185E-01	-3.9237E+00	48.92
69	9.6602E-02	-8.5542E-01	1.7649E+00	1.4486E+00	-2.2074E+00	37.45
70	6.8130E-02	-9.9782E-01	1.9008E+00	1.5093E+00	-2.4389E+00	37.17
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
59	6.0374E+00	1.0010E+00	-3.0753E+00	7.4940E+00	-4.5553E-01	-25.34
60	7.3796E+00	1.8463E-01	-2.5655E+00	8.2007E+00	-6.3644E-01	-17.75
69	6.7135E+00	3.8473E-02	-3.1560E+00	7.9693E+00	-1.2174E+00	-21.70
70	8.0136E+00	7.0573E-01	-2.6462E+00	8.8711E+00	-1.5182E-01	-17.96

ELEMENT ID 51 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
60	-1.3462E+00	-1.2807E+00	2.2506E+00	9.3744E-01	-3.5643E+00	45.42
61	-1.3449E+00	-1.2743E+00	2.2791E+00	9.6980E-01	-3.5890E+00	45.44
70	1.3418E+00	-7.4308E-01	1.9421E+00	2.5035E+00	-1.9048E+00	30.89
71	1.3431E+00	-7.3671E-01	1.9706E+00	2.5313E+00	-1.9250E+00	31.09
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
60	9.0322E+00	5.1515E-01	-2.6585E+00	9.7939E+00	-2.4657E-01	-15.99
61	9.5779E+00	1.3002E+00	-2.8069E+00	1.0440E+01	4.3818E-01	-17.07
70	7.8585E+00	6.7473E-01	-2.5547E+00	8.6744E+00	-1.4110E-01	-17.71
71	1.0392E+01	1.3781E+00	-2.7030E+00	1.1141E+01	6.2969E-01	-15.48

ELEMENT ID 52 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
61	-7.8163E-01	-1.1616E+00	2.2152E+00	1.2517E+00	-3.1950E+00	42.55
62	-7.4281E-01	-9.6755E-01	2.1908E+00	1.3385E+00	-3.0488E+00	43.53
71	1.9036E+00	-6.2459E-01	2.0843E+00	3.0772E+00	-1.7982E+00	29.38
72	1.9425E+00	-4.3050E-01	2.0598E+00	3.1331E+00	-1.6211E+00	30.03

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 52 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
61	9.1234E+00	1.2093E+00	-2.6532E+00	9.9305E+00	4.0216E-01	-16.92
62	1.0476E+01	1.5344E+00	-2.4716E+00	1.1113E+01	8.9668E-01	-14.47
71	1.0404E+01	1.3805E+00	-2.5047E+00	1.1053E+01	7.3190E-01	-14.52
72	1.1100E+01	1.8071E+00	-2.3231E+00	1.1648E+01	1.2587E+00	-13.28

ELEMENT ID 53 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
62	-7.2838E-01	-9.6466E-01	2.1293E+00	1.2861E+00	-2.9791E+00	43.41
63	-6.5689E-01	-6.0723E-01	2.2706E+00	1.6387E+00	-2.9028E+00	45.31
72	2.0696E+00	-4.0507E-01	2.0456E+00	3.2230E+00	-1.5584E+00	29.42
73	2.1411E+00	-4.7638E-02	2.1869E+00	3.4921E+00	-1.3987E+00	31.71
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
62	1.0449E+01	1.5292E+00	-2.3616E+00	1.1036E+01	9.4252E-01	-13.95
63	1.1196E+01	1.9263E+00	-2.2075E+00	1.1695E+01	1.4274E+00	-12.73
72	1.1111E+01	1.8094E+00	-2.1735E+00	1.1594E+01	1.3266E+00	-12.52
73	1.2189E+01	2.2107E+00	-2.0193E+00	1.2582E+01	1.8176E+00	-11.02

ELEMENT ID 54 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
63	-7.7684E-01	-6.3122E-01	2.2264E+00	1.5235E+00	-2.9316E+00	45.94
64	-7.1671E-01	-3.3055E-01	1.8676E+00	1.3539E+00	-2.4012E+00	47.95
73	2.1417E+00	-4.7499E-02	2.3377E+00	3.6284E+00	-1.5342E+00	32.45
74	2.2019E+00	2.5316E-01	1.9790E+00	3.4334E+00	-9.7833E-01	31.89
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
63	1.1190E+01	1.9251E+00	-1.9951E+00	1.1602E+01	1.5138E+00	-11.65
64	1.2019E+01	2.2731E+00	-1.7616E+00	1.2327E+01	1.9645E+00	-9.94
73	1.2185E+01	2.2099E+00	-1.8407E+00	1.2514E+01	1.8810E+00	-10.13
74	1.3491E+01	2.6444E+00	-1.6072E+00	1.3724E+01	2.4113E+00	-8.25

ELEMENT ID 55 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
64	-8.3760E-01	-3.5473E-01	1.7407E+00	1.1612E+00	-2.3535E+00	48.95
65	-8.1114E-01	-2.2243E-01	2.4002E+00	1.9014E+00	-2.9350E+00	48.50
74	2.0724E+00	2.2726E-01	1.8525E+00	3.2193E+00	-9.1968E-01	31.76
75	2.0988E+00	3.5955E-01	2.5120E+00	3.8875E+00	-1.4291E+00	35.45
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
64	1.2021E+01	2.2737E+00	-1.4355E+00	1.2228E+01	2.0667E+00	-8.21
65	1.3021E+01	2.5623E+00	-1.0954E+00	1.3135E+01	2.4488E+00	-5.92
74	1.3482E+01	2.6426E+00	-1.3664E+00	1.3652E+01	2.4731E+00	-7.08
75	1.5132E+01	3.0432E+00	-1.0263E+00	1.5219E+01	2.9567E+00	-4.82

ELEMENT ID 56 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
65	-8.6068E-01	-2.3234E-01	2.7242E+00	2.1958E+00	-3.2888E+00	48.29
66	-8.4814E-01	-1.6963E-01	1.2417E+00	7.7833E-01	-1.7961E+00	52.64
75	2.1762E+00	3.7505E-01	2.6636E+00	4.0874E+00	-1.5361E+00	35.66
76	2.1887E+00	4.3776E-01	1.1812E+00	2.7835E+00	-1.5700E-01	26.73

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 56

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
65	1.3016E+01	2.5614E+00	-6.7412E-01	1.3060E+01	2.5181E+00	-3.67
66	1.4233E+01	2.8467E+00	-2.3464E-01	1.4238E+01	2.8419E+00	-1.18
75	1.5155E+01	3.0478E+00	-6.6321E-01	1.5191E+01	3.0115E+00	-3.13
76	1.6685E+01	3.3370E+00	-2.2374E-01	1.6689E+01	3.3333E+00	-.96

ELEMENT ID 57
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
67	-1.5508E+00	7.6969E-02	4.1591E-01	1.7708E-01	-1.6509E+00	76.47
68	-1.7521E+00	-9.2990E-01	7.6705E-01	-4.7074E-01	-2.2113E+00	59.10
77	5.9677E-01	5.0647E-01	3.2169E-01	8.7646E-01	2.2678E-01	41.01
78	3.9540E-01	-5.0039E-01	6.7283E-01	7.5578E-01	-8.6077E-01	28.17

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
67	-6.9066E-01	-1.1299E+00	-1.5402E+00	6.4550E-01	-2.4661E+00	-40.94
68	6.8221E+00	2.2066E+00	-2.6156E+00	8.0025E+00	1.0262E+00	-24.29
77	4.4038E-01	3.6678E+00	-1.7264E+00	4.4173E+00	-3.0911E-01	-66.53
78	3.4333E+00	8.6798E-01	-2.8018E+00	5.2321E+00	-9.3082E-01	-32.70

ELEMENT ID 58
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
68	-4.5122E-01	-6.6971E-01	1.2038E+00	6.4829E-01	-1.7692E+00	42.41
69	-5.0957E-01	-9.6143E-01	1.3638E+00	6.4687E-01	-2.1179E+00	40.30
78	9.6452E-01	-3.8658E-01	9.4551E-01	1.4510E+00	-8.7308E-01	27.23
79	9.0618E-01	-6.7829E-01	1.1055E+00	1.4740E+00	-1.2461E+00	27.19

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
68	3.9096E+00	1.6241E+00	-3.0103E+00	5.9867E+00	-4.5302E-01	-34.61
69	5.6168E+00	2.9801E-01	-2.6650E+00	6.7223E+00	-8.0755E-01	-22.53
78	4.0724E+00	9.9577E-01	-3.3585E+00	6.2281E+00	-1.1599E+00	-32.70
79	6.2504E+00	1.7401E-01	-3.0133E+00	7.4912E+00	-1.0669E+00	-22.38

ELEMENT ID 59
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
69	9.9787E-02	-8.3957E-01	1.5061E+00	1.2077E+00	-1.9475E+00	36.34
70	5.6738E-02	-1.0548E+00	1.5413E+00	1.1394E+00	-2.1375E+00	35.09
79	2.3874E+00	-3.8205E-01	1.0171E+00	2.7208E+00	-7.1547E-01	18.15
80	2.3443E+00	-5.9729E-01	1.0523E+00	2.6820E+00	-9.3496E-01	17.79

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
69	6.8132E+00	5.3729E-01	-2.7717E+00	7.8620E+00	-5.1152E-01	-20.73
70	7.9841E+00	5.5851E-01	-2.9328E+00	9.0027E+00	-4.6007E-01	-19.15
79	6.0031E+00	1.2455E-01	-2.8142E+00	7.1331E+00	-1.0054E+00	-21.88
80	8.2440E+00	4.2905E-01	-2.9752E+00	9.2478E+00	-5.7471E-01	-18.64

ELEMENT ID 60
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
70	1.3304E+00	-8.0007E-01	1.5826E+00	2.1729E+00	-1.6425E+00	28.03
71	1.3094E+00	-9.0538E-01	1.7143E+00	2.2428E+00	-1.8389E+00	28.57
80	3.8405E+00	-2.9806E-01	1.1896E+00	4.1581E+00	-6.1562E-01	14.95
81	3.8195E+00	-4.0337E-01	1.3213E+00	4.1988E+00	-7.8271E-01	16.02

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 60

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
70	7.8291E+00	5.2750E-01	-2.8413E+00	8.8044E+00	-4.4783E-01	-18.95
71	1.0405E+01	1.4438E+00	-2.4924E+00	1.1052E+01	7.9722E-01	-14.54
80	8.2336E+00	4.2696E-01	-2.7845E+00	9.1250E+00	-4.6445E-01	-17.75
81	1.0854E+01	1.0266E+00	-2.4357E+00	1.1425E+01	4.5605E-01	-13.18

ELEMENT ID 61
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
71	1.8699E+00	-7.9327E-01	1.8280E+00	2.7999E+00	-1.7233E+00	26.96
72	1.9041E+00	-6.2228E-01	1.8883E+00	2.9128E+00	-1.6309E+00	28.11
81	4.9583E+00	-1.7560E-01	1.3492E+00	5.2913E+00	-5.0857E-01	13.86
82	4.9925E+00	-4.6105E-03	1.4095E+00	5.3626E+00	-3.7474E-01	14.71

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
71	1.0417E+01	1.4462E+00	-2.2941E+00	1.0970E+01	8.9357E-01	-13.54
72	1.1095E+01	1.7851E+00	-2.1557E+00	1.1570E+01	1.3102E+00	-12.42
81	1.0815E+01	1.0189E+00	-2.1433E+00	1.1264E+01	5.7047E-01	-11.82
82	1.1915E+01	1.3827E+00	-2.0050E+00	1.2284E+01	1.0140E+00	-10.42

ELEMENT ID 62
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
72	2.0313E+00	-5.9686E-01	1.8740E+00	3.0060E+00	-1.5716E+00	27.48
73	2.0509E+00	-4.9861E-01	2.0305E+00	3.1737E+00	-1.6214E+00	28.94
82	5.4619E+00	8.9276E-02	1.5225E+00	5.8634E+00	-3.1215E-01	14.77
83	5.4816E+00	1.8752E-01	1.6790E+00	5.9692E+00	-3.0004E-01	16.19

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
72	1.1107E+01	1.7874E+00	-2.0061E+00	1.1520E+01	1.3739E+00	-11.65
73	1.2194E+01	2.2359E+00	-1.8203E+00	1.2516E+01	1.9136E+00	-10.04
82	1.1913E+01	1.3824E+00	-1.8131E+00	1.2216E+01	1.0789E+00	-9.50
83	1.3084E+01	1.8303E+00	-1.6273E+00	1.3315E+01	1.5998E+00	-8.06

ELEMENT ID 63
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
73	2.0516E+00	-4.9848E-01	2.1814E+00	3.3032E+00	-1.7501E+00	29.85
74	2.1294E+00	-1.0944E-01	2.1555E+00	3.4388E+00	-1.4188E+00	31.28
83	5.9181E+00	2.7482E-01	1.7852E+00	6.4354E+00	-2.4247E-01	16.16
84	5.9959E+00	6.6386E-01	1.7592E+00	6.5240E+00	1.3573E-01	16.71

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
73	1.2190E+01	2.2350E+00	-1.6416E+00	1.2453E+01	1.9713E+00	-9.13
74	1.3497E+01	2.6730E+00	-1.4415E+00	1.3685E+01	2.4843E+00	-7.46
83	1.3092E+01	1.8318E+00	-1.3795E+00	1.3258E+01	1.6653E+00	-6.88
84	1.4488E+01	2.5385E+00	-1.1794E+00	1.4604E+01	2.4232E+00	-5.58

ELEMENT ID 64
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
74	1.9999E+00	-1.3534E-01	2.0289E+00	3.2250E+00	-1.3604E+00	31.12
75	2.1153E+00	4.4189E-01	2.5291E+00	3.9425E+00	-1.3853E+00	35.85
84	6.1730E+00	6.9929E-01	1.8999E+00	6.7678E+00	1.0446E-01	17.38
85	6.2885E+00	1.2765E+00	2.4001E+00	7.2524E+00	3.1258E-01	21.88

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 64 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
74	1.3488E+01	2.6712E+00	-1.2007E+00	1.3619E+01	2.5395E+00	-6.26
75	1.5117E+01	2.9697E+00	-9.9445E-01	1.5198E+01	2.8889E+00	-4.65
84	1.4497E+01	2.5401E+00	-9.6061E-01	1.4573E+01	2.4635E+00	-4.56
85	1.6245E+01	3.4705E+00	-7.5432E-01	1.6290E+01	3.4262E+00	-3.37

ELEMENT ID 65 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
75	2.1927E+00	4.5736E-01	2.6807E+00	4.1426E+00	-1.4926E+00	36.03
76	2.1887E+00	4.3775E-01	1.1811E+00	2.7835E+00	-1.5699E-01	26.73
85	5.6785E+00	1.1545E+00	2.6739E+00	6.9188E+00	-8.5820E-02	24.89
86	5.6746E+00	1.1349E+00	1.1744E+00	5.9604E+00	8.4912E-01	13.68
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
75	1.5140E+01	2.9743E+00	-6.3141E-01	1.5173E+01	2.9416E+00	-2.96
76	1.6685E+01	3.3370E+00	-2.2374E-01	1.6689E+01	3.3333E+00	-.96
85	1.6183E+01	3.4582E+00	-7.0421E-01	1.6222E+01	3.4193E+00	-3.16
86	1.9946E+01	3.9892E+00	-2.9655E-01	1.9951E+01	3.9837E+00	-1.06

ELEMENT ID 66 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
77	5.1580E-01	1.0160E-01	3.6846E-01	7.3138E-01	-1.1398E-01	30.33
78	4.1284E-01	-4.1323E-01	3.6449E-01	5.5067E-01	-5.5106E-01	20.71
87	7.4252E-01	1.4691E-01	3.3198E-01	8.9070E-01	-1.2635E-03	24.05
88	6.3956E-01	-3.6791E-01	3.2801E-01	7.3694E-01	-4.6529E-01	16.54
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
77	3.3841E-01	3.1580E+00	-2.8093E+00	4.8914E+00	-1.3950E+00	-58.32
78	3.5078E+00	1.2407E+00	-2.9947E+00	5.5763E+00	-8.2777E-01	-34.63
87	-8.8090E-02	1.3693E+01	-5.2596E+00	1.5471E+01	-1.8661E+00	-71.32
88	4.6048E+00	-3.3999E+00	-5.4450E+00	7.3601E+00	-6.1553E+00	-26.84

ELEMENT ID 67 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
78	9.8196E-01	-2.9942E-01	6.3717E-01	1.2449E+00	-5.6232E-01	22.42
79	9.3547E-01	-5.3185E-01	6.8887E-01	1.2082E+00	-8.0457E-01	21.60
88	2.5592E+00	1.6029E-02	2.2461E-01	2.5789E+00	-3.6566E-03	5.01
89	2.5127E+00	-2.1639E-01	2.7631E-01	2.5404E+00	-2.4409E-01	5.72
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
78	4.1469E+00	1.3685E+00	-3.5513E+00	6.5711E+00	-1.0556E+00	-34.32
79	6.2184E+00	1.4264E-02	-3.3044E+00	7.6487E+00	-1.4160E+00	-23.40
88	4.0961E+00	-3.5017E+00	-3.2884E+00	5.3217E+00	-4.7272E+00	-20.44
89	6.1468E+00	8.8597E-01	-3.0414E+00	7.5375E+00	-5.0473E-01	-24.57

ELEMENT ID 68 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
79	2.4167E+00	-2.3560E-01	6.0051E-01	2.5463E+00	-3.6523E-01	12.18
80	2.3357E+00	-6.4017E-01	6.0585E-01	2.4544E+00	-7.5879E-01	11.08
89	4.3273E+00	1.4650E-01	3.8403E-01	4.3623E+00	1.1152E-01	5.20
90	4.2464E+00	-2.5806E-01	3.8937E-01	4.2798E+00	-2.9147E-01	4.90

ALETA PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 68 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
79	5.9712E+00	-3.5193E-02	-3.1053E+00	7.2879E+00	-1.3520E+00	-22.98
80	8.2545E+00	4.8132E-01	-2.9438E+00	9.2435E+00	-5.0768E-01	-18.57
89	6.3078E+00	9.1819E-01	-3.2853E+00	7.8621E+00	-6.3613E-01	-25.32
90	8.4087E+00	-2.3317E-01	-3.1237E+00	9.4196E+00	-1.2440E+00	-17.93

ELEMENT ID 69 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
80	3.8320E+00	-3.4094E-01	7.4313E-01	3.9603E+00	-4.6933E-01	9.80
81	3.7938E+00	-5.3178E-01	7.8799E-01	3.9329E+00	-6.7086E-01	10.01
90	6.2712E+00	1.4691E-01	3.0790E-01	6.2867E+00	1.3147E-01	2.87
91	6.2331E+00	-4.3922E-02	3.5276E-01	6.2528E+00	-6.3685E-02	3.21
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
80	8.2441E+00	4.7923E-01	-2.7531E+00	9.1211E+00	-3.9782E-01	-17.67
81	1.0847E+01	9.9052E-01	-2.3976E+00	1.1399E+01	4.3824E-01	-12.97
90	8.3291E+00	-2.4910E-01	-2.7874E+00	9.1553E+00	-1.0753E+00	-16.51
91	1.1411E+01	8.7987E-02	-2.4319E+00	1.1911E+01	-4.1225E-01	-11.62

ELEMENT ID 70 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
81	4.9326E+00	-3.0401E-01	8.1590E-01	5.0568E+00	-4.2818E-01	8.65
82	4.8919E+00	-5.0771E-01	7.9659E-01	5.0070E+00	-6.2278E-01	8.22
91	7.5698E+00	2.2342E-01	5.3712E-01	7.6088E+00	1.8435E-01	4.16
92	7.5290E+00	1.9715E-02	5.1781E-01	7.5646E+00	-1.5823E-02	3.93
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
81	1.0808E+01	9.8279E-01	-2.1052E+00	1.1240E+01	5.5071E-01	-11.60
82	1.1916E+01	1.3875E+00	-1.9074E+00	1.2251E+01	1.0526E+00	-9.96
91	1.1562E+01	1.1821E-01	-2.1799E+00	1.1963E+01	-2.8298E-01	-10.43
92	1.2688E+01	-1.1766E-02	-1.9820E+00	1.2990E+01	-3.1391E-01	-8.67

ELEMENT ID 71 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
82	5.3613E+00	-4.1382E-01	9.0959E-01	5.5012E+00	-5.5370E-01	8.74
83	5.3761E+00	-3.4004E-01	1.1707E+00	5.6065E+00	-5.7050E-01	11.14
92	8.3563E+00	1.8516E-01	4.7890E-01	8.3843E+00	1.5719E-01	3.34
93	8.3711E+00	2.5894E-01	7.3995E-01	8.4380E+00	1.9200E-01	5.17
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
82	1.1914E+01	1.3872E+00	-1.7155E+00	1.2186E+01	1.1147E+00	-9.03
83	1.3090E+01	1.8588E+00	-1.4715E+00	1.3280E+01	1.6692E+00	-7.34
92	1.2683E+01	-1.2694E-02	-1.7368E+00	1.2917E+01	-2.4600E-01	-7.65
93	1.4106E+01	-1.3634E-02	-1.4928E+00	1.4262E+01	-1.6974E-01	-5.97

ELEMENT ID 72 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
83	5.8126E+00	-2.5275E-01	1.2769E+00	6.0704E+00	-5.1059E-01	11.42
84	5.7897E+00	-3.6721E-01	9.9257E-01	5.9458E+00	-5.2327E-01	8.94
93	9.4258E+00	4.6989E-01	9.9778E-01	9.5356E+00	3.6008E-01	6.28
94	9.4029E+00	3.5544E-01	7.1349E-01	9.4588E+00	2.9952E-01	4.48

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S H E L L E L E M E N T F O R C E S

ELEMENT ID 72

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
83	1.3097E+01	1.8603E+00	-1.2238E+00	1.3229E+01	1.7286E+00	-6.14
84	1.4465E+01	2.4197E+00	-9.1021E-01	1.4533E+01	2.3513E+00	-4.30
93	1.4094E+01	-1.6046E-02	-1.1760E+00	1.4191E+01	-1.1339E-01	-4.73
94	1.5774E+01	1.4409E-01	-8.6239E-01	1.5821E+01	9.6648E-02	-3.15

ELEMENT ID 73
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
84	5.9668E+00	-3.3178E-01	1.1333E+00	6.1645E+00	-5.2947E-01	9.90
85	5.9970E+00	-1.8066E-01	2.3322E+00	6.7786E+00	-9.6225E-01	18.53
94	1.1096E+01	6.9412E-01	6.5967E-01	1.1138E+01	6.5245E-01	3.61
95	1.1127E+01	8.4523E-01	1.8586E+00	1.1452E+01	5.1956E-01	9.94
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
84	1.4473E+01	2.4214E+00	-6.9142E-01	1.4512E+01	2.3818E+00	-3.27
85	1.6341E+01	3.9471E+00	-3.1686E-01	1.6349E+01	3.9390E+00	-1.46
94	1.5762E+01	1.4179E-01	-6.3681E-01	1.5788E+01	1.1587E-01	-2.33
95	1.7442E+01	-5.4856E-01	-2.6225E-01	1.7446E+01	-5.5238E-01	-.83

ELEMENT ID 74
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
85	5.3871E+00	-3.0266E-01	2.6061E+00	6.4003E+00	-1.3159E+00	21.25
86	5.6746E+00	1.1349E+00	1.1743E+00	5.9604E+00	8.4912E-01	13.68
95	1.3718E+01	1.3635E+00	2.9321E+00	1.4378E+01	7.0294E-01	12.70
96	1.4005E+01	2.8011E+00	1.5004E+00	1.4203E+01	2.6036E+00	7.50
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
85	1.6279E+01	3.9347E+00	-2.6676E-01	1.6284E+01	3.9289E+00	-1.24
86	1.9946E+01	3.9892E+00	-2.9654E-01	1.9951E+01	3.9837E+00	-1.06
95	1.7521E+01	-5.3265E-01	1.1907E+00	1.7600E+01	-6.1084E-01	3.76
96	1.7410E+01	3.4821E+00	1.1609E+00	1.7507E+01	3.3860E+00	4.73

ENCEPADO ESTRIBO

PROYECTO .....

.....

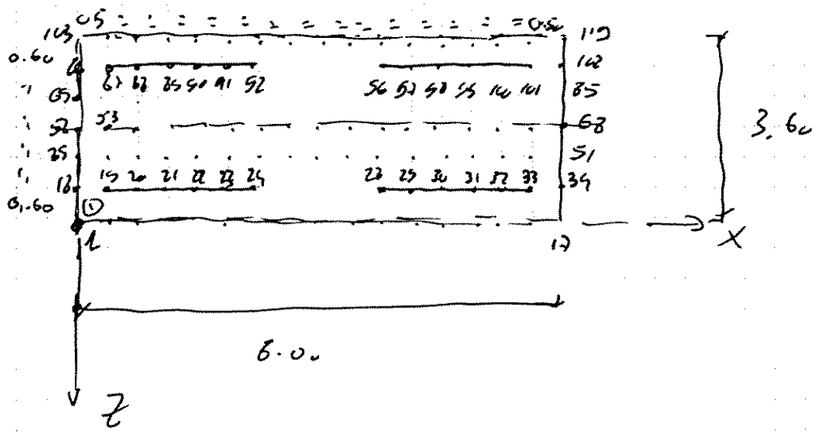
CONCEPTO .....

IOC
OFICINA CONSULTORA

Hoja nº. ..... de .....

Fecha .....

Encepado



e: 1.20

Discretización

Cargas en el eje: N = 4288/8 = 536 kN/ml ⇨

⇨ 26,8 Tn/unds. (f_y)

M = 618/8 = 77 kN/ml ⇨

⇨ 3,86 mt/unds (M_x)

ENCEPADO ESTRIBOS PS 4+300

```
SYSTEM
L=1
JOINTS
1   X=0    Y=0    Z=0
17  X=8    Y=0    Z=0
103 X=0    Y=0    Z=-3.6
119 X=8    Y=0    Z=-3.6  Q=1,17,103,119,1,17

RESTRAINTS
1,119,1   R=1,0,1,0,1,0
19,24,1   R=1,1,1,0,1,0
28,33,1   R=1,1,1,0,1,0
87,92,1   R=1,1,1,0,1,0
96,101,1  R=1,1,1,0,1,0

SHELL
NM=1  Y=-1
1   E=3500000    U=0.20   W=2.5
1   JQ=1,2,18,19  ETYPE=2  M=1  TH=1.20  LP=0   G=16,6

LOADS
52,68,1   F=0,-26.8,0,3.86,0,0
```

ENCEPADO ESTRIBOS PS 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(Y)	R(X)	R(Z)
1	.2579E-04	-.4791E-04	.3610E-05
2	.2720E-04	-.4501E-04	.1386E-05
3	.2707E-04	-.4544E-04	-.1558E-05
4	.2612E-04	-.4372E-04	-.1731E-05
5	.2549E-04	-.4259E-04	-.8406E-06
6	.2510E-04	-.4194E-04	-.1218E-05
7	.2392E-04	-.3941E-04	-.3522E-05
8	.2186E-04	-.4086E-04	-.4092E-05
9	.2064E-04	-.4122E-04	.0000E+00
10	.2186E-04	-.4086E-04	.4092E-05
11	.2392E-04	-.3941E-04	.3522E-05
12	.2510E-04	-.4194E-04	.1218E-05
13	.2549E-04	-.4259E-04	.8406E-06
14	.2612E-04	-.4372E-04	.1731E-05
15	.2707E-04	-.4544E-04	.1558E-05
16	.2720E-04	-.4501E-04	-.1386E-05
17	.2579E-04	-.4791E-04	-.3610E-05
18	-.3209E-05	-.4909E-04	.7939E-05
19	.0000E+00	-.4663E-04	.3043E-05
20	.0000E+00	-.4454E-04	-.7810E-06
21	.0000E+00	-.4307E-04	.2092E-06
22	.0000E+00	-.4220E-04	-.1995E-06
23	.0000E+00	-.4172E-04	.7191E-06
24	.0000E+00	-.4133E-04	-.2845E-05
25	-.2652E-05	-.4054E-04	-.5279E-05
26	-.4028E-05	-.4013E-04	.0000E+00
27	-.2652E-05	-.4054E-04	.5279E-05
28	.0000E+00	-.4133E-04	.2845E-05
29	.0000E+00	-.4172E-04	-.7191E-06
30	.0000E+00	-.4220E-04	.1995E-06
31	.0000E+00	-.4307E-04	-.2092E-06
32	.0000E+00	-.4454E-04	.7810E-06
33	.0000E+00	-.4663E-04	-.3043E-05
34	-.3209E-05	-.4909E-04	-.7939E-05
35	-.3065E-04	-.3806E-04	.1143E-04
36	-.2615E-04	-.3508E-04	.6441E-05
37	-.2403E-04	-.3200E-04	.2493E-05
38	-.2324E-04	-.3078E-04	.1005E-05
39	-.2287E-04	-.3038E-04	.5212E-06
40	-.2275E-04	-.3053E-04	-.2449E-06
41	-.2329E-04	-.3127E-04	-.2033E-05
42	-.2458E-04	-.2923E-04	-.2574E-05
43	-.2533E-04	-.2811E-04	.0000E+00
44	-.2458E-04	-.2923E-04	.2574E-05
45	-.2329E-04	-.3127E-04	.2033E-05
46	-.2275E-04	-.3053E-04	.2449E-06
47	-.2287E-04	-.3038E-04	-.5212E-06
48	-.2324E-04	-.3078E-04	-.1005E-05
49	-.2403E-04	-.3200E-04	-.2493E-05
50	-.2615E-04	-.3508E-04	-.6441E-05

ENCEPADO ESTRIBOS PS 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(Y)	R(X)	R(Z)
51	-.3065E-04	-.3806E-04	-.1143E-04
52	-.4239E-04	.6015E-05	.1503E-04
53	-.3676E-04	.2891E-05	.8087E-05
54	-.3388E-04	.3108E-05	.3790E-05
55	-.3264E-04	.2952E-05	.1519E-05
56	-.3215E-04	.2955E-05	.4969E-06
57	-.3216E-04	.2931E-05	-.5997E-06
58	-.3272E-04	.3012E-05	-.1525E-05
59	-.3350E-04	.3132E-05	-.1364E-05
60	-.3389E-04	.3212E-05	.0000E+00
61	-.3350E-04	.3132E-05	.1364E-05
62	-.3272E-04	.3012E-05	.1525E-05
63	-.3216E-04	.2931E-05	.5997E-06
64	-.3215E-04	.2955E-05	-.4969E-06
65	-.3264E-04	.2952E-05	-.1519E-05
66	-.3388E-04	.3108E-05	-.3790E-05
67	-.3676E-04	.2891E-05	-.8087E-05
68	-.4239E-04	.6015E-05	-.1503E-04
69	-.2834E-04	.3689E-04	.9293E-05
70	-.2455E-04	.3438E-04	.5620E-05
71	-.2264E-04	.3130E-04	.2330E-05
72	-.2188E-04	.3006E-04	.9779E-06
73	-.2153E-04	.2966E-04	.4690E-06
74	-.2144E-04	.2979E-04	-.2422E-06
75	-.2192E-04	.3048E-04	-.1764E-05
76	-.2302E-04	.2891E-04	-.2195E-05
77	-.2366E-04	.2803E-04	.0000E+00
78	-.2302E-04	.2891E-04	.2195E-05
79	-.2192E-04	.3048E-04	.1764E-05
80	-.2144E-04	.2979E-04	.2422E-06
81	-.2153E-04	.2966E-04	-.4690E-06
82	-.2188E-04	.3006E-04	-.9779E-06
83	-.2264E-04	.3130E-04	-.2330E-05
84	-.2455E-04	.3438E-04	-.5620E-05
85	-.2834E-04	.3689E-04	-.9293E-05
86	-.2649E-05	.4528E-04	.6584E-05
87	.0000E+00	.4314E-04	.2509E-05
88	.0000E+00	.4130E-04	-.6429E-06
89	.0000E+00	.3997E-04	.1722E-06
90	.0000E+00	.3919E-04	-.1647E-06
91	.0000E+00	.3878E-04	.5937E-06
92	.0000E+00	.3848E-04	-.2349E-05
93	-.2190E-05	.3787E-04	-.4360E-05
94	-.3327E-05	.3755E-04	.0000E+00
95	-.2190E-05	.3787E-04	.4360E-05
96	.0000E+00	.3848E-04	.2349E-05
97	.0000E+00	.3878E-04	-.5937E-06
98	.0000E+00	.3919E-04	.1647E-06
99	.0000E+00	.3997E-04	-.1722E-06
100	.0000E+00	.4130E-04	.6429E-06

ENCEPADO ESTRIBOS PS 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(Y)	R(X)	R(Z)
101	.0000E+00	.4314E-04	-.2509E-05
102	-.2649E-05	.4528E-04	-.6584E-05
103	.2407E-04	.4413E-04	.2889E-05
104	.2520E-04	.4170E-04	.1061E-05
105	.2505E-04	.4199E-04	-.1393E-05
106	.2421E-04	.4050E-04	-.1520E-05
107	.2365E-04	.3951E-04	-.7427E-06
108	.2332E-04	.3894E-04	-.1010E-05
109	.2235E-04	.3686E-04	-.2888E-05
110	.2066E-04	.3807E-04	-.3361E-05
111	.1966E-04	.3837E-04	.0000E+00
112	.2066E-04	.3807E-04	.3361E-05
113	.2235E-04	.3686E-04	.2888E-05
114	.2332E-04	.3894E-04	.1010E-05
115	.2365E-04	.3951E-04	.7427E-06
116	.2421E-04	.4050E-04	.1520E-05
117	.2505E-04	.4199E-04	.1393E-05
118	.2520E-04	.4170E-04	-.1061E-05
119	.2407E-04	.4413E-04	-.2889E-05

ENCEPADO ESTRIBOS PS 4+300

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(Y)	M(X)	M(Z)
1	.0000	.0000	.0000
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	.0000	.0000	.0000
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000	.0000	.0000
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	.0000	.0000	.0000
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000	.0000	.0000
15	.0000	.0000	.0000
16	.0000	.0000	.0000
17	.0000	.0000	.0000
18	.0000	.0000	.0000
19	56.9612	.0000	.0000
20	-4.1422	.0000	.0000
21	17.0038	.0000	.0000
22	17.6875	.0000	.0000
23	.5649	.0000	.0000
24	61.0957	.0000	.0000
25	.0000	.0000	.0000
26	.0000	.0000	.0000
27	.0000	.0000	.0000
28	61.0957	.0000	.0000
29	.5649	.0000	.0000
30	17.6875	.0000	.0000
31	17.0038	.0000	.0000
32	-4.1422	.0000	.0000
33	56.9612	.0000	.0000
34	.0000	.0000	.0000
35	.0000	.0000	.0000
36	.0000	.0000	.0000
37	.0000	.0000	.0000
38	.0000	.0000	.0000
39	.0000	.0000	.0000
40	.0000	.0000	.0000
41	.0000	.0000	.0000
42	.0000	.0000	.0000
43	.0000	.0000	.0000
44	.0000	.0000	.0000
45	.0000	.0000	.0000
46	.0000	.0000	.0000
47	.0000	.0000	.0000
48	.0000	.0000	.0000
49	.0000	.0000	.0000
50	.0000	.0000	.0000

ENCEPADO ESTRIBOS PS 4+300

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(Y)	M(X)	M(Z)
51	.0000	.0000	.0000
52	-26.8000	3.8600	.0000
53	-26.8000	3.8600	.0000
54	-26.8000	3.8600	.0000
55	-26.8000	3.8600	.0000
56	-26.8000	3.8600	.0000
57	-26.8000	3.8600	.0000
58	-26.8000	3.8600	.0000
59	-26.8000	3.8600	.0000
60	-26.8000	3.8600	.0000
61	-26.8000	3.8600	.0000
62	-26.8000	3.8600	.0000
63	-26.8000	3.8600	.0000
64	-26.8000	3.8600	.0000
65	-26.8000	3.8600	.0000
66	-26.8000	3.8600	.0000
67	-26.8000	3.8600	.0000
68	-26.8000	3.8600	.0000
69	.0000	.0000	.0000
70	.0000	.0000	.0000
71	.0000	.0000	.0000
72	.0000	.0000	.0000
73	.0000	.0000	.0000
74	.0000	.0000	.0000
75	.0000	.0000	.0000
76	.0000	.0000	.0000
77	.0000	.0000	.0000
78	.0000	.0000	.0000
79	.0000	.0000	.0000
80	.0000	.0000	.0000
81	.0000	.0000	.0000
82	.0000	.0000	.0000
83	.0000	.0000	.0000
84	.0000	.0000	.0000
85	.0000	.0000	.0000
86	.0000	.0000	.0000
87	46.8594	.0000	.0000
88	-3.6817	.0000	.0000
89	13.7362	.0000	.0000
90	14.3195	.0000	.0000
91	.2583	.0000	.0000
92	50.3375	.0000	.0000
93	.0000	.0000	.0000
94	.0000	.0000	.0000
95	.0000	.0000	.0000
96	50.3375	.0000	.0000
97	.2583	.0000	.0000
98	14.3195	.0000	.0000
99	13.7362	.0000	.0000
100	-3.6817	.0000	.0000

PAGE
PROGRAM:SAP90/FILE:ENCEPADO.SOI

ENCEPADO ESTRIBOS PS 4+300

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(Y)	M(X)	M(Z)
101	46.8594	.0000	.0000
102	.0000	.0000	.0000
103	.0000	.0000	.0000
104	.0000	.0000	.0000
105	.0000	.0000	.0000
106	.0000	.0000	.0000
107	.0000	.0000	.0000
108	.0000	.0000	.0000
109	.0000	.0000	.0000
110	.0000	.0000	.0000
111	.0000	.0000	.0000
112	.0000	.0000	.0000
113	.0000	.0000	.0000
114	.0000	.0000	.0000
115	.0000	.0000	.0000
116	.0000	.0000	.0000
117	.0000	.0000	.0000
118	.0000	.0000	.0000
119	.0000	.0000	.0000
TOTAL	.8640E+02	.6562E+02	.4220E-13

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

MEMBRANE FORCES ARE IN FORCE PER UNIT LENGTH
BENDING MOMENTS ARE IN MOMENTS PER UNIT LENGTH

ELEMENT ID 1 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
1	-3.5237E-01	-2.0030E-01	2.7316E+00	2.4563E+00	-3.0090E+00	45.80
2	-4.1130E+00	2.9229E-01	1.7966E+00	9.3209E-01	-4.7528E+00	70.40
18	3.1511E-01	-1.7969E+00	2.5511E+00	2.0201E+00	-3.5019E+00	33.76
19	-1.1780E+01	-6.1828E+00	1.6161E+00	-5.7497E+00	-1.2213E+01	75.00

ELEMENT ID 2 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
2	-3.9033E+00	3.3422E-01	3.9996E-01	3.7164E-01	-3.9408E+00	84.66
3	-2.0269E+00	-3.0937E-01	9.1921E-02	-3.0446E-01	-2.0318E+00	86.95
19	-1.1938E+01	-6.2144E+00	1.4583E+00	-5.8643E+00	-1.2288E+01	76.50
20	3.4073E+00	2.1071E+00	1.1503E+00	4.0785E+00	1.4359E+00	30.26

ELEMENT ID 3 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
3	-1.7431E+00	-2.5261E-01	9.9381E-01	2.4435E-01	-2.2400E+00	63.43
4	1.3616E+00	9.0754E-02	1.4010E+00	2.2645E+00	-8.1220E-01	32.80
20	3.1378E+00	2.0532E+00	8.8723E-01	3.6353E+00	1.5557E+00	29.28
21	-4.9538E-01	1.1777E+00	1.2944E+00	1.8824E+00	-1.2000E+00	61.44

ELEMENT ID 4 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
4	1.0312E+00	2.4679E-02	1.1542E+00	1.7871E+00	-7.3120E-01	33.22
5	7.7244E-01	1.9891E-02	6.9957E-01	1.1905E+00	-3.9818E-01	30.86
21	-1.9375E-01	1.2381E+00	1.0445E+00	1.7885E+00	-7.4415E-01	62.21
22	-2.3369E-01	7.4437E-01	5.8989E-01	1.0216E+00	-5.1090E-01	64.83

ELEMENT ID 5 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
5	1.0985E+00	8.5105E-02	4.9884E-01	1.3028E+00	-1.1924E-01	22.28
6	-1.8852E+00	-2.1164E-01	9.5252E-01	2.1944E-01	-2.3163E+00	65.65
22	-5.0735E-01	6.8963E-01	4.2753E-01	8.2665E-01	-6.4437E-01	72.23
23	2.6440E+00	7.3470E-01	8.8121E-01	2.9886E+00	3.9016E-01	21.35

ELEMENT ID 6 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
6	-2.2480E+00	-2.8419E-01	1.7392E+00	7.3112E-01	-3.2633E+00	59.72
7	-2.3714E+00	4.1098E-01	1.2982E+00	9.2262E-01	-2.8831E+00	68.49
23	2.9967E+00	8.0520E-01	8.4191E-01	3.2828E+00	5.1911E-01	18.77
24	-1.1293E+01	-6.3616E+00	4.0097E-01	-6.3292E+00	-1.1325E+01	85.38

PAGE
PROGRAM:SAP90/FILE:ENCEPADO.F4I

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 7 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
7	-2.4407E+00	3.9714E-01	-3.7292E-01	4.4532E-01	-2.4889E+00	-82.64
8	1.3248E+00	-2.2950E-01	-1.0253E+00	1.8342E+00	-7.3891E-01	-26.42
24	-1.1242E+01	-6.3515E+00	5.6735E-01	-6.2865E+00	-1.1307E+01	83.47
25	5.4920E+00	2.1362E+00	-8.5047E-02	5.4941E+00	2.1340E+00	-1.45

ELEMENT ID 8 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
8	1.7670E+00	-1.4107E-01	-5.6651E-01	1.9225E+00	-2.9659E-01	-15.35
9	6.4497E+00	-2.6359E-02	-1.5123E-01	6.4532E+00	-2.9889E-02	-1.34
25	5.0526E+00	2.0484E+00	-2.4352E-01	5.0722E+00	2.0287E+00	-4.60
26	6.9058E+00	4.5327E+00	1.7176E-01	6.9181E+00	4.5204E+00	4.12

ELEMENT ID 9 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
9	6.4497E+00	-2.6359E-02	1.5123E-01	6.4532E+00	-2.9889E-02	1.34
10	1.7670E+00	-1.4107E-01	5.6651E-01	1.9225E+00	-2.9659E-01	15.35
26	6.9058E+00	4.5327E+00	-1.7176E-01	6.9181E+00	4.5204E+00	-4.12
27	5.0526E+00	2.0484E+00	2.4352E-01	5.0722E+00	2.0287E+00	4.60

ELEMENT ID 10 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
10	1.3248E+00	-2.2950E-01	1.0253E+00	1.8342E+00	-7.3891E-01	26.42
11	-2.4407E+00	3.9714E-01	3.7292E-01	4.4532E-01	-2.4889E+00	82.64
27	5.4920E+00	2.1362E+00	8.5047E-02	5.4941E+00	2.1340E+00	1.45
28	-1.1242E+01	-6.3515E+00	-5.6735E-01	-6.2865E+00	-1.1307E+01	-83.47

ELEMENT ID 11 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
11	-2.3714E+00	4.1098E-01	-1.2982E+00	9.2262E-01	-2.8831E+00	-68.49
12	-2.2480E+00	-2.8419E-01	-1.7392E+00	7.3112E-01	-3.2633E+00	-59.72
28	-1.1293E+01	-6.3616E+00	-4.0097E-01	-6.3292E+00	-1.1325E+01	-85.38
29	2.9967E+00	8.0520E-01	-8.4191E-01	3.2828E+00	5.1911E-01	-18.77

ELEMENT ID 12 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
12	-1.8852E+00	-2.1164E-01	-9.5252E-01	2.1944E-01	-2.3163E+00	-65.65
13	1.0985E+00	8.5105E-02	-4.9884E-01	1.3028E+00	-1.1924E-01	-22.28
29	2.6440E+00	7.3470E-01	-8.8121E-01	2.9886E+00	3.9016E-01	-21.35
30	-5.0735E-01	6.8963E-01	-4.2753E-01	8.2665E-01	-6.4437E-01	-72.23

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 13 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
13	7.7244E-01	1.9891E-02	-6.9957E-01	1.1905E+00	-3.9818E-01	-30.86
14	1.0312E+00	2.4679E-02	-1.1542E+00	1.7871E+00	-7.3120E-01	-33.22
30	-2.3369E-01	7.4437E-01	-5.8989E-01	1.0216E+00	-5.1090E-01	-64.83
31	-1.9375E-01	1.2381E+00	-1.0445E+00	1.7885E+00	-7.4415E-01	-62.21

ELEMENT ID 14 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
14	1.3616E+00	9.0754E-02	-1.4010E+00	2.2645E+00	-8.1220E-01	-32.80
15	-1.7431E+00	-2.5261E-01	-9.9381E-01	2.4435E-01	-2.2400E+00	-63.43
31	-4.9538E-01	1.1777E+00	-1.2944E+00	1.8824E+00	-1.2000E+00	-61.44
32	3.1378E+00	2.0532E+00	-8.8723E-01	3.6353E+00	1.5557E+00	-29.28

ELEMENT ID 15 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
15	-2.0269E+00	-3.0937E-01	-9.1921E-02	-3.0446E-01	-2.0318E+00	-86.95
16	-3.9033E+00	3.3422E-01	-3.9996E-01	3.7164E-01	-3.9408E+00	-84.66
32	3.4073E+00	2.1071E+00	-1.1503E+00	4.0785E+00	1.4359E+00	-30.26
33	-1.1938E+01	-6.2144E+00	-1.4583E+00	-5.8643E+00	-1.2288E+01	-76.50

ELEMENT ID 16 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
16	-4.1130E+00	2.9229E-01	-1.7966E+00	9.3209E-01	-4.7528E+00	-70.40
17	-3.5237E-01	-2.0030E-01	-2.7316E+00	2.4563E+00	-3.0090E+00	-45.80
33	-1.1780E+01	-6.1828E+00	-1.6161E+00	-5.7497E+00	-1.2213E+01	-75.00
34	3.1511E-01	-1.7969E+00	-2.5511E+00	2.0201E+00	-3.5019E+00	-33.76

ELEMENT ID 17 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
18	3.6538E-01	-1.5459E+00	2.2583E+00	1.8619E+00	-3.0424E+00	33.53
19	-1.1833E+01	-6.4462E+00	2.2253E+00	-5.6458E+00	-1.2633E+01	70.22
35	-6.3287E-01	2.0026E+01	2.4756E+00	2.0318E+01	-9.2539E-01	83.26
36	-7.5478E-01	2.3331E+01	2.4426E+00	2.3577E+01	-1.0000E+00	84.27

ELEMENT ID 18 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
19	-1.1991E+01	-6.4778E+00	2.0676E+00	-5.7886E+00	-1.2680E+01	71.56
20	3.4426E+00	2.2828E+00	2.0243E+00	4.9684E+00	7.5698E-01	37.01
36	-5.9788E-01	2.3363E+01	2.4795E+00	2.3617E+01	-8.5178E-01	84.15
37	1.2532E+00	1.9707E+01	2.4363E+00	2.0023E+01	9.3699E-01	82.60

PAGE
PROGRAM:SAP90/FILE:ENCEPADO.F4I

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 19 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
20	3.1730E+00	2.2289E+00	1.7612E+00	4.5244E+00	8.7757E-01	37.50
21	-5.0493E-01	1.1301E+00	8.9399E-01	1.5240E+00	-8.9884E-01	66.22
37	1.4064E+00	1.9738E+01	1.6615E+00	1.9887E+01	1.2570E+00	84.86
38	3.5690E+00	2.0134E+01	7.9424E-01	2.0172E+01	3.5310E+00	87.26

ELEMENT ID 20 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
21	-2.0328E-01	1.1904E+00	6.4410E-01	1.4425E+00	-4.5535E-01	68.63
22	-2.4213E-01	7.0223E-01	6.1773E-01	1.0076E+00	-5.4747E-01	63.70
38	3.4022E+00	2.0101E+01	4.4647E-01	2.0113E+01	3.3902E+00	88.47
39	3.6086E+00	1.9832E+01	4.2011E-01	1.9843E+01	3.5977E+00	88.52

ELEMENT ID 21 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
22	-5.1581E-01	6.4750E-01	4.5538E-01	8.0455E-01	-6.7286E-01	70.97
23	2.6744E+00	8.8637E-01	-1.3426E-01	2.6844E+00	8.7635E-01	-4.27
39	3.7641E+00	1.9863E+01	1.8862E-01	1.9865E+01	3.7619E+00	89.33
40	2.4506E+00	1.8933E+01	-4.0101E-01	1.8942E+01	2.4409E+00	-88.61

ELEMENT ID 22 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
23	3.0271E+00	9.5691E-01	-1.7358E-01	3.0415E+00	9.4246E-01	-4.76
24	-1.1331E+01	-6.5553E+00	4.4802E-01	-6.5136E+00	-1.1373E+01	84.69
40	2.2800E+00	1.8899E+01	-6.4823E-01	1.8924E+01	2.2547E+00	-87.77
41	2.2212E+00	2.1629E+01	-2.6627E-02	2.1629E+01	2.2212E+00	-89.92

ELEMENT ID 23 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
24	-1.1281E+01	-6.5452E+00	6.1445E-01	-6.4668E+00	-1.1359E+01	82.73
25	5.5161E+00	2.2565E+00	1.2768E+00	5.9567E+00	1.8159E+00	19.04
41	2.1941E+00	2.1623E+01	1.1395E+00	2.1690E+01	2.1275E+00	86.66
42	4.7991E+00	1.8802E+01	1.8019E+00	1.9030E+01	4.5709E+00	82.78

ELEMENT ID 24 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
25	5.0767E+00	2.1686E+00	1.1183E+00	5.4570E+00	1.7883E+00	18.78
26	6.8952E+00	4.4799E+00	1.7176E-01	6.9074E+00	4.4678E+00	4.05
42	4.9995E+00	1.8842E+01	1.4169E+00	1.8986E+01	4.8559E+00	84.22
43	7.6841E+00	1.8626E+01	4.7038E-01	1.8646E+01	7.6639E+00	87.54

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 25 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
26	6.8952E+00	4.4799E+00	-1.7176E-01	6.9074E+00	4.4678E+00	-4.05
27	5.0767E+00	2.1686E+00	-1.1183E+00	5.4570E+00	1.7883E+00	-18.78
43	7.6841E+00	1.8626E+01	-4.7038E-01	1.8646E+01	7.6639E+00	-87.54
44	4.9995E+00	1.8842E+01	-1.4169E+00	1.8986E+01	4.8559E+00	-84.22

ELEMENT ID 26 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
27	5.5161E+00	2.2565E+00	-1.2768E+00	5.9567E+00	1.8159E+00	-19.04
28	-1.1281E+01	-6.5452E+00	-6.1445E-01	-6.4668E+00	-1.1359E+01	-82.73
44	4.7991E+00	1.8802E+01	-1.8019E+00	1.9030E+01	4.5709E+00	-82.78
45	2.1941E+00	2.1623E+01	-1.1395E+00	2.1690E+01	2.1275E+00	-86.66

ELEMENT ID 27 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
28	-1.1331E+01	-6.5553E+00	-4.4802E-01	-6.5136E+00	-1.1373E+01	-84.69
29	3.0271E+00	9.5691E-01	1.7358E-01	3.0415E+00	9.4246E-01	4.76
45	2.2212E+00	2.1629E+01	2.6627E-02	2.1629E+01	2.2212E+00	89.92
46	2.2800E+00	1.8899E+01	6.4823E-01	1.8924E+01	2.2547E+00	87.77

ELEMENT ID 28 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
29	2.6744E+00	8.8637E-01	1.3426E-01	2.6844E+00	8.7635E-01	4.27
30	-5.1581E-01	6.4750E-01	-4.5538E-01	8.0455E-01	-6.7286E-01	-70.97
46	2.4506E+00	1.8933E+01	4.0101E-01	1.8942E+01	2.4409E+00	88.61
47	3.7641E+00	1.9863E+01	-1.8862E-01	1.9865E+01	3.7619E+00	-89.33

ELEMENT ID 29 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
30	-2.4213E-01	7.0223E-01	-6.1773E-01	1.0076E+00	-5.4747E-01	-63.70
31	-2.0328E-01	1.1904E+00	-6.4410E-01	1.4425E+00	-4.5535E-01	-68.63
47	3.6086E+00	1.9832E+01	-4.2011E-01	1.9843E+01	3.5977E+00	-88.52
48	3.4022E+00	2.0101E+01	-4.4647E-01	2.0113E+01	3.3902E+00	-88.47

ELEMENT ID 30 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
31	-5.0493E-01	1.1301E+00	-8.9399E-01	1.5240E+00	-8.9884E-01	-66.22
32	3.1730E+00	2.2289E+00	-1.7612E+00	4.5244E+00	8.7757E-01	-37.50
48	3.5690E+00	2.0134E+01	-7.9424E-01	2.0172E+01	3.5310E+00	-87.26
49	1.4064E+00	1.9738E+01	-1.6615E+00	1.9887E+01	1.2570E+00	-84.86

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 31 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
32	3.4426E+00	2.2828E+00	-2.0243E+00	4.9684E+00	7.5698E-01	-37.01
33	-1.1991E+01	-6.4778E+00	-2.0676E+00	-5.7886E+00	-1.2680E+01	-71.56
49	1.2532E+00	1.9707E+01	-2.4363E+00	2.0023E+01	9.3699E-01	-82.60
50	-5.9788E-01	2.3363E+01	-2.4795E+00	2.3617E+01	-8.5178E-01	-84.15

ELEMENT ID 32 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
33	-1.1833E+01	-6.4462E+00	-2.2253E+00	-5.6458E+00	-1.2633E+01	-70.22
34	3.6538E-01	-1.5459E+00	-2.2583E+00	1.8619E+00	-3.0424E+00	-33.53
50	-7.5478E-01	2.3331E+01	-2.4426E+00	2.3577E+01	-1.0000E+00	-84.27
51	-6.3287E-01	2.0026E+01	-2.4756E+00	2.0318E+01	-9.2539E-01	-83.26

ELEMENT ID 33 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
35	-8.4252E-01	1.8978E+01	2.5138E+00	1.9292E+01	-1.1564E+00	82.88
36	-6.6941E-01	2.3758E+01	1.8300E+00	2.3894E+01	-8.0575E-01	85.74
52	2.3142E+00	5.5366E+01	-5.2005E-02	5.5366E+01	2.3142E+00	-89.94
53	2.8545E+00	4.0465E+01	-7.3577E-01	4.0480E+01	2.8401E+00	-88.88

ELEMENT ID 34 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
36	-5.1252E-01	2.3790E+01	1.8668E+00	2.3932E+01	-6.5509E-01	85.63
37	1.2622E+00	1.9752E+01	1.7446E+00	1.9915E+01	1.0991E+00	84.66
53	2.6231E+00	4.0419E+01	6.6766E-01	4.0431E+01	2.6114E+00	88.99
54	4.8915E+00	4.0468E+01	5.4541E-01	4.0477E+01	4.8832E+00	89.12

ELEMENT ID 35 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
37	1.4154E+00	1.9783E+01	9.6981E-01	1.9834E+01	1.3643E+00	86.99
38	3.5831E+00	2.0205E+01	6.9536E-01	2.0234E+01	3.5541E+00	87.61
54	4.8284E+00	4.0456E+01	3.8854E-01	4.0460E+01	4.8241E+00	89.38
55	6.3731E+00	3.8451E+01	1.1409E-01	3.8451E+01	6.3727E+00	89.80

ELEMENT ID 36 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
38	3.4163E+00	2.0172E+01	3.4760E-01	2.0179E+01	3.4091E+00	88.81
39	3.6047E+00	1.9812E+01	1.5939E-01	1.9814E+01	3.6031E+00	89.44
55	6.4242E+00	3.8461E+01	1.8128E-01	3.8462E+01	6.4232E+00	89.68
56	6.8642E+00	3.8281E+01	-6.9297E-03	3.8281E+01	6.8642E+00	-89.99

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 37 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
39	3.7602E+00	1.9844E+01	-7.2105E-02	1.9844E+01	3.7598E+00	-89.74
40	2.4869E+00	1.9114E+01	-1.8777E-01	1.9116E+01	2.4848E+00	-89.35
56	6.7809E+00	3.8264E+01	-1.8880E-02	3.8264E+01	6.7809E+00	-89.97
57	6.4377E+00	3.8883E+01	-1.3455E-01	3.8883E+01	6.4372E+00	-89.76

ELEMENT ID 38 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
40	2.3163E+00	1.9080E+01	-4.3496E-01	1.9091E+01	2.3050E+00	-88.52
41	2.1400E+00	2.1222E+01	-1.3322E-01	2.1223E+01	2.1390E+00	-89.60
57	6.4367E+00	3.8883E+01	-8.9843E-02	3.8883E+01	6.4364E+00	-89.84
58	7.1180E+00	3.8222E+01	2.1189E-01	3.8223E+01	7.1166E+00	89.61

ELEMENT ID 39 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
41	2.1128E+00	2.1217E+01	1.0329E+00	2.1272E+01	2.0571E+00	86.91
42	4.8301E+00	1.8957E+01	1.2788E+00	1.9072E+01	4.7153E+00	84.87
58	7.1360E+00	3.8226E+01	2.2796E-01	3.8227E+01	7.1344E+00	89.58
59	8.4480E+00	3.8071E+01	4.7388E-01	3.8079E+01	8.4404E+00	89.08

ELEMENT ID 40 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
42	5.0304E+00	1.8997E+01	8.9388E-01	1.9054E+01	4.9735E+00	86.35
43	7.7128E+00	1.8769E+01	4.7037E-01	1.8789E+01	7.6928E+00	87.57
59	8.4776E+00	3.8077E+01	4.5690E-01	3.8084E+01	8.4705E+00	89.12
60	9.3417E+00	3.7267E+01	3.3392E-02	3.7267E+01	9.3416E+00	89.93

ELEMENT ID 41 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
43	7.7128E+00	1.8769E+01	-4.7037E-01	1.8789E+01	7.6928E+00	-87.57
44	5.0304E+00	1.8997E+01	-8.9388E-01	1.9054E+01	4.9735E+00	-86.35
60	9.3417E+00	3.7267E+01	-3.3392E-02	3.7267E+01	9.3416E+00	-89.93
61	8.4776E+00	3.8077E+01	-4.5690E-01	3.8084E+01	8.4705E+00	-89.12

ELEMENT ID 42 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
44	4.8301E+00	1.8957E+01	-1.2788E+00	1.9072E+01	4.7153E+00	-84.87
45	2.1128E+00	2.1217E+01	-1.0329E+00	2.1272E+01	2.0571E+00	-86.91
61	8.4480E+00	3.8071E+01	-4.7388E-01	3.8079E+01	8.4404E+00	-89.08
62	7.1360E+00	3.8226E+01	-2.2796E-01	3.8227E+01	7.1344E+00	-89.58

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 43 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
45	2.1400E+00	2.1222E+01	1.3322E-01	2.1223E+01	2.1390E+00	89.60
46	2.3163E+00	1.9080E+01	4.3496E-01	1.9091E+01	2.3050E+00	88.52
62	7.1180E+00	3.8222E+01	-2.1189E-01	3.8223E+01	7.1166E+00	-89.61
63	6.4367E+00	3.8883E+01	8.9843E-02	3.8883E+01	6.4364E+00	89.84

ELEMENT ID 44 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
46	2.4869E+00	1.9114E+01	1.8777E-01	1.9116E+01	2.4848E+00	89.35
47	3.7602E+00	1.9844E+01	7.2105E-02	1.9844E+01	3.7598E+00	89.74
63	6.4377E+00	3.8883E+01	1.3455E-01	3.8883E+01	6.4372E+00	89.76
64	6.7809E+00	3.8264E+01	1.8880E-02	3.8264E+01	6.7809E+00	89.97

ELEMENT ID 45 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
47	3.6047E+00	1.9812E+01	-1.5939E-01	1.9814E+01	3.6031E+00	-89.44
48	3.4163E+00	2.0172E+01	-3.4760E-01	2.0179E+01	3.4091E+00	-88.81
64	6.8642E+00	3.8281E+01	6.9297E-03	3.8281E+01	6.8642E+00	89.99
65	6.4242E+00	3.8461E+01	-1.8128E-01	3.8462E+01	6.4232E+00	-89.68

ELEMENT ID 46 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
48	3.5831E+00	2.0205E+01	-6.9536E-01	2.0234E+01	3.5541E+00	-87.61
49	1.4154E+00	1.9783E+01	-9.6981E-01	1.9834E+01	1.3643E+00	-86.99
65	6.3731E+00	3.8451E+01	-1.1409E-01	3.8451E+01	6.3727E+00	-89.80
66	4.8284E+00	4.0456E+01	-3.8854E-01	4.0460E+01	4.8241E+00	-89.38

ELEMENT ID 47 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
49	1.2622E+00	1.9752E+01	-1.7446E+00	1.9915E+01	1.0991E+00	-84.66
50	-5.1252E-01	2.3790E+01	-1.8668E+00	2.3932E+01	-6.5509E-01	-85.63
66	4.8915E+00	4.0468E+01	-5.4541E-01	4.0477E+01	4.8832E+00	-89.12
67	2.6231E+00	4.0419E+01	-6.6766E-01	4.0431E+01	2.6114E+00	-88.99

ELEMENT ID 48 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
50	-6.6941E-01	2.3758E+01	-1.8300E+00	2.3894E+01	-8.0575E-01	-85.74
51	-8.4252E-01	1.8978E+01	-2.5138E+00	1.9292E+01	-1.1564E+00	-82.88
67	2.8545E+00	4.0465E+01	7.3577E-01	4.0480E+01	2.8401E+00	88.88
68	2.3142E+00	5.5366E+01	5.2005E-02	5.5366E+01	2.3142E+00	89.94

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 49 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
52	-1.6510E+00	3.5540E+01	-3.3203E+00	3.5834E+01	-1.9451E+00	-84.94
53	1.8596E+00	3.5491E+01	-2.1759E+00	3.5631E+01	1.7194E+00	-86.31
69	2.7779E-01	1.6061E+01	-3.0644E+00	1.6635E+01	-2.9628E-01	-79.39
70	-9.5343E-01	1.7590E+01	-1.9200E+00	1.7787E+01	-1.1501E+00	-84.15

ELEMENT ID 50 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
53	1.6283E+00	3.5445E+01	-7.7243E-01	3.5462E+01	1.6106E+00	-88.69
54	3.2117E+00	3.2069E+01	-4.2009E-01	3.2075E+01	3.2055E+00	-89.17
70	-7.4901E-01	1.7631E+01	-2.1558E+00	1.7880E+01	-9.9849E-01	-83.40
71	8.6436E-01	1.6112E+01	-1.8035E+00	1.6323E+01	6.5395E-01	-83.35

ELEMENT ID 51 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
54	3.1485E+00	3.2056E+01	-5.7697E-01	3.2068E+01	3.1369E+00	-88.86
55	4.8608E+00	3.0890E+01	-2.5491E-01	3.0892E+01	4.8583E+00	-89.44
71	1.0148E+00	1.6143E+01	-1.0326E+00	1.6213E+01	9.4462E-01	-86.11
72	2.7231E+00	1.6171E+01	-7.1053E-01	1.6208E+01	2.6857E+00	-86.98

ELEMENT ID 52 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
55	4.9120E+00	3.0900E+01	-1.8771E-01	3.0901E+01	4.9106E+00	-89.59
56	5.3136E+00	3.0527E+01	-8.2217E-03	3.0527E+01	5.3136E+00	-89.98
72	2.5900E+00	1.6144E+01	-3.5829E-01	1.6154E+01	2.5806E+00	-88.49
73	2.8042E+00	1.5957E+01	-1.7881E-01	1.5960E+01	2.8017E+00	-89.22

ELEMENT ID 53 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
56	5.2303E+00	3.0511E+01	-2.0168E-02	3.0511E+01	5.2303E+00	-89.95
57	4.8906E+00	3.1147E+01	1.1473E-01	3.1148E+01	4.8901E+00	89.75
73	2.9331E+00	1.5983E+01	4.6144E-02	1.5983E+01	2.9330E+00	89.80
74	1.8972E+00	1.5337E+01	1.8105E-01	1.5339E+01	1.8947E+00	89.23

ELEMENT ID 54 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
57	4.8895E+00	3.1147E+01	1.5943E-01	3.1148E+01	4.8886E+00	89.65
58	5.5811E+00	3.0537E+01	-4.9168E-02	3.0537E+01	5.5810E+00	-89.89
74	1.7549E+00	1.5308E+01	4.1596E-01	1.5321E+01	1.7421E+00	88.24
75	1.6514E+00	1.7062E+01	2.0737E-01	1.7064E+01	1.6487E+00	89.23

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 55 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
58	5.5991E+00	3.0541E+01	-3.3107E-02	3.0541E+01	5.5991E+00	-89.92
59	6.9006E+00	3.0334E+01	-2.4044E-01	3.0337E+01	6.8981E+00	-89.41
75	1.6305E+00	1.7057E+01	-7.4605E-01	1.7093E+01	1.5945E+00	-87.24
76	3.9384E+00	1.5134E+01	-9.5338E-01	1.5215E+01	3.8577E+00	-85.17

ELEMENT ID 56 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
59	6.9301E+00	3.0340E+01	-2.5742E-01	3.0343E+01	6.9273E+00	-89.37
60	7.7974E+00	2.9545E+01	3.3386E-02	2.9545E+01	7.7973E+00	89.91
76	4.1063E+00	1.5168E+01	-6.6051E-01	1.5207E+01	4.0670E+00	-86.60
77	6.3472E+00	1.4972E+01	-3.6970E-01	1.4988E+01	6.3314E+00	-87.55

ELEMENT ID 57 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
60	7.7974E+00	2.9545E+01	-3.3386E-02	2.9545E+01	7.7973E+00	-89.91
61	6.9301E+00	3.0340E+01	2.5742E-01	3.0343E+01	6.9273E+00	89.37
77	6.3472E+00	1.4972E+01	3.6970E-01	1.4988E+01	6.3314E+00	87.55
78	4.1063E+00	1.5168E+01	6.6051E-01	1.5207E+01	4.0670E+00	86.60

ELEMENT ID 58 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
61	6.9006E+00	3.0334E+01	2.4044E-01	3.0337E+01	6.8981E+00	89.41
62	5.5991E+00	3.0541E+01	3.3107E-02	3.0541E+01	5.5991E+00	89.92
78	3.9384E+00	1.5134E+01	9.5338E-01	1.5215E+01	3.8577E+00	85.17
79	1.6305E+00	1.7057E+01	7.4605E-01	1.7093E+01	1.5945E+00	87.24

ELEMENT ID 59 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
62	5.5811E+00	3.0537E+01	4.9168E-02	3.0537E+01	5.5810E+00	89.89
63	4.8895E+00	3.1147E+01	-1.5943E-01	3.1148E+01	4.8886E+00	-89.65
79	1.6514E+00	1.7062E+01	-2.0737E-01	1.7064E+01	1.6487E+00	-89.23
80	1.7549E+00	1.5308E+01	-4.1596E-01	1.5321E+01	1.7421E+00	-88.24

ELEMENT ID 60 ----------
LOAD COND 1 ----------

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
63	4.8906E+00	3.1147E+01	-1.1473E-01	3.1148E+01	4.8901E+00	-89.75
64	5.2303E+00	3.0511E+01	2.0168E-02	3.0511E+01	5.2303E+00	89.95
80	1.8972E+00	1.5337E+01	-1.8105E-01	1.5339E+01	1.8947E+00	-89.23
81	2.9331E+00	1.5983E+01	-4.6144E-02	1.5983E+01	2.9330E+00	-89.80

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 61
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
64	5.3136E+00	3.0527E+01	8.2217E-03	3.0527E+01	5.3136E+00	89.98
65	4.9120E+00	3.0900E+01	1.8771E-01	3.0901E+01	4.9106E+00	89.59
81	2.8042E+00	1.5957E+01	1.7881E-01	1.5960E+01	2.8017E+00	89.22
82	2.5900E+00	1.6144E+01	3.5829E-01	1.6154E+01	2.5806E+00	88.49

ELEMENT ID 62
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
65	4.8608E+00	3.0890E+01	2.5491E-01	3.0892E+01	4.8583E+00	89.44
66	3.1485E+00	3.2056E+01	5.7697E-01	3.2068E+01	3.1369E+00	88.86
82	2.7231E+00	1.6171E+01	7.1053E-01	1.6208E+01	2.6857E+00	86.98
83	1.0148E+00	1.6143E+01	1.0326E+00	1.6213E+01	9.4462E-01	86.11

ELEMENT ID 63
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
66	3.2117E+00	3.2069E+01	4.2009E-01	3.2075E+01	3.2055E+00	89.17
67	1.6283E+00	3.5445E+01	7.7243E-01	3.5462E+01	1.6106E+00	88.69
83	8.6436E-01	1.6112E+01	1.8035E+00	1.6323E+01	6.5395E-01	83.35
84	-7.4901E-01	1.7631E+01	2.1558E+00	1.7880E+01	-9.9849E-01	83.40

ELEMENT ID 64
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
67	1.8596E+00	3.5491E+01	2.1759E+00	3.5631E+01	1.7194E+00	86.31
68	-1.6510E+00	3.5540E+01	3.3203E+00	3.5834E+01	-1.9451E+00	84.94
84	-9.5343E-01	1.7590E+01	1.9200E+00	1.7787E+01	-1.1501E+00	84.15
85	2.7779E-01	1.6061E+01	3.0644E+00	1.6635E+01	-2.9628E-01	79.39

ELEMENT ID 65
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
69	2.2681E-01	1.5806E+01	-2.0047E+00	1.6060E+01	-2.7009E-02	-82.78
70	-8.6349E-01	1.8040E+01	-2.1451E+00	1.8280E+01	-1.1039E+00	-83.61
86	1.0641E-01	-1.6449E+00	-1.8491E+00	1.2767E+00	-2.8152E+00	-32.33
87	-9.7385E+00	-5.4430E+00	-1.9895E+00	-4.6632E+00	-1.0518E+01	-68.60

ELEMENT ID 66
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
70	-6.5907E-01	1.8081E+01	-2.3809E+00	1.8378E+01	-9.5685E-01	-82.87
71	7.9596E-01	1.5770E+01	-2.3325E+00	1.6125E+01	4.4104E-01	-81.35
87	-9.9161E+00	-5.4785E+00	-1.8612E+00	-4.8013E+00	-1.0593E+01	-70.01
88	2.8155E+00	1.7480E+00	-1.8128E+00	4.1715E+00	3.9201E-01	-36.80

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 67
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
71	9.4636E-01	1.5800E+01	-1.5616E+00	1.5963E+01	7.8396E-01	-84.06
72	2.7288E+00	1.6199E+01	-8.0328E-01	1.6247E+01	2.6810E+00	-86.60
88	2.5856E+00	1.7020E+00	-1.5970E+00	3.8007E+00	4.8684E-01	-37.27
89	-4.1832E-01	9.1772E-01	-8.3862E-01	1.3219E+00	-8.2247E-01	-64.27

ELEMENT ID 68
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
72	2.5957E+00	1.6172E+01	-4.5104E-01	1.6187E+01	2.5807E+00	-88.10
73	2.8004E+00	1.5938E+01	-3.9083E-01	1.5950E+01	2.7888E+00	-88.30
89	-1.6868E-01	9.6764E-01	-6.1301E-01	1.2353E+00	-4.3634E-01	-66.41
90	-1.9930E-01	5.8862E-01	-5.5280E-01	8.7348E-01	-4.8416E-01	-62.74

ELEMENT ID 69
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
73	2.9294E+00	1.5964E+01	-1.6588E-01	1.5966E+01	2.9273E+00	-89.27
74	1.8701E+00	1.5202E+01	3.4848E-01	1.5211E+01	1.8610E+00	88.50
90	-4.2398E-01	5.4369E-01	-3.9377E-01	6.8367E-01	-5.6396E-01	-70.43
91	2.2033E+00	7.0824E-01	1.2058E-01	2.2130E+00	6.9857E-01	4.58

ELEMENT ID 70
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
74	1.7278E+00	1.5173E+01	5.8340E-01	1.5199E+01	1.7026E+00	87.52
75	1.7180E+00	1.7395E+01	8.6035E-02	1.7395E+01	1.7175E+00	89.69
91	2.4951E+00	7.6656E-01	1.6882E-01	2.5114E+00	7.5023E-01	5.53
92	-9.3720E+00	-5.4884E+00	-3.2854E-01	-5.4608E+00	-9.3996E+00	-85.20

ELEMENT ID 71
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
75	1.6970E+00	1.7390E+01	-8.6738E-01	1.7438E+01	1.6492E+00	-86.85
76	3.9138E+00	1.5011E+01	-1.4204E+00	1.5190E+01	3.7349E+00	-82.82
92	-9.3297E+00	-5.4800E+00	-4.6184E-01	-5.4253E+00	-9.3843E+00	-83.25
93	4.5258E+00	1.7356E+00	-1.0149E+00	4.8559E+00	1.4055E+00	-18.02

ELEMENT ID 72
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
76	4.0817E+00	1.5045E+01	-1.1275E+00	1.5160E+01	3.9670E+00	-84.19
77	6.3212E+00	1.4842E+01	-3.6970E-01	1.4858E+01	6.3052E+00	-87.52
93	4.1631E+00	1.6631E+00	-8.9265E-01	4.4491E+00	1.3771E+00	-17.77
94	5.6711E+00	3.5550E+00	-1.3481E-01	5.6797E+00	3.5465E+00	-3.63

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 73
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
77	6.3212E+00	1.4842E+01	3.6970E-01	1.4858E+01	6.3052E+00	87.52
78	4.0817E+00	1.5045E+01	1.1275E+00	1.5160E+01	3.9670E+00	84.19
94	5.6711E+00	3.5550E+00	1.3481E-01	5.6797E+00	3.5465E+00	3.63
95	4.1631E+00	1.6631E+00	8.9265E-01	4.4491E+00	1.3771E+00	17.77

ELEMENT ID 74
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
78	3.9138E+00	1.5011E+01	1.4204E+00	1.5190E+01	3.7349E+00	82.82
79	1.6970E+00	1.7390E+01	8.6738E-01	1.7438E+01	1.6492E+00	86.85
95	4.5258E+00	1.7356E+00	1.0149E+00	4.8559E+00	1.4055E+00	18.02
96	-9.3297E+00	-5.4800E+00	4.6184E-01	-5.4253E+00	-9.3843E+00	83.25

ELEMENT ID 75
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
79	1.7180E+00	1.7395E+01	-8.6035E-02	1.7395E+01	1.7175E+00	-89.69
80	1.7278E+00	1.5173E+01	-5.8340E-01	1.5199E+01	1.7026E+00	-87.52
96	-9.3720E+00	-5.4884E+00	3.2854E-01	-5.4608E+00	-9.3996E+00	85.20
97	2.4951E+00	7.6656E-01	-1.6882E-01	2.5114E+00	7.5023E-01	-5.53

ELEMENT ID 76
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
80	1.8701E+00	1.5202E+01	-3.4848E-01	1.5211E+01	1.8610E+00	-88.50
81	2.9294E+00	1.5964E+01	1.6588E-01	1.5966E+01	2.9273E+00	89.27
97	2.2033E+00	7.0824E-01	-1.2058E-01	2.2130E+00	6.9857E-01	-4.58
98	-4.2398E-01	5.4369E-01	3.9377E-01	6.8367E-01	-5.6396E-01	70.43

ELEMENT ID 77
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
81	2.8004E+00	1.5938E+01	3.9083E-01	1.5950E+01	2.7888E+00	88.30
82	2.5957E+00	1.6172E+01	4.5104E-01	1.6187E+01	2.5807E+00	88.10
98	-1.9930E-01	5.8862E-01	5.5280E-01	8.7348E-01	-4.8416E-01	62.74
99	-1.6868E-01	9.6764E-01	6.1301E-01	1.2353E+00	-4.3634E-01	66.41

ELEMENT ID 78
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
82	2.7288E+00	1.6199E+01	8.0328E-01	1.6247E+01	2.6810E+00	86.60
83	9.4636E-01	1.5800E+01	1.5616E+00	1.5963E+01	7.8396E-01	84.06
99	-4.1832E-01	9.1772E-01	8.3862E-01	1.3219E+00	-8.2247E-01	64.27
100	2.5856E+00	1.7020E+00	1.5970E+00	3.8007E+00	4.8684E-01	37.27

PROGRAM:SAP90/FILE:ENCEPADO.F41

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 79
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
83	7.9596E-01	1.5770E+01	2.3325E+00	1.6125E+01	4.4104E-01	81.35
84	-6.5907E-01	1.8081E+01	2.3809E+00	1.8378E+01	-9.5685E-01	82.87
100	2.8155E+00	1.7480E+00	1.8128E+00	4.1715E+00	3.9201E-01	36.80
101	-9.9161E+00	-5.4785E+00	1.8612E+00	-4.8013E+00	-1.0593E+01	70.01

ELEMENT ID 80
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
84	-8.6349E-01	1.8040E+01	2.1451E+00	1.8280E+01	-1.1039E+00	83.61
85	2.2681E-01	1.5806E+01	2.0047E+00	1.6060E+01	-2.7009E-02	82.78
101	-9.7385E+00	-5.4430E+00	1.9895E+00	-4.6632E+00	-1.0518E+01	68.60
102	1.0641E-01	-1.6449E+00	1.8491E+00	1.2767E+00	-2.8152E+00	32.33

ELEMENT ID 81
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
86	7.3429E-02	-1.8101E+00	-2.1938E+00	1.5191E+00	-3.2557E+00	-33.38
87	-9.7054E+00	-5.2771E+00	-1.4076E+00	-4.8675E+00	-1.0115E+01	-73.78
103	-2.0052E-01	-1.5192E-01	-2.3119E+00	2.1359E+00	-2.4883E+00	-45.30
104	-3.4693E+00	2.3290E-01	-1.5258E+00	7.8065E-01	-4.0171E+00	-70.25

ELEMENT ID 82
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
87	-9.8830E+00	-5.3126E+00	-1.2793E+00	-4.9789E+00	-1.0217E+01	-75.38
88	2.7933E+00	1.6363E+00	-1.0350E+00	3.4005E+00	1.0291E+00	-30.40
104	-3.2676E+00	2.7325E-01	-3.8731E-01	3.1512E-01	-3.3095E+00	-83.83
105	-1.6765E+00	-2.5445E-01	-1.4309E-01	-2.4019E-01	-1.6907E+00	-84.31

ELEMENT ID 83
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
88	2.5633E+00	1.5903E+00	-8.1926E-01	3.0296E+00	1.1240E+00	-29.65
89	-4.1114E-01	9.5370E-01	-1.1490E+00	1.6076E+00	-1.0651E+00	-60.35
105	-1.4419E+00	-2.0754E-01	-8.8953E-01	2.5795E-01	-1.9074E+00	-62.38
106	1.1593E+00	7.3414E-02	-1.2192E+00	1.9510E+00	-7.1828E-01	-33.00

ELEMENT ID 84
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
89	-1.6148E-01	1.0036E+00	-9.2334E-01	1.5128E+00	-6.7068E-01	-61.12
90	-1.9238E-01	6.2325E-01	-5.3330E-01	8.8679E-01	-4.5593E-01	-63.70
106	8.8458E-01	1.8461E-02	-1.0079E+00	1.5486E+00	-6.4552E-01	-33.37
107	6.8951E-01	1.5209E-02	-6.1792E-01	1.0563E+00	-3.5155E-01	-30.69

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 85
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
90	-4.1707E-01	5.7831E-01	-3.7427E-01	7.0333E-01	-5.4209E-01	-71.53
91	2.1786E+00	5.8434E-01	-7.3340E-01	2.4646E+00	2.9828E-01	-21.31
107	9.5792E-01	6.8892E-02	-4.3972E-01	1.1387E+00	-1.1185E-01	-22.34
108	-1.5187E+00	-1.7515E-01	-7.9884E-01	1.9683E-01	-1.8907E+00	-65.03

ELEMENT ID 86
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
91	2.4704E+00	6.4269E-01	-6.8518E-01	2.6987E+00	4.1435E-01	-18.43
92	-9.3400E+00	-5.3279E+00	-3.1253E-01	-5.3037E+00	-9.3642E+00	-85.57
108	-1.8171E+00	-2.3481E-01	-1.4373E+00	6.1471E-01	-2.6666E+00	-59.42
109	-1.9481E+00	3.3903E-01	-1.0647E+00	7.5790E-01	-2.3670E+00	-68.52

ELEMENT ID 87
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
92	-9.2977E+00	-5.3195E+00	-4.4578E-01	-5.2701E+00	-9.3470E+00	-83.68
93	4.5058E+00	1.6351E+00	9.2920E-02	4.5088E+00	1.6321E+00	1.85
109	-2.0038E+00	3.2788E-01	3.1937E-01	3.7083E-01	-2.0468E+00	82.34
110	1.0796E+00	-1.8874E-01	8.5807E-01	1.5124E+00	-6.2157E-01	26.77

ELEMENT ID 88
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
93	4.1430E+00	1.5626E+00	2.1513E-01	4.1609E+00	1.5448E+00	4.73
94	5.6795E+00	3.5969E+00	-1.3481E-01	5.6882E+00	3.5882E+00	-3.69
110	1.4461E+00	-1.1544E-01	4.7769E-01	1.5806E+00	-2.4998E-01	15.73
111	5.3017E+00	-2.1026E-02	1.2776E-01	5.3048E+00	-2.4091E-02	1.37

ELEMENT ID 89
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
94	5.6795E+00	3.5969E+00	1.3481E-01	5.6882E+00	3.5882E+00	3.69
95	4.1430E+00	1.5626E+00	-2.1513E-01	4.1609E+00	1.5448E+00	-4.73
111	5.3017E+00	-2.1026E-02	-1.2776E-01	5.3048E+00	-2.4091E-02	-1.37
112	1.4461E+00	-1.1544E-01	-4.7769E-01	1.5806E+00	-2.4998E-01	-15.73

ELEMENT ID 90
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
95	4.5058E+00	1.6351E+00	-9.2920E-02	4.5088E+00	1.6321E+00	-1.85
96	-9.2977E+00	-5.3195E+00	4.4578E-01	-5.2701E+00	-9.3470E+00	83.68
112	1.0796E+00	-1.8874E-01	-8.5807E-01	1.5124E+00	-6.2157E-01	-26.77
113	-2.0038E+00	3.2788E-01	-3.1937E-01	3.7083E-01	-2.0468E+00	-82.34

ENCEPADO ESTRIBOS PS 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 91
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
96	-9.3400E+00	-5.3279E+00	3.1253E-01	-5.3037E+00	-9.3642E+00	85.57
97	2.4704E+00	6.4269E-01	6.8518E-01	2.6987E+00	4.1435E-01	18.43
113	-1.9481E+00	3.3903E-01	1.0647E+00	7.5790E-01	-2.3670E+00	68.52
114	-1.8171E+00	-2.3481E-01	1.4373E+00	6.1471E-01	-2.6666E+00	59.42

ELEMENT ID 92
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
97	2.1786E+00	5.8434E-01	7.3340E-01	2.4646E+00	2.9828E-01	21.31
98	-4.1707E-01	5.7831E-01	3.7427E-01	7.0333E-01	-5.4209E-01	71.53
114	-1.5187E+00	-1.7515E-01	7.9884E-01	1.9683E-01	-1.8907E+00	65.03
115	9.5792E-01	6.8892E-02	4.3972E-01	1.1387E+00	-1.1185E-01	22.34

ELEMENT ID 93
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
98	-1.9238E-01	6.2325E-01	5.3330E-01	8.8679E-01	-4.5593E-01	63.70
99	-1.6148E-01	1.0036E+00	9.2334E-01	1.5128E+00	-6.7068E-01	61.12
115	6.8951E-01	1.5209E-02	6.1792E-01	1.0563E+00	-3.5155E-01	30.69
116	8.8458E-01	1.8461E-02	1.0079E+00	1.5486E+00	-6.4552E-01	33.37

ELEMENT ID 94
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
99	-4.1114E-01	9.5370E-01	1.1490E+00	1.6076E+00	-1.0651E+00	60.35
100	2.5633E+00	1.5903E+00	8.1926E-01	3.0296E+00	1.1240E+00	29.65
116	1.1593E+00	7.3414E-02	1.2192E+00	1.9510E+00	-7.1828E-01	33.00
117	-1.4419E+00	-2.0754E-01	8.8953E-01	2.5795E-01	-1.9074E+00	62.38

ELEMENT ID 95
LOAD COND 1

JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
100	2.7933E+00	1.6363E+00	1.0350E+00	3.4005E+00	1.0291E+00	30.40
101	-9.8830E+00	-5.3126E+00	1.2793E+00	-4.9789E+00	-1.0217E+01	75.38
117	-1.6765E+00	-2.5445E-01	1.4309E-01	-2.4019E-01	-1.6907E+00	84.31
118	-3.2676E+00	2.7325E-01	3.8731E-01	3.1512E-01	-3.3095E+00	83.83

ELEMENT ID 96
LOAD COND 1

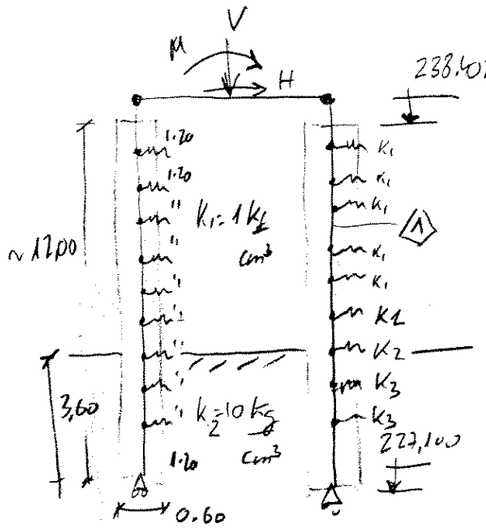
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
101	-9.7054E+00	-5.2771E+00	1.4076E+00	-4.8675E+00	-1.0115E+01	73.78
102	7.3429E-02	-1.8101E+00	2.1938E+00	1.5191E+00	-3.2557E+00	33.38
118	-3.4693E+00	2.3290E-01	1.5258E+00	7.8065E-01	-4.0171E+00	70.25
119	-2.0052E-01	-1.5192E-01	2.3119E+00	2.1359E+00	-2.4883E+00	45.30

ANEJO Nº 1

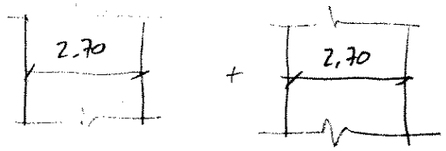
MODELO DE CIMENTACIÓN DE ESTRIBOS

Anejo 2. Modelo de Cimentación de Estribos

Se toman coeficientes de balasto diferenciados para el terreno de cimentación (MARGAS), y para las capas superiores, de 10 Kg/cm³ y 1Kg/cm³ respectivamente. Estos valores se consideran lo suficientemente conservadores para estar del lado de la seguridad.



$K = 1\ Kg/cm^3 = 1 \times 10^6\ Kg/m^3 = 1 \times 10^3\ T/m^3$



$I = (0{,}60^3 \times 5{,}40) / 12 = 0{,}097\ m^4$

$A = 2x\ 2{,}70 \times 0{,}60 = 3{,}24\ m^2$

$E = 21000 \sqrt{fck} \approx 350.000\ Kg/cm^2$

$K_1 = (2 \times 2{,}70) \times 1{,}20 \times 2 \times 10^3\ T/m^3 = 6480\ T/m$

$K_3 = (2 \times 2{,}70) \times 1{,}20 \times 10 \times 10^3\ T/m^3 = 64800\ T/m$

$K_2 = (K_1 + K_2) / 2 = 35640\ T/m$

$V = 558{,}4\ Tn$

$M = 49{,}7\ mt$

$H = 30 + (39 + 30) \times 0{,}5 \times 6 = 156\ KN = 15{,}6\ Tn$

En los listados del resultado del Análisis podemos observar:

- Nmax = 311,8 Tn; N'max = 311,8 / 2 = 155,9 Tn por batache de 2,70 m.

Project Details

Title:
Client
Site
Building
Description

Design Details

Job ID:
Version:
Company:
Designed by:
Checked by:
Notes:

Joint Coordinates (m)

Joint	Label	x	y	z	Type
1		0,0	0,0	0,0	Rigid
2		0,0	1,2	0,0	Rigid
3		0,0	2,4	0,0	Rigid
4		0,0	3,6	0,0	Rigid
5		0,0	4,8	0,0	Rigid
6		0,0	6,0	0,0	Rigid
7		0,0	7,2	0,0	Rigid
8		0,0	8,4	0,0	Rigid
9		0,0	9,6	0,0	Rigid
10		0,0	10,8	0,0	Rigid
11		0,0	12,0	0,0	Rigid
12		1,3	12,0	0,0	Rigid
13		2,5	0,0	0,0	Rigid
14		2,5	1,2	0,0	Rigid
15		2,5	2,4	0,0	Rigid
16		2,5	3,6	0,0	Rigid
17		2,5	4,8	0,0	Rigid
18		2,5	6,0	0,0	Rigid
19		2,5	7,2	0,0	Rigid
20		2,5	8,4	0,0	Rigid
21		2,5	9,6	0,0	Rigid
22		2,5	10,8	0,0	Rigid
23		2,5	12,0	0,0	Rigid

Member Geometry (m,deg)

Member	Label	Joint1	Joint2	Length	Slope	Orient.
1		1	2	1,2	90,0	0,0
2		2	3	1,2	90,0	0,0
3		3	4	1,2	90,0	0,0
4		4	5	1,2	90,0	0,0
5		5	6	1,2	90,0	0,0
6		6	7	1,2	90,0	0,0
7		7	8	1,2	90,0	0,0
8		8	9	1,2	90,0	0,0
9		9	10	1,2	90,0	0,0
10		10	11	1,2	90,0	0,0
11		11	12	1,3	0,0	0,0
12		12	23	1,3	0,0	0,0
13		13	14	1,2	90,0	0,0
14		14	15	1,2	90,0	0,0
15		15	16	1,2	90,0	0,0
16		16	17	1,2	90,0	0,0
17		17	18	1,2	90,0	0,0
18		18	19	1,2	90,0	0,0
19		19	20	1,2	90,0	0,0
20		20	21	1,2	90,0	0,0
21		21	22	1,2	90,0	0,0
22		22	23	1,2	90,0	0,0

Member Types

Member	Label	Øx'	Øy'	Øz'	Member Type	Self Weight
1		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
2		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
3		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
4		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
5		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
6		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes

Multiframe Summary

7	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
8	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
9	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
10	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
11	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
12	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
13	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
14	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
15	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
16	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
17	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
18	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
19	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
20	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
21	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
22	Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes

Member Sections

Member	Label	Group	Section
1		Custom 1	PANT. 5.40 x 0.60
2		Custom 1	PANT. 5.40 x 0.60
3		Custom 1	PANT. 5.40 x 0.60
4		Custom 1	PANT. 5.40 x 0.60
5		Custom 1	PANT. 5.40 x 0.60
6		Custom 1	PANT. 5.40 x 0.60
7		Custom 1	PANT. 5.40 x 0.60
8		Custom 1	PANT. 5.40 x 0.60
9		Custom 1	PANT. 5.40 x 0.60
10		Custom 1	PANT. 5.40 x 0.60
11		Custom 1	ENCEPADO
12		Custom 1	ENCEPADO
13		Custom 1	PANT. 5.40 x 0.60
14		Custom 1	PANT. 5.40 x 0.60
15		Custom 1	PANT. 5.40 x 0.60
16		Custom 1	PANT. 5.40 x 0.60
17		Custom 1	PANT. 5.40 x 0.60
18		Custom 1	PANT. 5.40 x 0.60
19		Custom 1	PANT. 5.40 x 0.60
20		Custom 1	PANT. 5.40 x 0.60
21		Custom 1	PANT. 5.40 x 0.60
22		Custom 1	PANT. 5.40 x 0.60

Section Properties

Section	A	Ix	Iy	J	E	G
	cm^2	cm^4	cm^4	cm^4	kg/cm^2	kg/cm^2
ANT. 5.40 x 0.60	32400,0	9720000,9	787320059,2	36158439,8	360000,0	150000,0
ENCEPADO	64800,0	77760007,5	1574640118,4	267503278,4	360000,0	150000,0
Total Mass (kg)		234900,0				

Joint Restraints (mm,deg)

Joint	Label	Joint Axes	dx	dy	dz	Øx	Øy	Øz
1		Local	-	0,0	-	-	-	-
13		Local	-	0,0	-	-	-	-

Joint Springs (t/m,t-m/rad)

Joint	Label	Spring Type	Stiffness
10		kx'	6480,0
5		kx'	6480,0
6		kx'	6480,0
7		kx'	6480,0
8		kx'	6480,0
9		kx'	6480,0
4		kx'	35640,0
2		kx'	64800,0
3		kx'	64800,0
22		kx'	6480,0
17		kx'	6480,0
18		kx'	6480,0
19		kx'	6480,0
20		kx'	6480,0
21		kx'	6480,0
16		kx'	35640,0

14	kx'	64800,0
15	kx'	64800,0

Self Weight Load Cases(cm/s^2)

Name	Loading Type	Design	X Accel.	Y Accel.	Z Accel.
No self weight load cases selected.					

Static Load Cases

Name	Loading Type	Design	Joint Loads	Joint Disps	Member Disps	Thermal Disps
Load Case 1	Unknown	Strength+Serv.	3	0	0	0

Combined Load Cases

Name	Loading Type	Design	Factored Cases	Factor
No combined load cases selected.				

Joint Loads(tonne,t-m) Load Case 1

Joint	Label	Load	Mag
12		Py	-558,4
12		Px	15,6
12		Mz	-49,7

There are no prescribed joint displacements in Load Case 1

There are no member loads in Load Case 1

There are no thermal loads in Load Case 1

Analysis Settings

Load Case	LC Type	Analysis	Options	Settings
Load Case 1	Static	Linear		

Joint Displacements (mm,deg)

Joint Label	Load Case	dx'	dy'	dz'	Øx'	Øy'	Øz'
1	Load Case 1	-0,0	0,0	0,0	0,0	0,0	-0,0
2	Load Case 1	-0,0	-0,0	0,0	0,0	0,0	-0,0
3	Load Case 1	-0,0	-0,1	0,0	0,0	0,0	-0,0
4	Load Case 1	-0,0	-0,1	0,0	0,0	0,0	-0,0
5	Load Case 1	0,0	-0,1	0,0	0,0	0,0	-0,0
6	Load Case 1	0,0	-0,1	0,0	0,0	0,0	-0,0
7	Load Case 1	0,1	-0,2	0,0	0,0	0,0	-0,0
8	Load Case 1	0,2	-0,2	0,0	0,0	0,0	-0,0
9	Load Case 1	0,3	-0,2	0,0	0,0	0,0	-0,0
10	Load Case 1	0,4	-0,2	0,0	0,0	0,0	-0,0
11	Load Case 1	0,5	-0,3	0,0	0,0	0,0	-0,0
12	Load Case 1	0,5	-0,3	0,0	0,0	0,0	-0,0
13	Load Case 1	-0,1	0,0	0,0	0,0	0,0	-0,0
14	Load Case 1	-0,0	-0,0	0,0	0,0	0,0	-0,0
15	Load Case 1	0,0	-0,1	0,0	0,0	0,0	-0,0
16	Load Case 1	0,0	-0,1	0,0	0,0	0,0	-0,0
17	Load Case 1	0,1	-0,1	0,0	0,0	0,0	-0,0
18	Load Case 1	0,2	-0,2	0,0	0,0	0,0	-0,0
19	Load Case 1	0,2	-0,2	0,0	0,0	0,0	-0,0
20	Load Case 1	0,3	-0,2	0,0	0,0	0,0	-0,0
21	Load Case 1	0,4	-0,3	0,0	0,0	0,0	-0,0
22	Load Case 1	0,5	-0,3	0,0	0,0	0,0	-0,0
23	Load Case 1	0,5	-0,3	0,0	0,0	0,0	0,0

Joint Reactions (tonne,t-m)

Joint Label	Load Case	Rx'	Ry'	Rz'	Mx'	My'	Mz'
1	Load Case 1	-0,0	246,5	0,0	0,0	0,0	0,0
2	Load Case 1	0,6	0,0	0,0	0,0	0,0	0,0

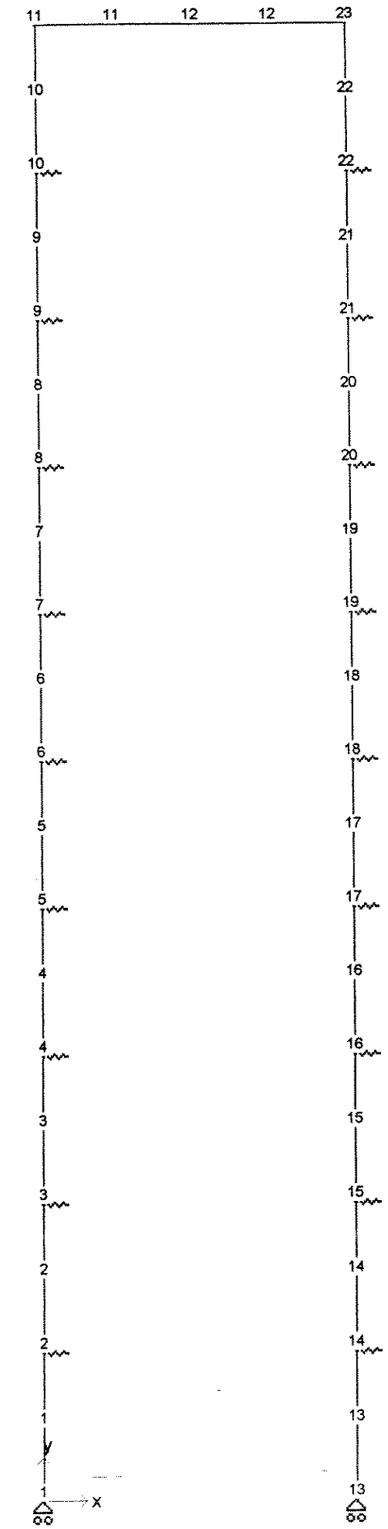
3	Load Case 1	0,5	0,0	0,0	0,0	0,0	0,0
4	Load Case 1	0,1	0,0	0,0	0,0	0,0	0,0
5	Load Case 1	-0,1	0,0	0,0	0,0	0,0	0,0
6	Load Case 1	-0,3	0,0	0,0	0,0	0,0	0,0
7	Load Case 1	-0,6	0,0	0,0	0,0	0,0	0,0
8	Load Case 1	-1,0	0,0	0,0	0,0	0,0	0,0
9	Load Case 1	-1,6	0,0	0,0	0,0	0,0	0,0
10	Load Case 1	-2,4	0,0	0,0	0,0	0,0	0,0
11	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0
12	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0
13	Load Case 1	-0,0	311,9	0,0	0,0	0,0	0,0
14	Load Case 1	1,7	0,0	0,0	0,0	0,0	-0,0
15	Load Case 1	-0,0	0,0	0,0	0,0	0,0	0,0
16	Load Case 1	-1,3	0,0	0,0	0,0	0,0	0,0
17	Load Case 1	-0,6	0,0	0,0	0,0	0,0	0,0
18	Load Case 1	-1,0	0,0	0,0	0,0	0,0	0,0
19	Load Case 1	-1,6	0,0	0,0	0,0	0,0	0,0
20	Load Case 1	-2,2	0,0	0,0	0,0	0,0	0,0
21	Load Case 1	-2,8	0,0	0,0	0,0	0,0	0,0
22	Load Case 1	-3,2	0,0	0,0	0,0	0,0	0,0
23	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0

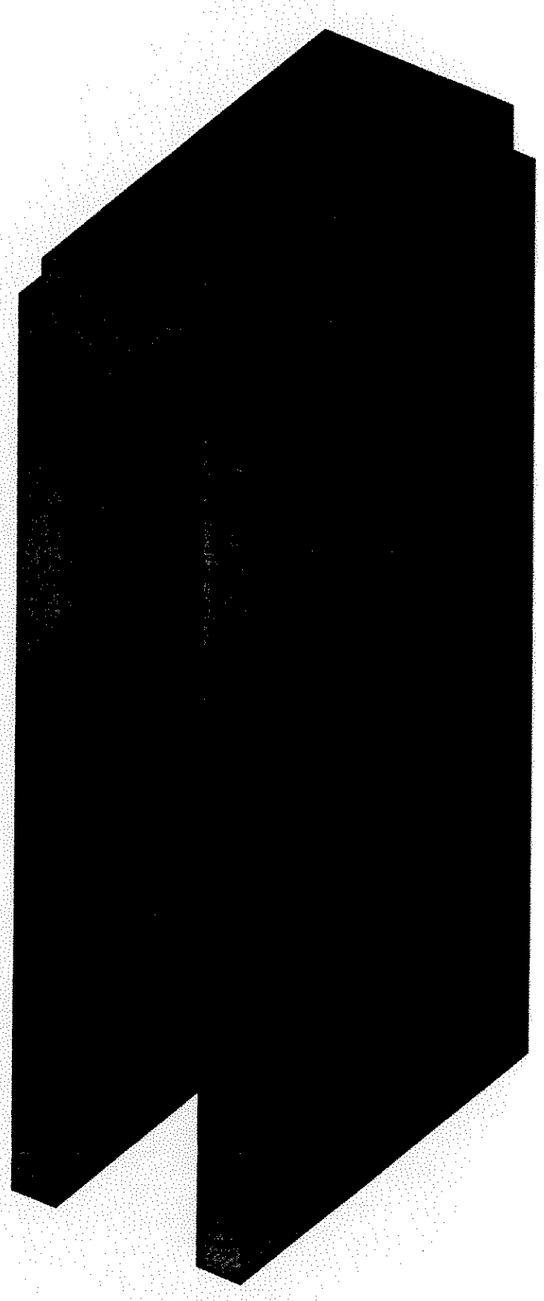
Sum of Reactions (tonne,t-m) Load Case 1

Rx	-15,6
Ry	558,4
Rz	0,0

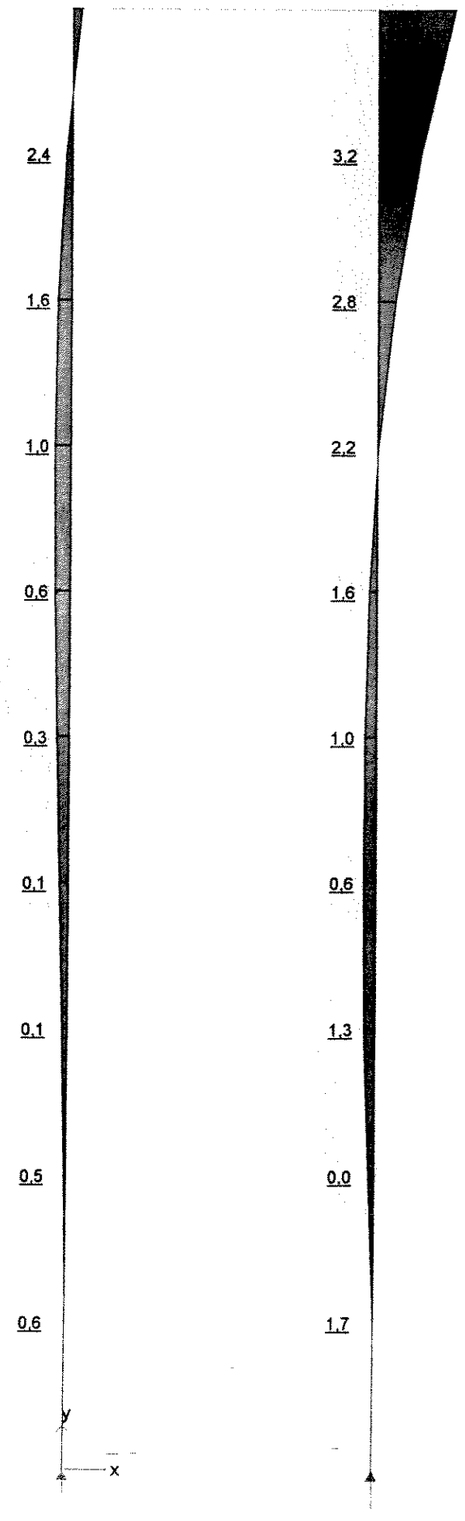
Member Actions (tonne,t-m)

Member	*Load Case*	*Px'*	*Vy'*	*Vz'*	*Tx'*	*My'*	*Mz'*
1	Load Case 1	246,5	0,0	0,0	0,0	0,0	0,0
		-246,5	-0,0	0,0	0,0	0,0	0,0
2	Load Case 1	246,5	-0,6	0,0	0,0	0,0	0,0
		-246,5	0,6	0,0	0,0	0,0	-0,7
3	Load Case 1	246,5	-1,1	0,0	0,0	0,0	0,7
		-246,5	1,1	0,0	0,0	0,0	-2,0
4	Load Case 1	246,5	-1,2	0,0	0,0	0,0	2,0
		-246,5	1,2	0,0	0,0	0,0	-3,4
5	Load Case 1	246,5	-1,1	0,0	0,0	0,0	3,4
		-246,5	1,1	0,0	0,0	0,0	-4,7
6	Load Case 1	246,5	-0,8	0,0	0,0	0,0	4,7
		-246,5	0,8	0,0	0,0	0,0	-5,8
7	Load Case 1	246,5	-0,3	0,0	0,0	0,0	5,8
		-246,5	0,3	0,0	0,0	0,0	-6,1
8	Load Case 1	246,5	0,7	0,0	0,0	0,0	6,1
		-246,5	-0,7	0,0	0,0	0,0	-5,2
9	Load Case 1	246,5	2,4	0,0	0,0	0,0	5,2
		-246,5	-2,4	0,0	0,0	0,0	-2,4
10	Load Case 1	246,5	4,7	0,0	0,0	0,0	2,4
		-246,5	-4,7	0,0	0,0	0,0	3,3
11	Load Case 1	-4,7	246,5	0,0	0,0	0,0	-3,3
		4,7	-246,5	0,0	0,0	0,0	311,4
12	Load Case 1	10,9	-311,9	0,0	0,0	0,0	-361,1
		-10,9	311,9	0,0	0,0	0,0	-28,7
13	Load Case 1	311,9	0,0	0,0	0,0	0,0	0,0
		-311,9	-0,0	0,0	0,0	0,0	-0,0
14	Load Case 1	311,9	-1,7	0,0	0,0	0,0	0,0
		-311,9	1,7	0,0	0,0	0,0	-2,0
15	Load Case 1	311,9	-1,7	0,0	0,0	0,0	2,0
		-311,9	1,7	0,0	0,0	0,0	-4,0
16	Load Case 1	311,9	-0,4	0,0	0,0	0,0	4,0
		-311,9	0,4	0,0	0,0	0,0	-4,5
17	Load Case 1	311,9	0,2	0,0	0,0	0,0	4,5
		-311,9	-0,2	0,0	0,0	0,0	-4,2
18	Load Case 1	311,9	1,2	0,0	0,0	0,0	4,2
		-311,9	-1,2	0,0	0,0	0,0	-2,8
19	Load Case 1	311,9	2,7	0,0	0,0	0,0	2,8
		-311,9	-2,7	0,0	0,0	0,0	0,5
20	Load Case 1	311,9	4,9	0,0	0,0	0,0	-0,5
		-311,9	-4,9	0,0	0,0	0,0	6,4
21	Load Case 1	311,9	7,7	0,0	0,0	0,0	-6,4
		-311,9	-7,7	0,0	0,0	0,0	15,6
22	Load Case 1	311,9	10,9	0,0	0,0	0,0	-15,6
		-311,9	-10,9	0,0	0,0	0,0	28,7

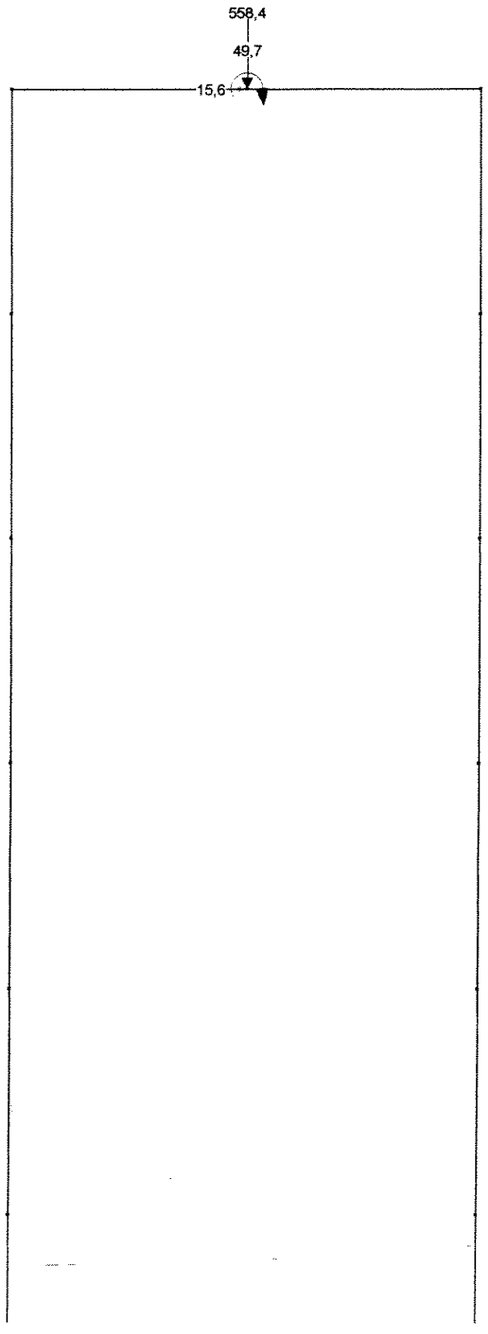




Frame

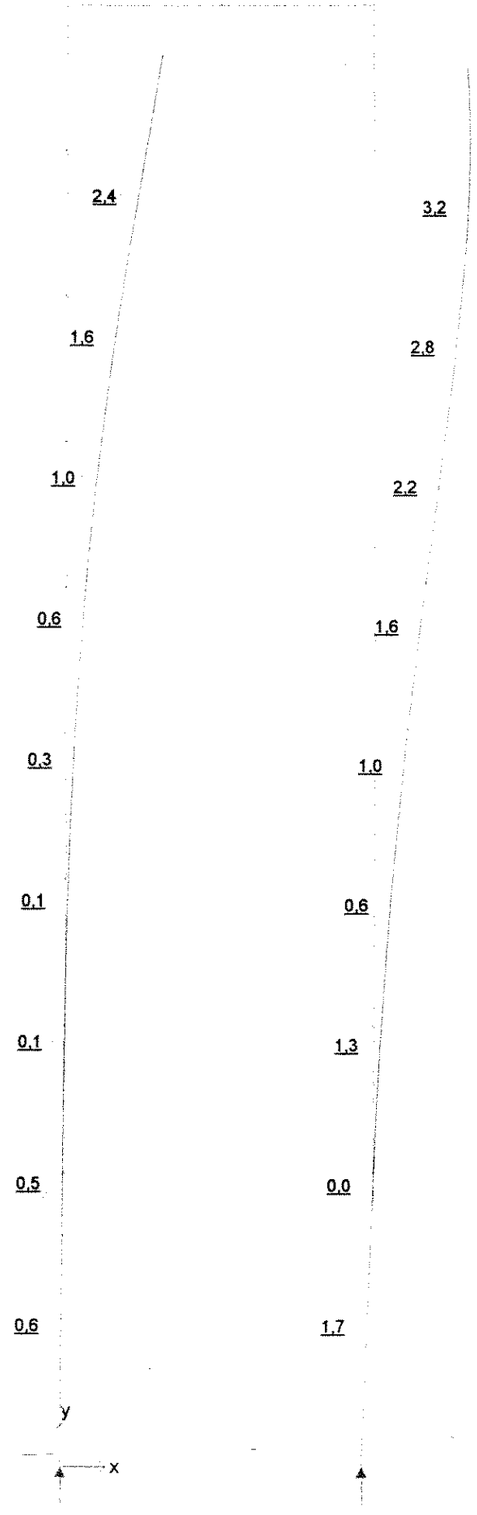


Plot View - Static Case: Load Case 1 Mz' (t-m)



Load View - Load Case 1

viernes, 05 de diciembre de 2003
Multiframe3D Version 8.52
Page 1
C:\Archivos de programa\Multiframe\AVE OLERDOLA\CIMENT. ESTRIBO.mfd



Plot View - Static Case: Load Case 1 Defl (mm)

ANEJO Nº 2

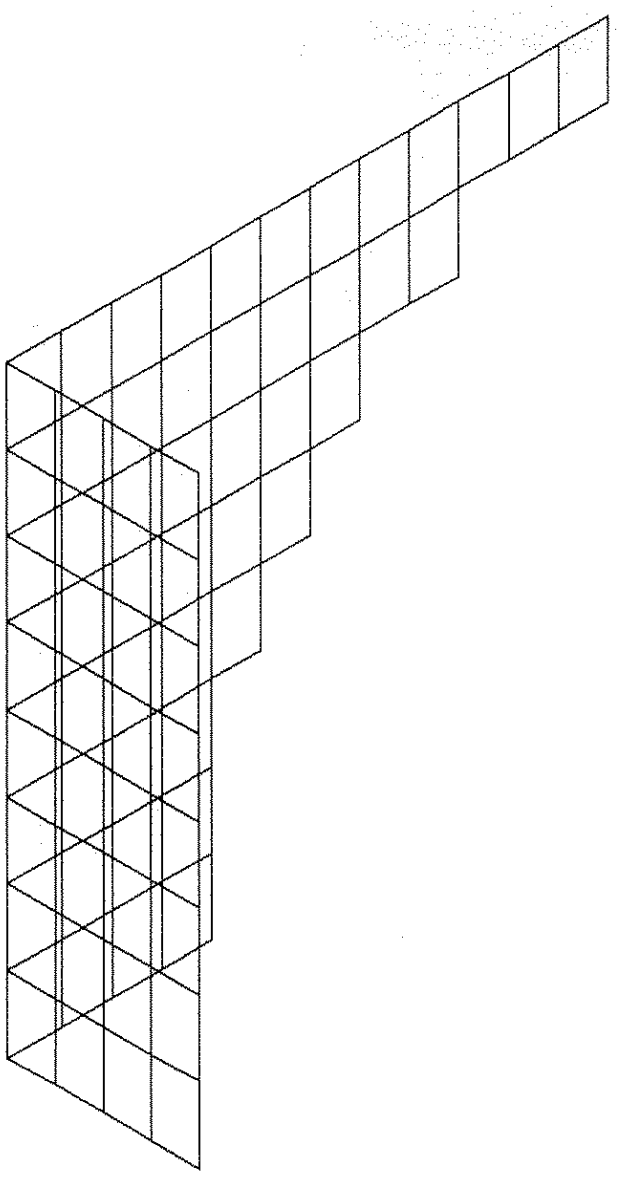
MODELO DE CIMENTACIÓN DE ESTRIBO 2

```
        ESTRIBO 2 OF 4+300                                                    97        L=2 F=-4.5,0,0,0,0,3.6
SYSTEM
L=2
JOINTS
1     X=0    Y=0    Z=-11
12    X=0    Y=0    Z=-1
97    X=0    Y=11   Z=-11
108   X=0    Y=11   Z=-1    Q=1,12,97,108,1,12
109   X=0    Y=0    Z=0
113   X=3.5  Y=0    Z=0
149   X=0    Y=11   Z=0
153   X=3.5  Y=11   Z=0     Q=109,113,149,153,1,5

RESTRAINTS
1,12,1      R=1,1,1,1,1,1
109,113,1   R=1,1,1,1,1,1
118,153,5   R=1,0,0,0,1,1
13,20,1     R=1,1,1,1,1,1
25,32,1     R=1,1,1,1,1,1
37,43,1     R=1,1,1,1,1,1
49,54,1     R=1,1,1,1,1,1
61,65,1     R=1,1,1,1,1,1
73,75,1     R=1,1,1,1,1,1

SHELL
NM=1   Y=-1,0
1     E=3800000   U=0.2   W=2.5
1     JQ=9,10,21,22      ETYPE=0     M=1     TH=1            G=3,4
13    JQ=57,58,69,70                         TH=0.60         G=3,4
25    JQ=44,45,56,57                         TH=0.6
26    JQ=55,56,67,68     G=2,1
28    JQ=66,67,78,79     G=3,1
31    JQ=76,77,88,89     G=5,1
36    JQ=85,86,97,98     G=8,1
44    JQ=12,109,24,114                       TH=1
45    JQ=24,114,36,119
46    JQ=36,119,48,124
47    JQ=48,124,60,129
48    JQ=60,129,72,134                       TH=0.60
49    JQ=72,134,84,139
50    JQ=84,139,96,144
51    JQ=96,144,108,149
75    JQ=109,110,114,115                      TH=1.20         G=4,6
76    JQ=139,140,144,145                      TH=0.45         G=4,2

LOADS
145,147,1 L=1 F=0,-28.1,0.5,8.43,0,0
21,24,1   L=1 F=-7.88,0,0
33,36,1   L=1 F=-6.81,0,0
45,48,1   L=1 F=-5.74,0,0
55,60,1   L=1 F=-4.67,0,0
66,72,1   L=1 F=-3.59,0,0
76,84,1   L=1 F=-2.52,0,0
85,96,1   L=1 F=-1.45,0,0
97,108,1  L=1 F=-0.32,0,0
115,118,1 L=1 F=0,0,7.52
120,123,1 L=1 F=0,0,6.5
125,128,1 L=1 F=0,0,5.48
130,133,1 L=1 F=0,0,4.46
135,138,1 L=1 F=0,0,3.43
140,143,1 L=1 F=0,0,2.40
145,148,1 L=1 F=0,0,1.38
150,153,1 L=1 F=0,0,0.31
```



Y
Z X

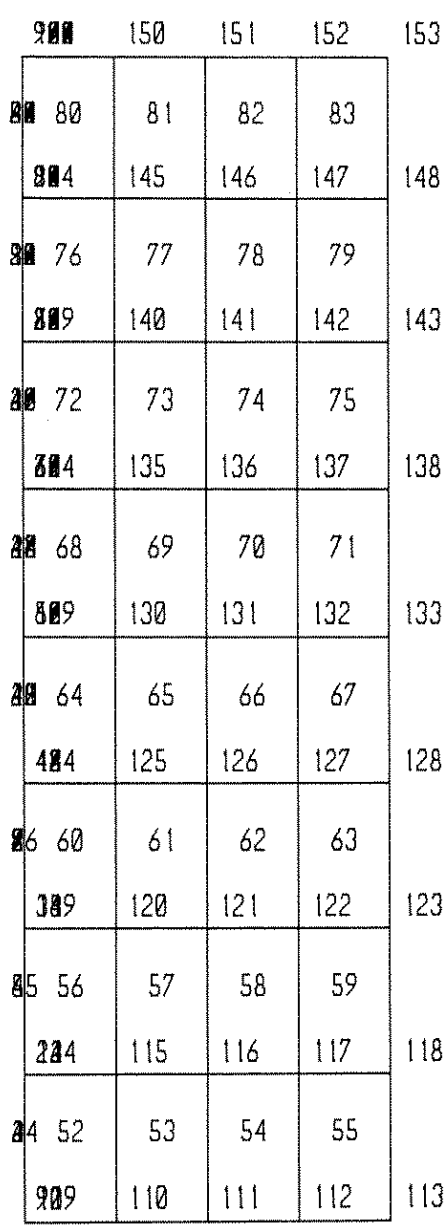
EST2430

UNDEFORMED
SHAPE

OPTIONS

WIRE FRAME

SAP90



Y
X

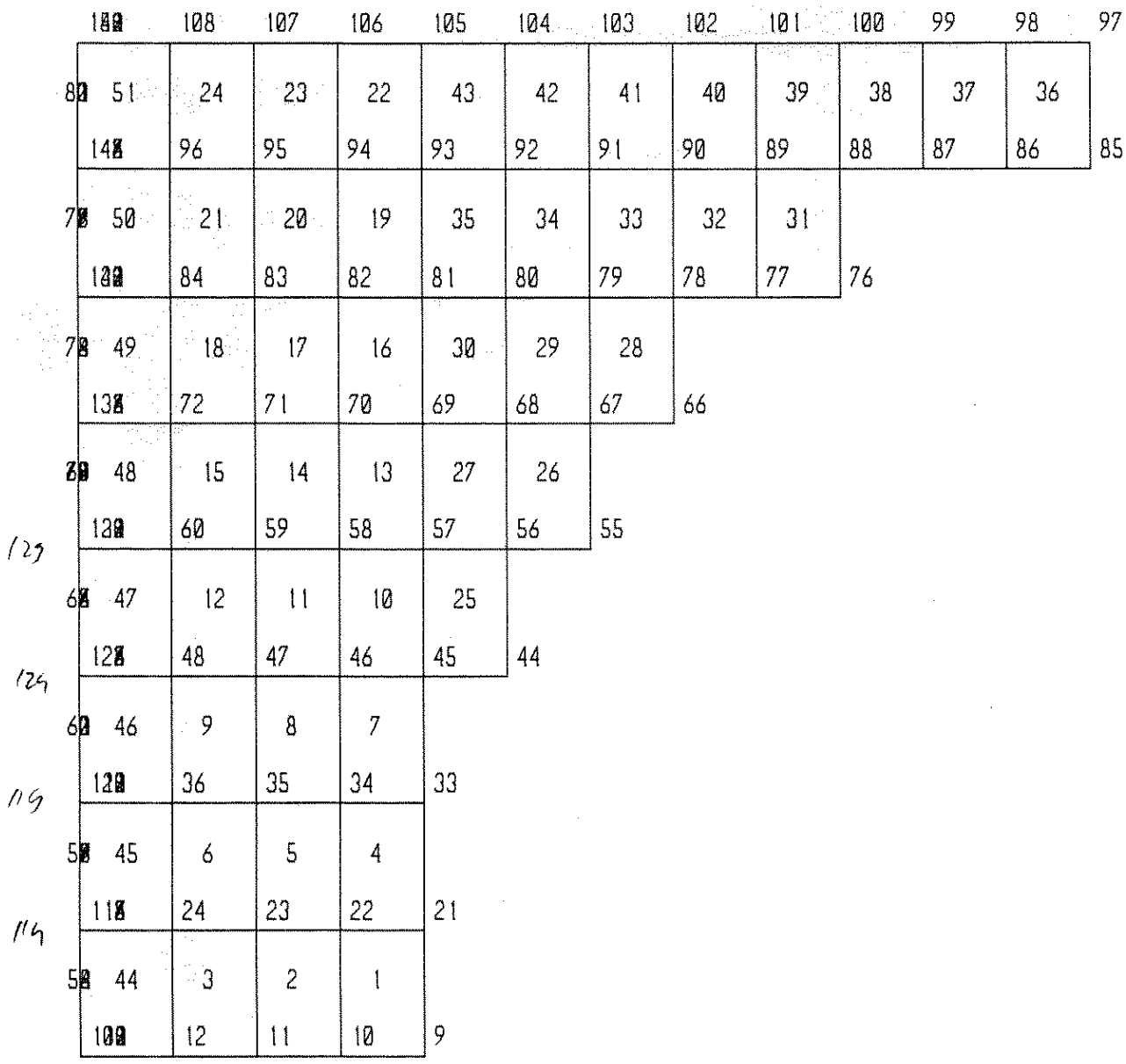
EST2430

UNDEFORMED
SHAPE

OPTIONS

JOINT IDS
ELEMENT IDS
WIRE FRAME

SAP90



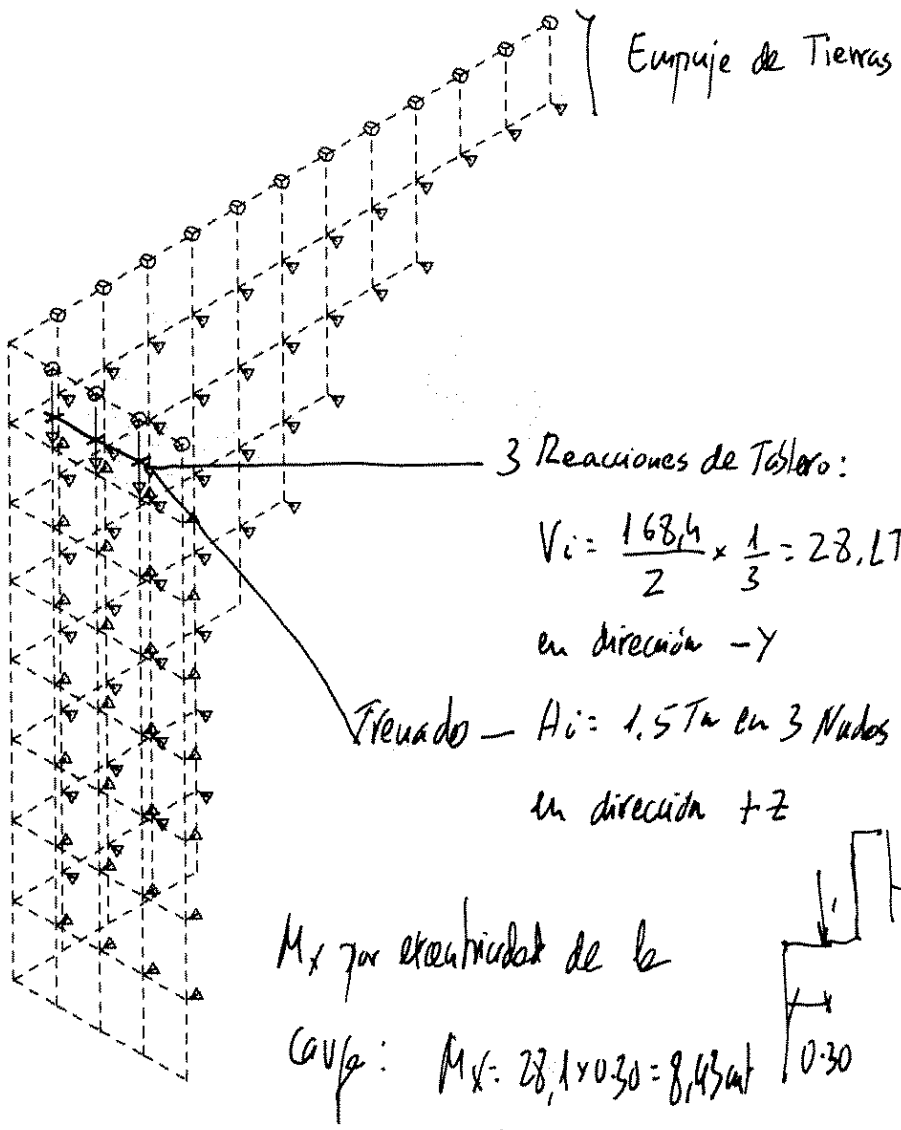
EST2430

UNDEFORMED SHAPE

OPTIONS

JOINT IDS
ELEMENT IDS
WIRE FRAME

SAP90



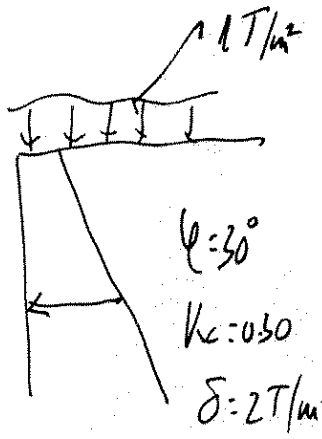
EST2430

JOINT LOADS

LOAD 1

MINIMA
P -.2810E+02
MAXIMA
P .7520E+01

SAP90



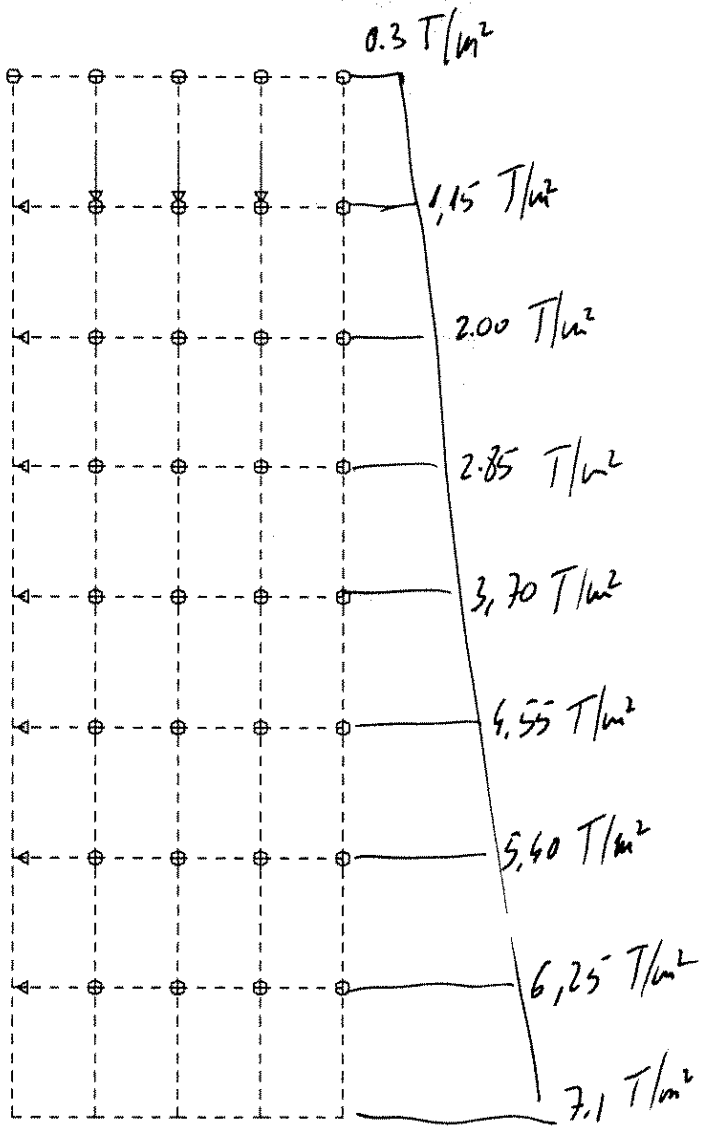
$\sigma = 0.30(\delta z + q)$

↑ Ley de Empujes

Carga/nudo = $\sigma \times 1.375 \times b$,

$b = 0,917$ ó $b = 0.875$

según corresponda

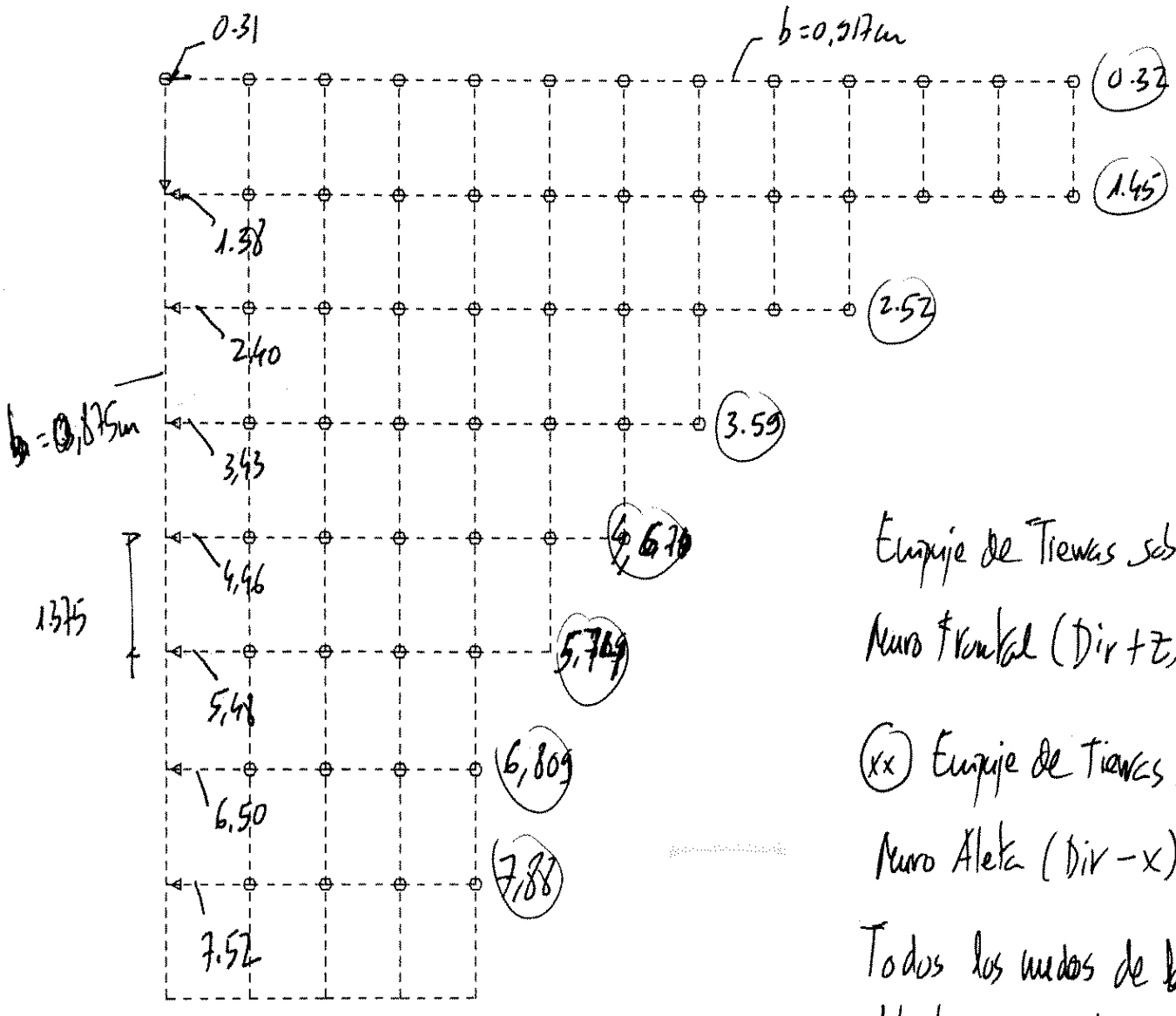


Y
X

EST2430
JOINT
LOADS
LOAD 1

MINIMA
P -.2810E+02
MAXIMA
P .7520E+01

SAP90



Empuje de Tierras sobre Muro Frontal (Dir +z), Tn

(xx) Empuje de Tierras sobre Muro Aleta (Dir -x), Tn

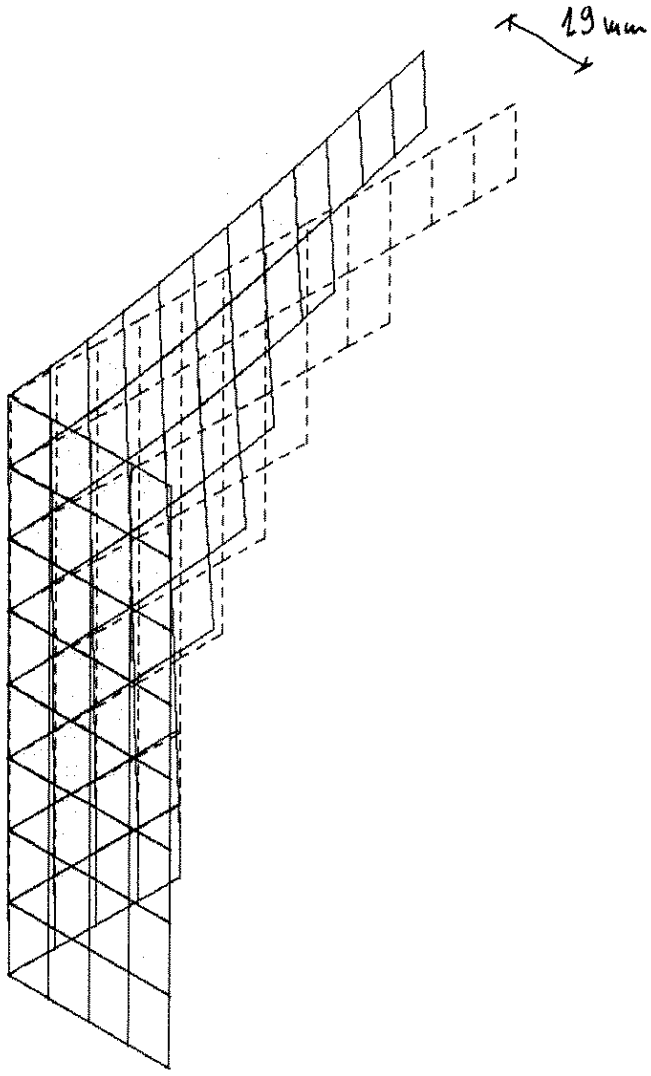
Todos los nudos de la misma fila tienen idéntica carga.

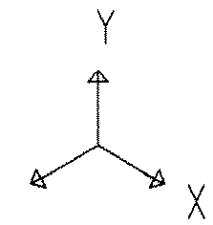
Y
Z

EST2430
JOINT
LOADS
LOAD 1

MINIMA
P -.2810E+02
MAXIMA
P .7520E+01

SAP90





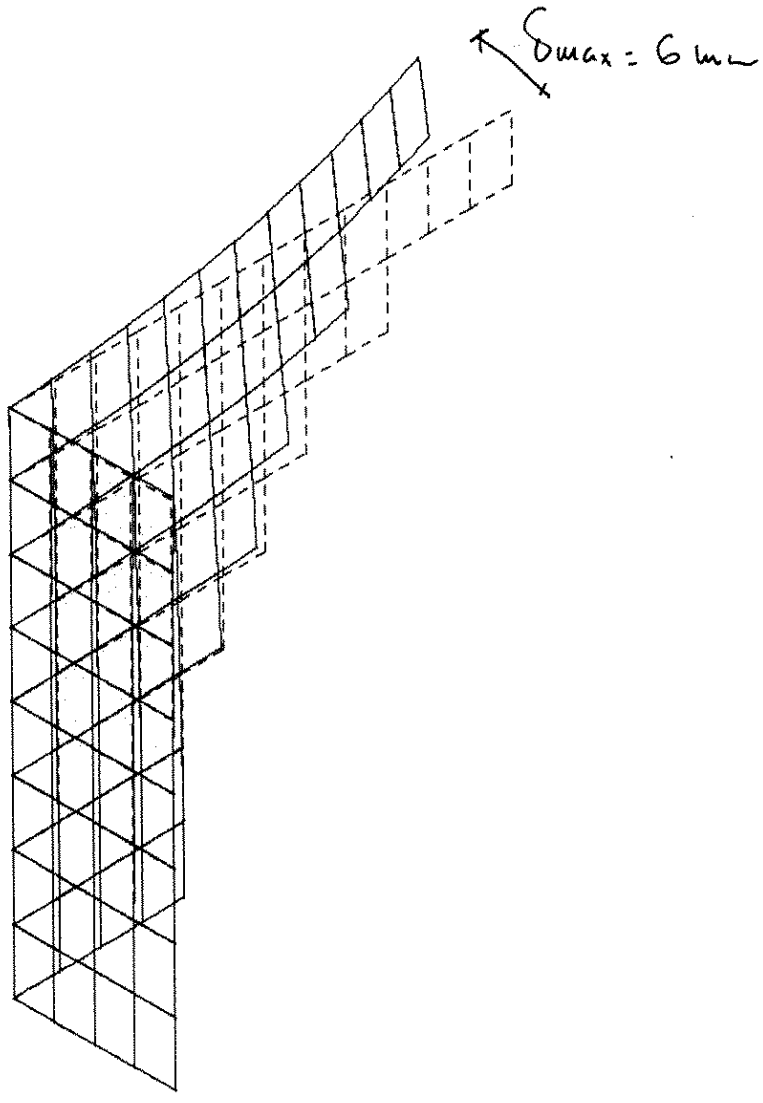
EST2430

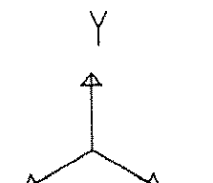
DEFORMED SHAPE

LOAD 1

MINIMA
X -.1867E-01
Y -.1124E-03
Z -.7868E-04
MAXIMA
X .1215E-06
Y .9166E-04
Z .3520E-03

SAP90





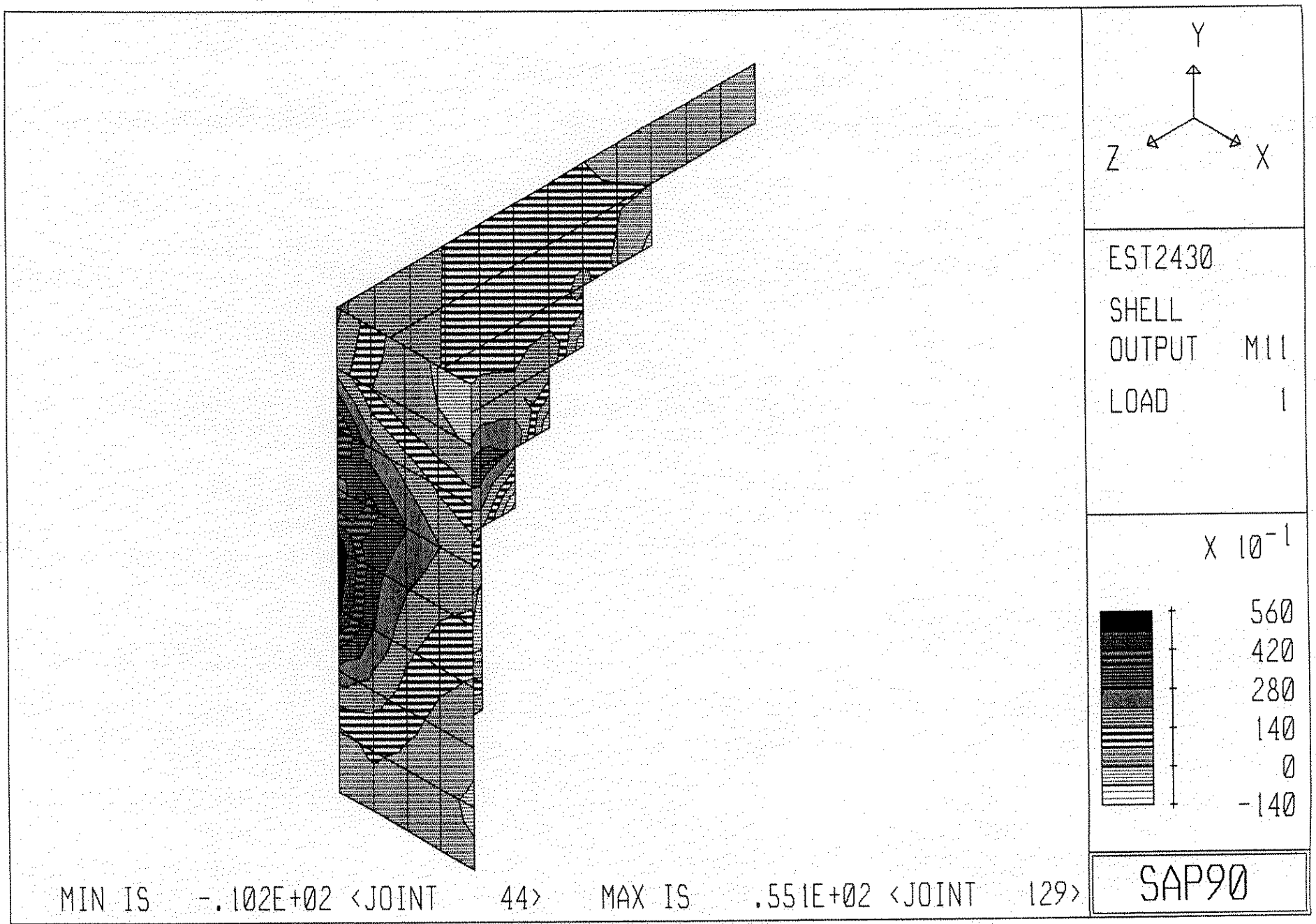
EST2430

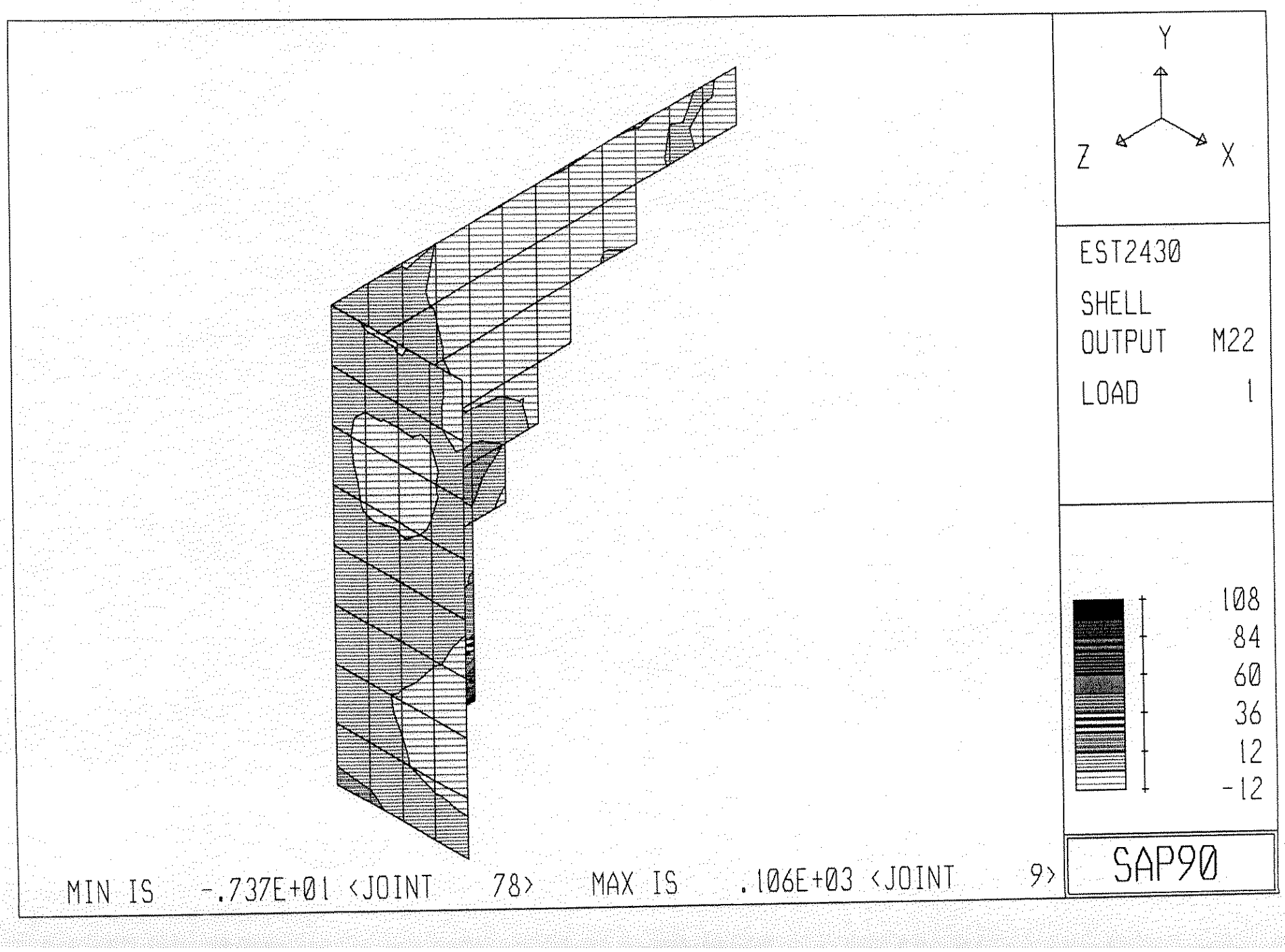
DEFORMED SHAPE

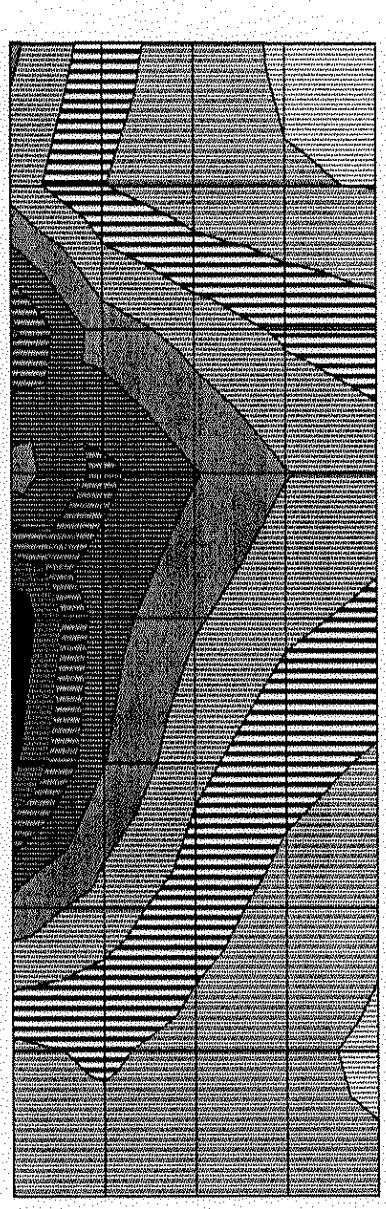
LOAD 2

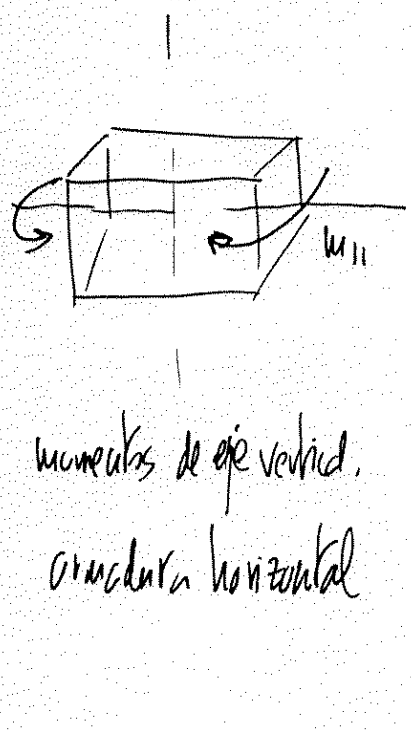
MINIMA
X -.5966E-02
Y -.1623E-05
Z -.1707E-03
MAXIMA
X .9756E-06
Y .3029E-05
Z .4962E-05

SAP90


Y
Z
X
EST2430
SHELL
OUTPUT M11
LOAD 1
X 10-1
560
420
280
140
0
-140
SAP90
MIN IS -.102E+02 <JOINT 44> MAX IS .551E+02 <JOINT 129>


Y
Z
X
EST2430
SHELL
OUTPUT M22
LOAD 1
108
84
60
36
12
-12
SAP90
MIN IS -.737E+01 <JOINT 78> MAX IS .106E+03 <JOINT 9>





Momentos de eje vertical, armadura horizontal

Y
X

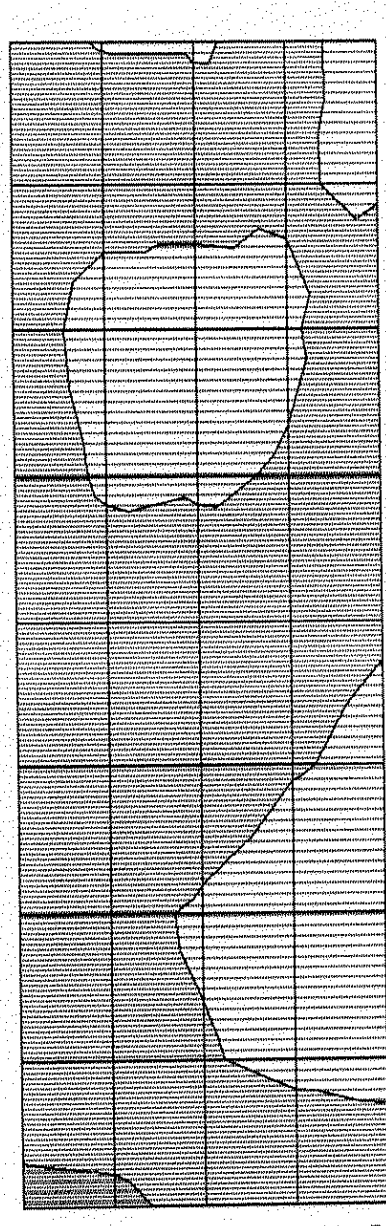
EST2430
SHELL
OUTPUT M11
LOAD 1

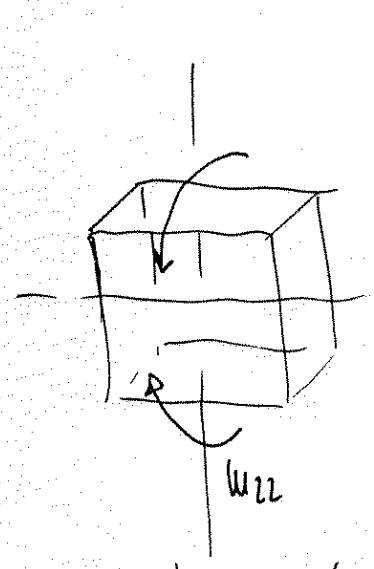
X 10^{-1}

560
420
280
140
0
-140

SAP90

MIN IS -.102E+02 <JOINT 44> MAX IS .551E+02 <JOINT 129>





Momentos de eje horizontal, armadura vertical

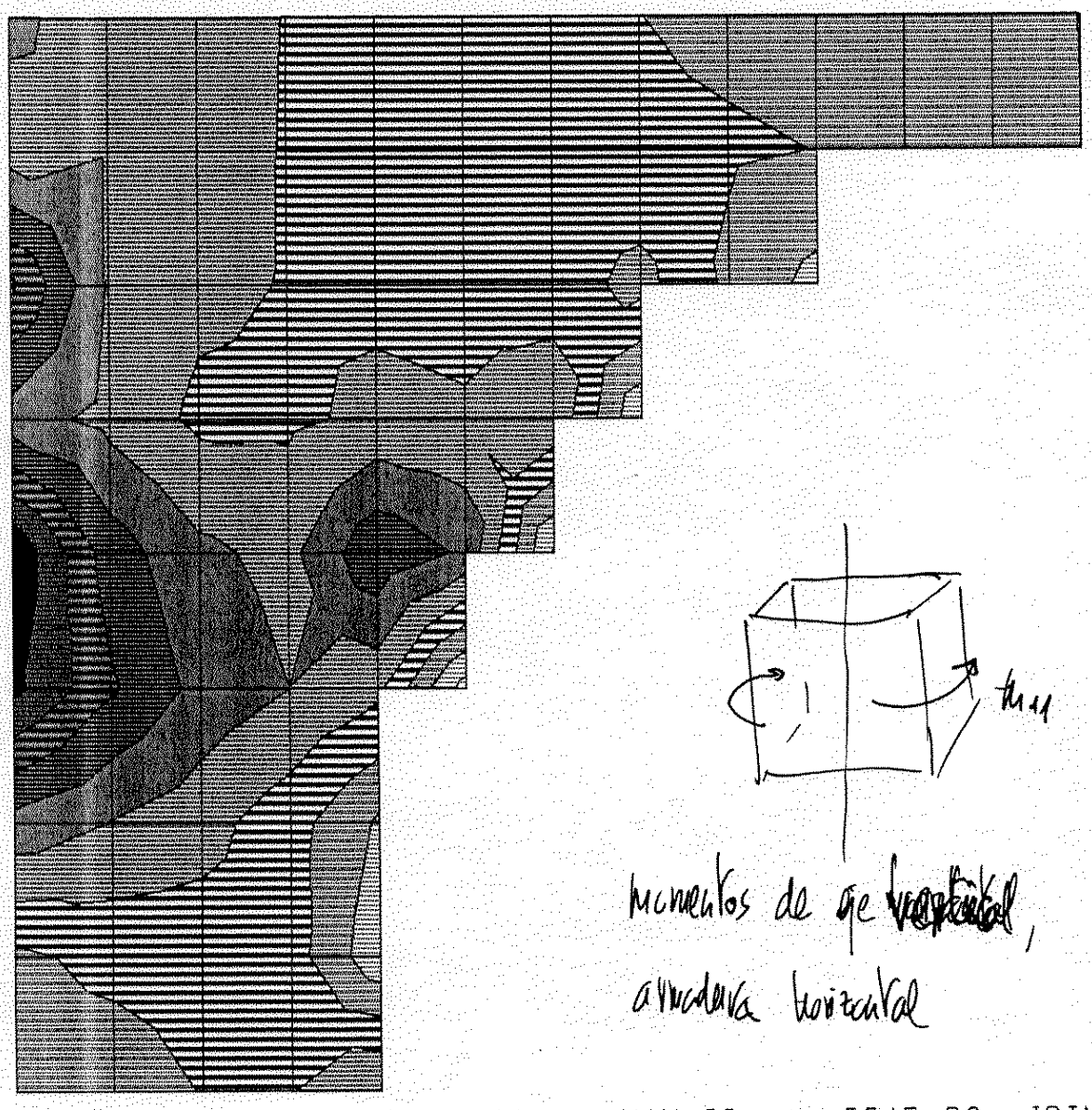
Y
X

EST2430
SHELL
OUTPUT M22
LOAD 1

108
84
60
36
12
-12

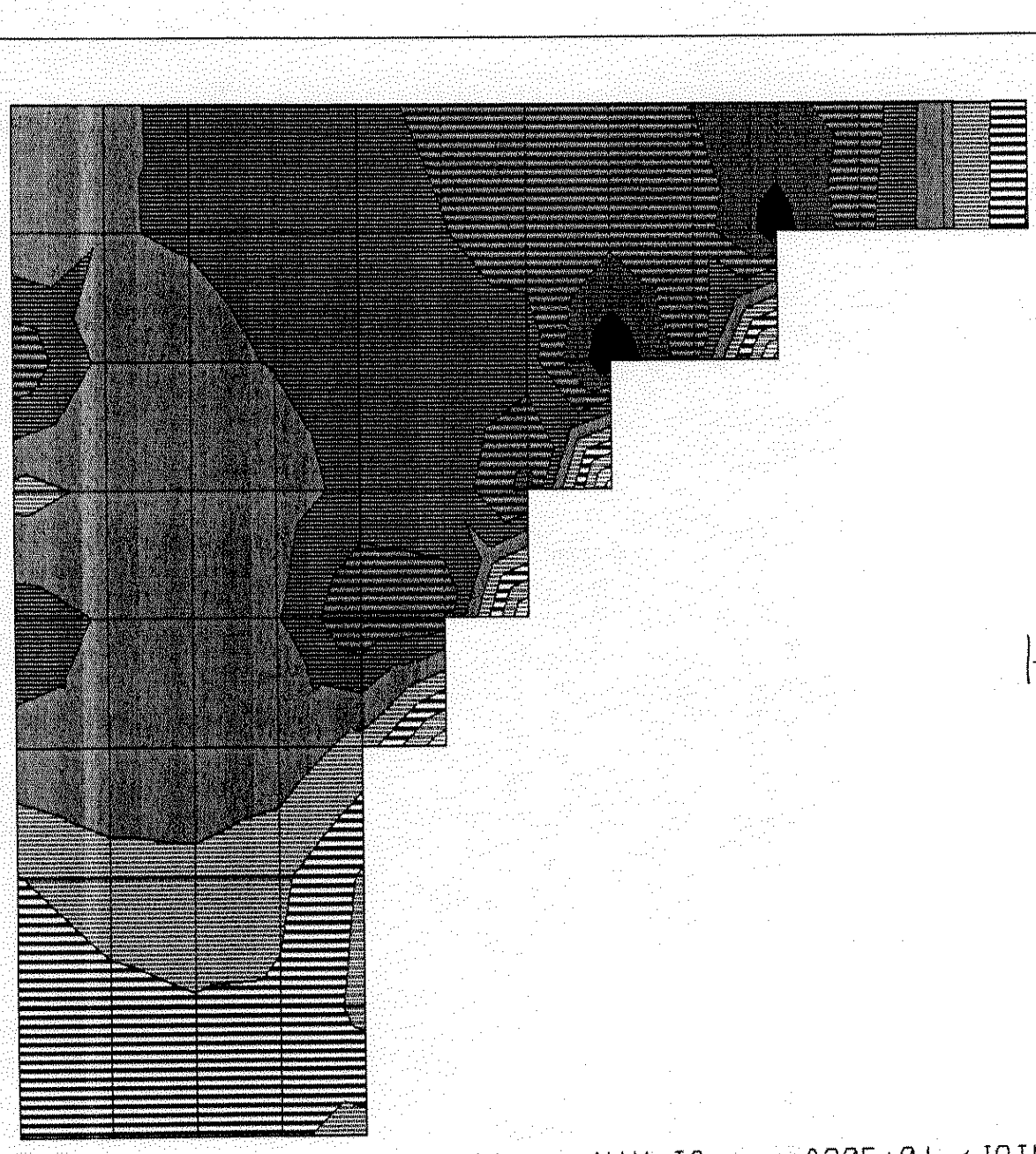
SAP90

MIN IS -.737E+01 <JOINT 78> MAX IS .106E+03 <JOINT 9>

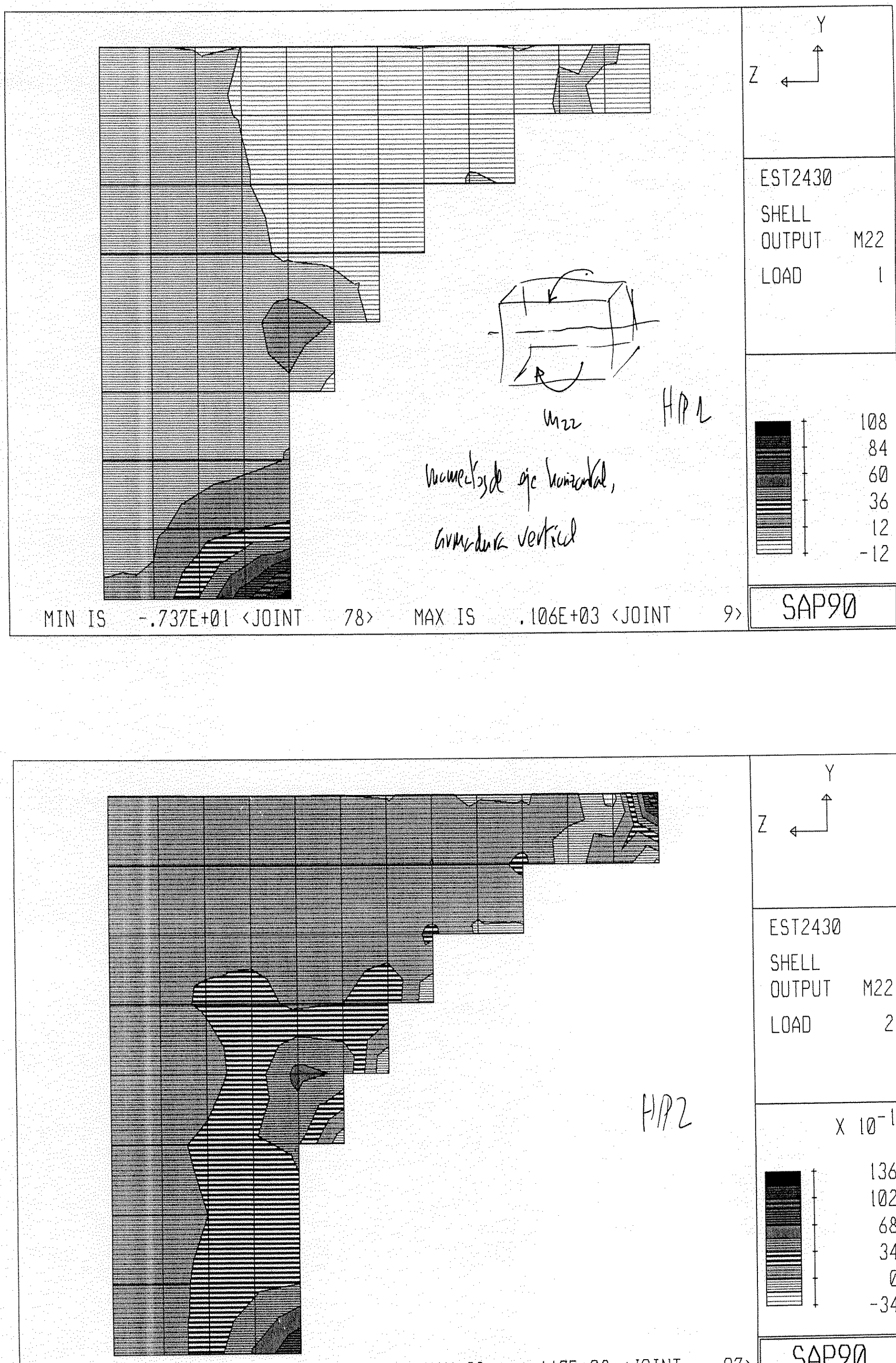


HIP 1

momentos de eje horizontal,
armadura horizontal



HIP 2


Y
Z
EST2430
SHELL
OUTPUT M22
LOAD 1
108
84
60
36
12
-12
SAP90
M22
HP2
momentos en horizontal,
compresión vertical
MIN IS -.737E+01 <JOINT 78> MAX IS .106E+03 <JOINT 9>
Y
Z
EST2430
SHELL
OUTPUT M22
LOAD 2
X 10-1
136
102
68
34
0
-34
SAP90
HP2
MIN IS -.316E+01 <JOINT 113> MAX IS .117E+02 <JOINT 97>

ESTRIBO 2 OF 4+300

S Y S T E M D A T A

EXECUTION CODE	0
NUMBER OF LOAD CONDITIONS	2
STEADY STATE LOAD FREQUENCY	.0000E+00
NUMBER OF EIGENVALUES	0
EIGEN CONVERGENCE TOLERANCE	.1000E-03
EIGEN CUTOFF TIME PERIOD	.0000E+00

ESTRIBO 2 OF 4+300

G E N E R A T E D J O I N T C O O R D I N A T E S

JOINT	X	Y	Z
1	.000	.000	-11.000
2	.000	.000	-10.091
3	.000	.000	-9.182
4	.000	.000	-8.273
5	.000	.000	-7.364
6	.000	.000	-6.455
7	.000	.000	-5.545
8	.000	.000	-4.636
9	.000	.000	-3.727
10	.000	.000	-2.818
11	.000	.000	-1.909
12	.000	.000	-1.000
13	.000	1.375	-11.000
14	.000	1.375	-10.091
15	.000	1.375	-9.182
16	.000	1.375	-8.273
17	.000	1.375	-7.364
18	.000	1.375	-6.455
19	.000	1.375	-5.545
20	.000	1.375	-4.636
21	.000	1.375	-3.727
22	.000	1.375	-2.818
23	.000	1.375	-1.909
24	.000	1.375	-1.000
25	.000	2.750	-11.000
26	.000	2.750	-10.091
27	.000	2.750	-9.182
28	.000	2.750	-8.273
29	.000	2.750	-7.364
30	.000	2.750	-6.455
31	.000	2.750	-5.545
32	.000	2.750	-4.636
33	.000	2.750	-3.727
34	.000	2.750	-2.818
35	.000	2.750	-1.909
36	.000	2.750	-1.000
37	.000	4.125	-11.000
38	.000	4.125	-10.091
39	.000	4.125	-9.182
40	.000	4.125	-8.273
41	.000	4.125	-7.364
42	.000	4.125	-6.455
43	.000	4.125	-5.545
44	.000	4.125	-4.636
45	.000	4.125	-3.727
46	.000	4.125	-2.818
47	.000	4.125	-1.909
48	.000	4.125	-1.000
49	.000	5.500	-11.000
50	.000	5.500	-10.091
51	.000	5.500	-9.182
52	.000	5.500	-8.273

ESTRIBO 2 OF 4+300

GENERATED JOINT COORDINATES

JOINT	X	Y	Z
53	.000	5.500	-7.364
54	.000	5.500	-6.455
55	.000	5.500	-5.545
56	.000	5.500	-4.636
57	.000	5.500	-3.727
58	.000	5.500	-2.818
59	.000	5.500	-1.909
60	.000	5.500	-1.000
61	.000	6.875	-11.000
62	.000	6.875	-10.091
63	.000	6.875	-9.182
64	.000	6.875	-8.273
65	.000	6.875	-7.364
66	.000	6.875	-6.455
67	.000	6.875	-5.545
68	.000	6.875	-4.636
69	.000	6.875	-3.727
70	.000	6.875	-2.818
71	.000	6.875	-1.909
72	.000	6.875	-1.000
73	.000	8.250	-11.000
74	.000	8.250	-10.091
75	.000	8.250	-9.182
76	.000	8.250	-8.273
77	.000	8.250	-7.364
78	.000	8.250	-6.455
79	.000	8.250	-5.545
80	.000	8.250	-4.636
81	.000	8.250	-3.727
82	.000	8.250	-2.818
83	.000	8.250	-1.909
84	.000	8.250	-1.000
85	.000	9.625	-11.000
86	.000	9.625	-10.091
87	.000	9.625	-9.182
88	.000	9.625	-8.273
89	.000	9.625	-7.364
90	.000	9.625	-6.455
91	.000	9.625	-5.545
92	.000	9.625	-4.636
93	.000	9.625	-3.727
94	.000	9.625	-2.818
95	.000	9.625	-1.909
96	.000	9.625	-1.000
97	.000	11.000	-11.000
98	.000	11.000	-10.091
99	.000	11.000	-9.182
100	.000	11.000	-8.273
101	.000	11.000	-7.364
102	.000	11.000	-6.455
103	.000	11.000	-5.545
104	.000	11.000	-4.636

ESTRIBO 2 OF 4+300

GENERATED JOINT COORDINATES

JOINT	X	Y	Z
105	.000	11.000	-3.727
106	.000	11.000	-2.818
107	.000	11.000	-1.909
108	.000	11.000	-1.000
109	.000	.000	.000
110	.875	.000	.000
111	1.750	.000	.000
112	2.625	.000	.000
113	3.500	.000	.000
114	.000	1.375	.000
115	.875	1.375	.000
116	1.750	1.375	.000
117	2.625	1.375	.000
118	3.500	1.375	.000
119	.000	2.750	.000
120	.875	2.750	.000
121	1.750	2.750	.000
122	2.625	2.750	.000
123	3.500	2.750	.000
124	.000	4.125	.000
125	.875	4.125	.000
126	1.750	4.125	.000
127	2.625	4.125	.000
128	3.500	4.125	.000
129	.000	5.500	.000
130	.875	5.500	.000
131	1.750	5.500	.000
132	2.625	5.500	.000
133	3.500	5.500	.000
134	.000	6.875	.000
135	.875	6.875	.000
136	1.750	6.875	.000
137	2.625	6.875	.000
138	3.500	6.875	.000
139	.000	8.250	.000
140	.875	8.250	.000
141	1.750	8.250	.000
142	2.625	8.250	.000
143	3.500	8.250	.000
144	.000	9.625	.000
145	.875	9.625	.000
146	1.750	9.625	.000
147	2.625	9.625	.000
148	3.500	9.625	.000
149	.000	11.000	.000
150	.875	11.000	.000
151	1.750	11.000	.000
152	2.625	11.000	.000
153	3.500	11.000	.000

ESTRIBO 2 OF 4+300

RESTRAINT DATA

JOINT	RX	RY	RZ	RXX	RYY	RZZ
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	1	1	1	1	1	1
12	1	1	1	1	1	1
13	1	1	1	1	1	1
14	1	1	1	1	1	1
15	1	1	1	1	1	1
16	1	1	1	1	1	1
17	1	1	1	1	1	1
18	1	1	1	1	1	1
19	1	1	1	1	1	1
20	1	1	1	1	1	1
25	1	1	1	1	1	1
26	1	1	1	1	1	1
27	1	1	1	1	1	1
28	1	1	1	1	1	1
29	1	1	1	1	1	1
30	1	1	1	1	1	1
31	1	1	1	1	1	1
32	1	1	1	1	1	1
37	1	1	1	1	1	1
38	1	1	1	1	1	1
39	1	1	1	1	1	1
40	1	1	1	1	1	1
41	1	1	1	1	1	1
42	1	1	1	1	1	1
43	1	1	1	1	1	1
49	1	1	1	1	1	1
50	1	1	1	1	1	1
51	1	1	1	1	1	1
52	1	1	1	1	1	1
53	1	1	1	1	1	1
54	1	1	1	1	1	1
61	1	1	1	1	1	1
62	1	1	1	1	1	1
63	1	1	1	1	1	1
64	1	1	1	1	1	1
65	1	1	1	1	1	1
73	1	1	1	1	1	1
74	1	1	1	1	1	1
75	1	1	1	1	1	1
109	1	1	1	1	1	1
110	1	1	1	1	1	1
111	1	1	1	1	1	1

ESTRIBO 2 OF 4+300

RESTRAINT DATA

JOINT	RX	RY	RZ	RXX	RYY	RZZ
112	1	1	1	1	1	1
113	1	1	1	1	1	1
118	1	0	0	0	1	1
123	1	0	0	0	1	1
128	1	0	0	0	1	1
133	1	0	0	0	1	1
138	1	0	0	0	1	1
143	1	0	0	0	1	1
148	1	0	0	0	1	1
153	1	0	0	0	1	1

ESTRIBO 2 OF 4+300

S H E L L C O N T R O L D A T A

NUMBER OF ELEMENT MATERIAL TYPES 1
TYPE OF OUTPUT RESULTANTS

LOAD COND	GRAVITATIONAL MULTIPLIERS X	Y	Z	TEMPERATURE MULTIPLIERS	PRESSURE MULTIPLIERS
1	.000	-1.000	.000	.000	.000
2	.000	.000	.000	.000	.000

ESTRIBO 2 OF 4+300

M A T E R I A L P R O P E R T Y D A T A

MAT ID	MODULUS OF ELASTICITY	POISSONS RATIO	WEIGHT PER UNIT VOL	MASS PER UNIT VOL	THERMAL EXPANSION
1	.3800E+07	.2000E+00	.2500E+01	.0000E+00	.0000E+00

ESTRIBO 2 OF 4+300

SHELL ELEMENT DATA

ELT ID	JOINT I	JOINT J	JOINT K	JOINT L	ELT TYPE	MAT ID	MEMBRANE THICKNESS	BENDING THICKNESS	REF TEMP	LOC AXIS
1	9	10	21	22	0	1	.1000E+01	.1000E+01	.00	0
2	10	11	22	23	0	1	.1000E+01	.1000E+01	.00	0
3	11	12	23	24	0	1	.1000E+01	.1000E+01	.00	0
4	21	22	33	34	0	1	.1000E+01	.1000E+01	.00	0
5	22	23	34	35	0	1	.1000E+01	.1000E+01	.00	0
6	23	24	35	36	0	1	.1000E+01	.1000E+01	.00	0
7	33	34	45	46	0	1	.1000E+01	.1000E+01	.00	0
8	34	35	46	47	0	1	.1000E+01	.1000E+01	.00	0
9	35	36	47	48	0	1	.1000E+01	.1000E+01	.00	0
10	45	46	57	58	0	1	.1000E+01	.1000E+01	.00	0
11	46	47	58	59	0	1	.1000E+01	.1000E+01	.00	0
12	47	48	59	60	0	1	.1000E+01	.1000E+01	.00	0
13	57	58	69	70	0	1	.6000E+00	.6000E+00	.00	0
14	58	59	70	71	0	1	.6000E+00	.6000E+00	.00	0
15	59	60	71	72	0	1	.6000E+00	.6000E+00	.00	0
16	69	70	81	82	0	1	.6000E+00	.6000E+00	.00	0
17	70	71	82	83	0	1	.6000E+00	.6000E+00	.00	0
18	71	72	83	84	0	1	.6000E+00	.6000E+00	.00	0
19	81	82	93	94	0	1	.6000E+00	.6000E+00	.00	0
20	82	83	94	95	0	1	.6000E+00	.6000E+00	.00	0
21	83	84	95	96	0	1	.6000E+00	.6000E+00	.00	0
22	93	94	105	106	0	1	.6000E+00	.6000E+00	.00	0
23	94	95	106	107	0	1	.6000E+00	.6000E+00	.00	0
24	95	96	107	108	0	1	.6000E+00	.6000E+00	.00	0
25	44	45	56	57	0	1	.6000E+00	.6000E+00	.00	0
26	55	56	67	68	0	1	.6000E+00	.6000E+00	.00	0
27	56	57	68	69	0	1	.6000E+00	.6000E+00	.00	0
28	66	67	78	79	0	1	.6000E+00	.6000E+00	.00	0
29	67	68	79	80	0	1	.6000E+00	.6000E+00	.00	0
30	68	69	80	81	0	1	.6000E+00	.6000E+00	.00	0
31	76	77	88	89	0	1	.6000E+00	.6000E+00	.00	0
32	77	78	89	90	0	1	.6000E+00	.6000E+00	.00	0
33	78	79	90	91	0	1	.6000E+00	.6000E+00	.00	0
34	79	80	91	92	0	1	.6000E+00	.6000E+00	.00	0
35	80	81	92	93	0	1	.6000E+00	.6000E+00	.00	0
36	85	86	97	98	0	1	.6000E+00	.6000E+00	.00	0
37	86	87	98	99	0	1	.6000E+00	.6000E+00	.00	0
38	87	88	99	100	0	1	.6000E+00	.6000E+00	.00	0
39	88	89	100	101	0	1	.6000E+00	.6000E+00	.00	0
40	89	90	101	102	0	1	.6000E+00	.6000E+00	.00	0
41	90	91	102	103	0	1	.6000E+00	.6000E+00	.00	0
42	91	92	103	104	0	1	.6000E+00	.6000E+00	.00	0
43	92	93	104	105	0	1	.6000E+00	.6000E+00	.00	0
44	12	109	24	114	0	1	.1000E+01	.1000E+01	.00	0
45	24	114	36	119	0	1	.1000E+01	.1000E+01	.00	0
46	36	119	48	124	0	1	.1000E+01	.1000E+01	.00	0
47	48	124	60	129	0	1	.1000E+01	.1000E+01	.00	0
48	60	129	72	134	0	1	.6000E+00	.6000E+00	.00	0
49	72	134	84	139	0	1	.6000E+00	.6000E+00	.00	0
50	84	139	96	144	0	1	.6000E+00	.6000E+00	.00	0
51	96	144	108	149	0	1	.6000E+00	.6000E+00	.00	0

ESTRIBO 2 OF 4+300

SHELL ELEMENT DATA

ELT ID	JOINT I	JOINT J	JOINT K	JOINT L	ELT TYPE	MAT ID	MEMBRANE THICKNESS	BENDING THICKNESS	REF TEMP	LOC AXIS
52	109	110	114	115	0	1	.1200E+01	.1200E+01	.00	0
53	110	111	115	116	0	1	.1200E+01	.1200E+01	.00	0
54	111	112	116	117	0	1	.1200E+01	.1200E+01	.00	0
55	112	113	117	118	0	1	.1200E+01	.1200E+01	.00	0
56	114	115	119	120	0	1	.1200E+01	.1200E+01	.00	0
57	115	116	120	121	0	1	.1200E+01	.1200E+01	.00	0
58	116	117	121	122	0	1	.1200E+01	.1200E+01	.00	0
59	117	118	122	123	0	1	.1200E+01	.1200E+01	.00	0
60	119	120	124	125	0	1	.1200E+01	.1200E+01	.00	0
61	120	121	125	126	0	1	.1200E+01	.1200E+01	.00	0
62	121	122	126	127	0	1	.1200E+01	.1200E+01	.00	0
63	122	123	127	128	0	1	.1200E+01	.1200E+01	.00	0
64	124	125	129	130	0	1	.1200E+01	.1200E+01	.00	0
65	125	126	130	131	0	1	.1200E+01	.1200E+01	.00	0
66	126	127	131	132	0	1	.1200E+01	.1200E+01	.00	0
67	127	128	132	133	0	1	.1200E+01	.1200E+01	.00	0
68	129	130	134	135	0	1	.1200E+01	.1200E+01	.00	0
69	130	131	135	136	0	1	.1200E+01	.1200E+01	.00	0
70	131	132	136	137	0	1	.1200E+01	.1200E+01	.00	0
71	132	133	137	138	0	1	.1200E+01	.1200E+01	.00	0
72	134	135	139	140	0	1	.1200E+01	.1200E+01	.00	0
73	135	136	140	141	0	1	.1200E+01	.1200E+01	.00	0
74	136	137	141	142	0	1	.1200E+01	.1200E+01	.00	0
75	137	138	142	143	0	1	.1200E+01	.1200E+01	.00	0
76	139	140	144	145	0	1	.4500E+00	.4500E+00	.00	0
77	140	141	145	146	0	1	.4500E+00	.4500E+00	.00	0
78	141	142	146	147	0	1	.4500E+00	.4500E+00	.00	0
79	142	143	147	148	0	1	.4500E+00	.4500E+00	.00	0
80	144	145	149	150	0	1	.4500E+00	.4500E+00	.00	0
81	145	146	150	151	0	1	.4500E+00	.4500E+00	.00	0
82	146	147	151	152	0	1	.4500E+00	.4500E+00	.00	0
83	147	148	152	153	0	1	.4500E+00	.4500E+00	.00	0

ESTRIBO 2 OF 4+300

T O T A L W E I G H T S A N D M A S S E S

PROP	WEIGHT	MASS
1	215.0781	.0000
TOTAL	215.0781	.0000

ESTRIBO 2 OF 4+300

J O I N T L O A D S

JOINT	LOAD	FX	FY	FZ	MX	MY	MZ
145	1	.000E+00	-.281E+02	.500E+00	.843E+01	.000E+00	.000E+00
146	1	.000E+00	-.281E+02	.500E+00	.843E+01	.000E+00	.000E+00
147	1	.000E+00	-.281E+02	.500E+00	.843E+01	.000E+00	.000E+00
21	1	-.788E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
22	1	-.788E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
23	1	-.788E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
24	1	-.788E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
33	1	-.681E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
34	1	-.681E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
35	1	-.681E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
36	1	-.681E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
45	1	-.574E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
46	1	-.574E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
47	1	-.574E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
48	1	-.574E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
55	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
56	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
57	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
58	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
59	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
60	1	-.467E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
66	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
67	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
68	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
69	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
70	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
71	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
72	1	-.359E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
76	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
77	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
78	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
79	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
80	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
81	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
82	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
83	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
84	1	-.252E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
85	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
86	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
87	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
88	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
89	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
90	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
91	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
92	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
93	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
94	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
95	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
96	1	-.145E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
97	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
98	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
99	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

ESTRIBO 2 OF 4+300

J O I N T L O A D S

JOINT	LOAD	FX	FY	FZ	MX	MY	MZ
100	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
101	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
102	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
103	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
104	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
105	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
106	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
107	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
108	1	-.320E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
115	1	.000E+00	.000E+00	.752E+01	.000E+00	.000E+00	.000E+00
116	1	.000E+00	.000E+00	.752E+01	.000E+00	.000E+00	.000E+00
117	1	.000E+00	.000E+00	.752E+01	.000E+00	.000E+00	.000E+00
118	1	.000E+00	.000E+00	.752E+01	.000E+00	.000E+00	.000E+00
120	1	.000E+00	.000E+00	.650E+01	.000E+00	.000E+00	.000E+00
121	1	.000E+00	.000E+00	.650E+01	.000E+00	.000E+00	.000E+00
122	1	.000E+00	.000E+00	.650E+01	.000E+00	.000E+00	.000E+00
123	1	.000E+00	.000E+00	.650E+01	.000E+00	.000E+00	.000E+00
125	1	.000E+00	.000E+00	.548E+01	.000E+00	.000E+00	.000E+00
126	1	.000E+00	.000E+00	.548E+01	.000E+00	.000E+00	.000E+00
127	1	.000E+00	.000E+00	.548E+01	.000E+00	.000E+00	.000E+00
128	1	.000E+00	.000E+00	.548E+01	.000E+00	.000E+00	.000E+00
130	1	.000E+00	.000E+00	.446E+01	.000E+00	.000E+00	.000E+00
131	1	.000E+00	.000E+00	.446E+01	.000E+00	.000E+00	.000E+00
132	1	.000E+00	.000E+00	.446E+01	.000E+00	.000E+00	.000E+00
133	1	.000E+00	.000E+00	.446E+01	.000E+00	.000E+00	.000E+00
135	1	.000E+00	.000E+00	.343E+01	.000E+00	.000E+00	.000E+00
136	1	.000E+00	.000E+00	.343E+01	.000E+00	.000E+00	.000E+00
137	1	.000E+00	.000E+00	.343E+01	.000E+00	.000E+00	.000E+00
138	1	.000E+00	.000E+00	.343E+01	.000E+00	.000E+00	.000E+00
140	1	.000E+00	.000E+00	.240E+01	.000E+00	.000E+00	.000E+00
141	1	.000E+00	.000E+00	.240E+01	.000E+00	.000E+00	.000E+00
142	1	.000E+00	.000E+00	.240E+01	.000E+00	.000E+00	.000E+00
143	1	.000E+00	.000E+00	.240E+01	.000E+00	.000E+00	.000E+00
145	1	.000E+00	.000E+00	.138E+01	.000E+00	.000E+00	.000E+00
146	1	.000E+00	.000E+00	.138E+01	.000E+00	.000E+00	.000E+00
147	1	.000E+00	.000E+00	.138E+01	.000E+00	.000E+00	.000E+00
148	1	.000E+00	.000E+00	.138E+01	.000E+00	.000E+00	.000E+00
150	1	.000E+00	.000E+00	.310E+00	.000E+00	.000E+00	.000E+00
151	1	.000E+00	.000E+00	.310E+00	.000E+00	.000E+00	.000E+00
152	1	.000E+00	.000E+00	.310E+00	.000E+00	.000E+00	.000E+00
153	1	.000E+00	.000E+00	.310E+00	.000E+00	.000E+00	.000E+00
97	2	-.450E+01	.000E+00	.000E+00	.000E+00	.000E+00	.360E+01

ESTRIBO 2 OF 4+300

O U T P U T F I L E S C R E A T E D B Y P R O G R A M

INPUT DATA ECHO	EST2430.SAP
SOLUTION ERRORS AND WARNINGS	EST2430.ERR
EQUATION NUMBERING	EST2430.EQN
DISPLACEMENTS AND REACTIONS	EST2430.SOL
ELEMENT FORCES	EST2430.FEF
SHELL ELEMENT FORCES	EST2430.F4F

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.000000	.000000	.000000	.000000	.000000	.000000
2	.000000	.000000	.000000	.000000	.000000	.000000
3	.000000	.000000	.000000	.000000	.000000	.000000
4	.000000	.000000	.000000	.000000	.000000	.000000
5	.000000	.000000	.000000	.000000	.000000	.000000
6	.000000	.000000	.000000	.000000	.000000	.000000
7	.000000	.000000	.000000	.000000	.000000	.000000
8	.000000	.000000	.000000	.000000	.000000	.000000
9	.000000	.000000	.000000	.000000	.000000	.000000
10	.000000	.000000	.000000	.000000	.000000	.000000
11	.000000	.000000	.000000	.000000	.000000	.000000
12	.000000	.000000	.000000	.000000	.000000	.000000
13	.000000	.000000	.000000	.000000	.000000	.000000
14	.000000	.000000	.000000	.000000	.000000	.000000
15	.000000	.000000	.000000	.000000	.000000	.000000
16	.000000	.000000	.000000	.000000	.000000	.000000
17	.000000	.000000	.000000	.000000	.000000	.000000
18	.000000	.000000	.000000	.000000	.000000	.000000
19	.000000	.000000	.000000	.000000	.000000	.000000
20	.000000	.000000	.000000	.000000	.000000	.000000
21	-.2272E-03	.2985E-04	.3231E-04	.3395E-04	.7496E-04	.2749E-03
22	-.1527E-03	.7457E-05	.3044E-04	.2653E-04	.8169E-04	.1902E-03
23	-.8572E-04	-.4617E-05	.3132E-04	.2377E-04	.6490E-04	.1104E-03
24	-.3552E-04	-.1448E-04	.3261E-04	.2280E-04	.4540E-04	.4702E-04
25	.000000	.000000	.000000	.000000	.000000	.000000
26	.000000	.000000	.000000	.000000	.000000	.000000
27	.000000	.000000	.000000	.000000	.000000	.000000
28	.000000	.000000	.000000	.000000	.000000	.000000
29	.000000	.000000	.000000	.000000	.000000	.000000
30	.000000	.000000	.000000	.000000	.000000	.000000
31	.000000	.000000	.000000	.000000	.000000	.000000
32	.000000	.000000	.000000	.000000	.000000	.000000
33	-.6742E-03	.3992E-04	.8148E-04	.3641E-04	.2324E-03	.3640E-03
34	-.4632E-03	.1071E-04	.8166E-04	.3428E-04	.2261E-03	.2510E-03
35	-.2714E-03	-.9552E-05	.8201E-04	.2843E-04	.1924E-03	.1514E-03
36	-.1183E-03	-.2755E-04	.8459E-04	.2977E-04	.1424E-03	.6824E-04
37	.000000	.000000	.000000	.000000	.000000	.000000
38	.000000	.000000	.000000	.000000	.000000	.000000
39	.000000	.000000	.000000	.000000	.000000	.000000
40	.000000	.000000	.000000	.000000	.000000	.000000
41	.000000	.000000	.000000	.000000	.000000	.000000
42	.000000	.000000	.000000	.000000	.000000	.000000
43	.000000	.000000	.000000	.000000	.000000	.000000
44	-.001707	.000054	.000137	.000021	.000567	.000627
45	-.001211	.000034	.000135	.000034	.000438	.000416
46	-.8269E-03	.8480E-05	.1344E-03	.2952E-04	.4012E-03	.2762E-03
47	-.4892E-03	-.1482E-04	.1353E-03	.3264E-04	.3393E-03	.1645E-03
48	-.2169E-03	-.3734E-04	.1385E-03	.2965E-04	.2551E-03	.7319E-04
49	.000000	.000000	.000000	.000000	.000000	.000000
50	.000000	.000000	.000000	.000000	.000000	.000000

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
51	.000000	.000000	.000000	.000000	.000000	.000000
52	.000000	.000000	.000000	.000000	.000000	.000000
53	.000000	.000000	.000000	.000000	.000000	.000000
54	.000000	.000000	.000000	.000000	.000000	.000000
55	-.003679	.000067	.000182	.000022	.001227	.000917
56	-.002612	.000047	.000180	.000030	.001023	.000746
57	-.001811	.000027	.000179	.000024	.000715	.000462
58	-.001219	.000004	.000180	.000032	.000600	.000290
59	-.7149E-03	-.2052E-04	.1813E-03	.2661E-04	.5058E-03	.1596E-03
60	-.3092E-03	-.4449E-04	.1850E-03	.2988E-04	.3789E-03	.5278E-04
61	.000000	.000000	.000000	.000000	.000000	.000000
62	.000000	.000000	.000000	.000000	.000000	.000000
63	.000000	.000000	.000000	.000000	.000000	.000000
64	.000000	.000000	.000000	.000000	.000000	.000000
65	.000000	.000000	.000000	.000000	.000000	.000000
66	-.006328	.000080	.000224	.000025	.001626	.000868
67	-.004883	.000061	.000223	.000029	.001477	.000820
68	-.003631	.000041	.000222	.000022	.001286	.000708
69	-.002562	.000020	.000221	.000031	.001075	.000559
70	-.001681	-.000003	.000221	.000023	.000876	.000366
71	-.9569E-03	-.2754E-04	.2220E-03	.3361E-04	.7193E-03	.1990E-03
72	-.3844E-03	-.5310E-04	.2231E-03	.2071E-04	.5272E-03	.7220E-04
73	.000000	.000000	.000000	.000000	.000000	.000000
74	.000000	.000000	.000000	.000000	.000000	.000000
75	.000000	.000000	.000000	.000000	.000000	.000000
76	-.011036	.000092	.000270	.000035	.002015	.000692
77	-.009208	.000078	.000270	-.000001	.001990	.000687
78	-.007469	.000073	.000264	.000023	.001793	.000738
79	-.005917	.000057	.000261	.000019	.001631	.000679
80	-.004515	.000037	.000260	.000029	.001453	.000580
81	-.003270	.000016	.000260	.000020	.001282	.000472
82	-.002182	-.000007	.000260	.000034	.001108	.000351
83	-.001259	-.000031	.000260	.000019	.000919	.000232
84	-.5223E-03	-.5765E-04	.2599E-03	.4145E-04	.6908E-03	.1266E-03
85	-.017858	.000062	.000303	-.000009	.002191	.000594
86	-.015869	.000072	.000302	-.000013	.002185	.000601
87	-.013892	.000081	.000299	-.000004	.002158	.000613
88	-.011964	.000087	.000293	-.000005	.002067	.000640
89	-.010125	.000080	.000289	.000022	.001974	.000632
90	-.008381	.000069	.000290	.000008	.001866	.000601
91	-.006747	.000054	.000291	.000025	.001728	.000544
92	-.005237	.000035	.000293	.000017	.001591	.000475
93	-.003860	.000014	.000295	.000031	.001437	.000390
94	-.002631	-.000009	.000298	.000020	.001264	.000299
95	-.001570	-.000034	.000301	.000037	.001064	.000211
96	-.7087E-03	-.6106E-04	.3038E-03	.2320E-04	.8229E-03	.1248E-03
97	-.018675	.000062	.000288	-.000013	.002184	.000593
98	-.016692	.000072	.000288	-.000008	.002175	.000596
99	-.014728	.000082	.000291	-.000011	.002140	.000601
100	-.012807	.000084	.000298	.000010	.002089	.000595

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
101	-.010944	.000079	.000305	.000002	.002011	.000571
102	-.009153	.000067	.000311	.000022	.001924	.000535
103	-.007447	.000052	.000317	.000012	.001826	.000483
104	-.005841	.000034	.000323	.000027	.001705	.000411
105	-.004352	.000013	.000329	.000018	.001565	.000330
106	-.003003	-.000011	.000335	.000034	.001398	.000242
107	-.001821	-.000036	.000342	.000020	.001196	.000152
108	-.8370E-03	-.6572E-04	.3484E-03	.4841E-04	.9656E-03	.5983E-04
109	.000000	.000000	.000000	.000000	.000000	.000000
110	.000000	.000000	.000000	.000000	.000000	.000000
111	.000000	.000000	.000000	.000000	.000000	.000000
112	.000000	.000000	.000000	.000000	.000000	.000000
113	.000000	.000000	.000000	.000000	.000000	.000000
114	-.5269E-06	-.3199E-04	.3544E-04	.3640E-04	.2544E-04	.5471E-05
115	.1215E-06	-.2260E-04	.1716E-04	.1939E-04	.1549E-04	.6328E-05
116	-.1794E-07	-.1843E-04	.8233E-05	.8605E-05	.5803E-05	.1522E-05
117	-.9958E-07	-.1682E-04	.5614E-05	.5046E-05	.9031E-06	.1170E-05
118	.0000E+00	-.1633E-04	.5490E-05	.4304E-05	.0000E+00	.0000E+00
119	-.9618E-05	-.5309E-04	.8950E-04	.3842E-04	.7170E-04	.9156E-05
120	-.7479E-05	-.4133E-04	.4183E-04	.1680E-04	.3902E-04	.1088E-04
121	-.5028E-05	-.3505E-04	.1798E-04	.4447E-05	.1736E-04	.3747E-05
122	-.2507E-05	-.3267E-04	.8609E-05	-.1143E-05	.5437E-05	.2313E-05
123	.0000E+00	-.3191E-04	.6580E-05	-.3038E-05	.0000E+00	.0000E+00
124	-.2186E-04	-.6527E-04	.1446E-03	.3677E-04	.1295E-03	.1274E-04
125	-.1701E-04	-.5565E-04	.6231E-04	.1527E-04	.6550E-04	.5858E-05
126	-.1112E-04	-.5094E-04	.2114E-04	.8669E-06	.3181E-04	.4348E-05
127	-.5427E-05	-.4838E-04	.2517E-05	-.7025E-05	.1235E-04	.1426E-05
128	.0000E+00	-.4770E-04	-.2542E-05	-.9735E-05	.0000E+00	.0000E+00
129	-.3019E-04	-.7076E-04	.1910E-03	.2901E-04	.1606E-03	-.7921E-05
130	-.2138E-04	-.6882E-04	.8314E-04	.1458E-04	.9278E-04	.5740E-05
131	-.1384E-04	-.6534E-04	.2118E-04	-.1536E-05	.5129E-04	-.3700E-06
132	-.6833E-05	-.6363E-04	-.1019E-04	-.1161E-04	.2203E-04	.1765E-05
133	.0000E+00	-.6282E-04	-.1948E-04	-.1492E-04	.0000E+00	.0000E+00
134	-.2050E-04	-.7737E-04	.2268E-03	.2562E-04	.1654E-03	-.7413E-06
135	-.1796E-04	-.7851E-04	.9769E-04	.2664E-05	.1235E-03	-.3886E-05
136	-.1282E-04	-.7760E-04	.1332E-04	-.1165E-04	.7142E-04	.1977E-05
137	-.6612E-05	-.7664E-04	-.3087E-04	-.1928E-04	.3153E-04	-.6919E-06
138	.0000E+00	-.7647E-04	-.4432E-04	-.2159E-04	.0000E+00	.0000E+00
139	-.2316E-04	-.8659E-04	.2558E-03	.1268E-04	.2533E-03	-.4634E-06
140	-.1695E-04	-.8631E-04	.8379E-04	-.2548E-04	.1491E-03	.2494E-05
141	-.1140E-04	-.8764E-04	-.1558E-04	-.3161E-04	.8168E-04	-.2824E-05
142	-.5462E-05	-.8743E-04	-.6478E-04	-.3059E-04	.3371E-04	-.9551E-07
143	.0000E+00	-.8748E-04	-.7868E-04	-.2724E-04	.0000E+00	.0000E+00
144	-.1604E-04	-.9519E-04	.3120E-03	.4621E-04	.5842E-03	-.1631E-05
145	-.1452E-04	-.1080E-03	.2143E-04	.4705E-04	.1581E-03	-.1392E-04
146	-.9582E-05	-.1124E-03	-.5129E-04	.3938E-04	.3242E-04	.3473E-06
147	-.4500E-05	-.1115E-03	-.6337E-04	.9295E-04	.2444E-05	.5976E-05
148	.0000E+00	-.1025E-03	-.6369E-04	-.5540E-05	.0000E+00	.0000E+00
149	-.1627E-04	-.9880E-04	.3520E-03	.6115E-05	.6582E-03	-.1893E-04
150	-.8370E-05	-.1066E-03	-.2909E-05	-.7898E-04	.1978E-03	.3248E-05

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
151	-.6645E-05	-.1118E-03	-.7141E-04	-.5093E-04	-.2648E-06	-.6383E-05
152	-.5022E-05	-.1111E-03	-.5213E-04	-.2303E-04	-.2622E-04	.4785E-06
153	.0000E+00	-.1115E-03	-.4056E-04	.1698E-04	.0000E+00	.0000E+00

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.000000	.000000	.000000	.000000	.000000	.000000
2	.000000	.000000	.000000	.000000	.000000	.000000
3	.000000	.000000	.000000	.000000	.000000	.000000
4	.000000	.000000	.000000	.000000	.000000	.000000
5	.000000	.000000	.000000	.000000	.000000	.000000
6	.000000	.000000	.000000	.000000	.000000	.000000
7	.000000	.000000	.000000	.000000	.000000	.000000
8	.000000	.000000	.000000	.000000	.000000	.000000
9	.000000	.000000	.000000	.000000	.000000	.000000
10	.000000	.000000	.000000	.000000	.000000	.000000
11	.000000	.000000	.000000	.000000	.000000	.000000
12	.000000	.000000	.000000	.000000	.000000	.000000
13	.000000	.000000	.000000	.000000	.000000	.000000
14	.000000	.000000	.000000	.000000	.000000	.000000
15	.000000	.000000	.000000	.000000	.000000	.000000
16	.000000	.000000	.000000	.000000	.000000	.000000
17	.000000	.000000	.000000	.000000	.000000	.000000
18	.000000	.000000	.000000	.000000	.000000	.000000
19	.000000	.000000	.000000	.000000	.000000	.000000
20	.000000	.000000	.000000	.000000	.000000	.000000
21	-.2000E-04	.6049E-06	.6617E-06	.7592E-06	.6994E-05	.2544E-04
22	-.1296E-04	.2224E-06	.6256E-06	.3572E-06	.7720E-05	.1708E-04
23	-.6736E-05	.7397E-07	.6563E-06	.5054E-06	.5862E-05	.9390E-05
24	-.2338E-05	-.3551E-07	.7136E-06	.2879E-06	.3890E-05	.3596E-05
25	.000000	.000000	.000000	.000000	.000000	.000000
26	.000000	.000000	.000000	.000000	.000000	.000000
27	.000000	.000000	.000000	.000000	.000000	.000000
28	.000000	.000000	.000000	.000000	.000000	.000000
29	.000000	.000000	.000000	.000000	.000000	.000000
30	.000000	.000000	.000000	.000000	.000000	.000000
31	.000000	.000000	.000000	.000000	.000000	.000000
32	.000000	.000000	.000000	.000000	.000000	.000000
33	-.6536E-04	.7081E-06	.1416E-05	.1926E-06	.2345E-04	.4039E-04
34	-.4380E-04	.3579E-06	.1432E-05	.6510E-06	.2309E-04	.2732E-04
35	-.2457E-04	.1086E-06	.1451E-05	.1973E-06	.1883E-04	.1614E-04
36	-.9888E-05	-.8328E-07	.1527E-05	.4903E-06	.1347E-04	.7135E-05
37	.000000	.000000	.000000	.000000	.000000	.000000
38	.000000	.000000	.000000	.000000	.000000	.000000
39	.000000	.000000	.000000	.000000	.000000	.000000
40	.000000	.000000	.000000	.000000	.000000	.000000
41	.000000	.000000	.000000	.000000	.000000	.000000
42	.000000	.000000	.000000	.000000	.000000	.000000
43	.000000	.000000	.000000	.000000	.000000	.000000
44	-.1887E-03	.6855E-06	.1988E-05	-.5656E-06	.6175E-04	.9494E-04
45	-.1319E-03	.6017E-06	.1976E-05	.7126E-06	.4978E-04	.5761E-04
46	-.8802E-04	.3303E-06	.2001E-05	-.8210E-07	.4544E-04	.3718E-04
47	-.5058E-04	.1051E-06	.2101E-05	.6017E-06	.3671E-04	.2174E-04
48	-.2156E-04	-.1348E-06	.2242E-05	.2030E-06	.2701E-04	.9711E-05
49	.000000	.000000	.000000	.000000	.000000	.000000
50	.000000	.000000	.000000	.000000	.000000	.000000

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
51	.000000	.000000	.000000	.000000	.000000	.000000
52	.000000	.000000	.000000	.000000	.000000	.000000
53	.000000	.000000	.000000	.000000	.000000	.000000
54	.000000	.000000	.000000	.000000	.000000	.000000
55	-.5114E-03	.1043E-05	.2158E-05	-.4920E-06	.1940E-03	.2181E-03
56	-.3417E-03	.7754E-06	.2178E-05	.9740E-06	.1563E-03	.1519E-03
57	-.2245E-03	.5041E-06	.2229E-05	-.4317E-06	.9768E-04	.7861E-04
58	-.1458E-03	.2632E-06	.2298E-05	.7902E-06	.7718E-04	.4562E-04
59	-.8288E-04	-.3915E-07	.2385E-05	-.3387E-06	.6107E-04	.2431E-04
60	-.3502E-04	-.2115E-06	.2600E-05	.4079E-06	.4401E-04	.8686E-05
61	.000000	.000000	.000000	.000000	.000000	.000000
62	.000000	.000000	.000000	.000000	.000000	.000000
63	.000000	.000000	.000000	.000000	.000000	.000000
64	.000000	.000000	.000000	.000000	.000000	.000000
65	.000000	.000000	.000000	.000000	.000000	.000000
66	-.001111	.000001	.000002	-.000000	.000334	.000295
67	-.8136E-03	.1117E-05	.2504E-05	.1154E-05	.2920E-03	.2366E-03
68	-.5738E-03	.8156E-06	.2496E-05	-.5439E-06	.2389E-03	.1806E-03
69	-.3820E-03	.5090E-06	.2462E-05	.1143E-05	.1852E-03	.1348E-03
70	-.2371E-03	.2177E-06	.2397E-05	-.7142E-06	.1368E-03	.8447E-04
71	-.1290E-03	-.1245E-06	.2299E-05	.1232E-05	.1025E-03	.4484E-04
72	-.5021E-04	-.4794E-06	.2123E-05	-.1135E-05	.7027E-04	.1645E-04
73	.000000	.000000	.000000	.000000	.000000	.000000
74	.000000	.000000	.000000	.000000	.000000	.000000
75	.000000	.000000	.000000	.000000	.000000	.000000
76	-.002516	.000002	.000003	.000001	.000585	.000369
77	-.001984	.000002	.000003	-.000000	.000565	.000345
78	-.001517	.000001	.000003	.000001	.000446	.000303
79	-.001145	.000001	.000003	-.000001	.000377	.000242
80	-.8324E-03	.8754E-06	.2924E-05	.1285E-05	.3117E-03	.1925E-03
81	-.5756E-03	.6120E-06	.2859E-05	-.7243E-06	.2538E-03	.1458E-03
82	-.3686E-03	.2531E-06	.2750E-05	.1686E-05	.2023E-03	.1034E-03
83	-.2060E-03	.1182E-07	.2553E-05	-.1320E-05	.1562E-03	.6527E-04
84	-.8370E-04	-.3592E-06	.2161E-05	.2759E-05	.1130E-03	.3256E-04
85	-.005272	.000003	.000003	.000001	.000883	.000479
86	-.004476	.000003	.000003	-.000000	.000863	.000470
87	-.003715	.000002	.000003	.000001	.000804	.000442
88	-.003032	.000002	.000003	-.000000	.000685	.000386
89	-.002444	.000002	.000003	.000001	.000609	.000328
90	-.001924	.000002	.000003	-.000000	.000536	.000286
91	-.001475	.000001	.000003	.000001	.000452	.000236
92	-.001096	.000001	.000003	-.000001	.000383	.000189
93	-.7776E-03	.6469E-06	.3440E-05	.1530E-05	.3189E-03	.1460E-03
94	-.5146E-03	.4037E-06	.3426E-05	-.9719E-06	.2609E-03	.1066E-03
95	-.3019E-03	-.6685E-07	.3418E-05	.2407E-05	.2077E-03	.7142E-04
96	-.1359E-03	-.4467E-06	.3588E-05	-.1519E-05	.1579E-03	.3954E-04
97	-.005966	.000003	.000004	-.000000	.000932	.000576
98	-.005116	.000003	.000004	.000001	.000924	.000448
99	-.004302	.000002	.000004	-.000000	.000862	.000417
100	-.003554	.000002	.000004	.000001	.000786	.000369

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
101	-.002886	.000002	.000004	-.000000	.000687	.000312
102	-.002301	.000002	.000004	.000001	.000601	.000263
103	-.001789	.000001	.000004	-.000001	.000524	.000218
104	-.001347	.000001	.000004	.000001	.000449	.000174
105	-.9710E-03	.7036E-06	.4000E-05	-.8636E-06	.3795E-03	.1329E-03
106	-.6552E-03	.3238E-06	.4155E-05	.1982E-05	.3159E-03	.9553E-04
107	-.3951E-03	-.2633E-07	.4416E-05	-.1314E-05	.2572E-03	.6170E-04
108	-.1857E-03	-.1123E-05	.4689E-05	.3950E-05	.2048E-03	.3094E-04
109	.000000	.000000	.000000	.000000	.000000	.000000
110	.000000	.000000	.000000	.000000	.000000	.000000
111	.000000	.000000	.000000	.000000	.000000	.000000
112	.000000	.000000	.000000	.000000	.000000	.000000
113	.000000	.000000	.000000	.000000	.000000	.000000
114	.8727E-06	-.1684E-06	.8649E-06	.6511E-06	.2834E-05	-.4946E-06
115	.5757E-06	-.1589E-06	-.1426E-05	-.1925E-05	.2279E-05	-.1427E-06
116	.3471E-06	-.5694E-07	-.3030E-05	-.3877E-05	.1402E-05	-.7341E-07
117	.1608E-06	-.1706E-08	-.3915E-05	-.4977E-05	.6476E-06	-.4238E-07
118	.0000E+00	.1270E-07	-.4194E-05	-.5336E-05	.0000E+00	.0000E+00
119	.9756E-06	-.4186E-06	.1637E-05	.5066E-06	.8583E-05	.2721E-06
120	.6467E-06	-.1070E-06	-.5004E-05	-.3099E-05	.6487E-05	.3642E-06
121	.3636E-06	.5512E-07	-.9653E-05	-.5547E-05	.4162E-05	.8716E-07
122	.1632E-06	.1073E-06	-.1234E-04	-.6991E-05	.2015E-05	.8443E-07
123	.0000E+00	.1280E-06	-.1322E-04	-.7480E-05	.0000E+00	.0000E+00
124	.1140E-06	-.5120E-06	.2480E-05	.5266E-06	.1656E-04	.1241E-05
125	.1446E-07	.3093E-08	-.9635E-05	-.3474E-05	.1142E-04	.2729E-06
126	.1900E-07	.1196E-06	-.1783E-04	-.6245E-05	.7387E-05	.2662E-06
127	.1674E-07	.1863E-06	-.2265E-04	-.7923E-05	.3655E-05	.3336E-07
128	.0000E+00	.1952E-06	-.2424E-04	-.8489E-05	.0000E+00	.0000E+00
129	-.1139E-05	-.2726E-06	.2809E-05	-.8657E-07	.2326E-04	-.4227E-06
130	-.5603E-06	-.1428E-06	-.1460E-04	-.3881E-05	.1685E-04	.4612E-06
131	-.2653E-06	.5570E-07	-.2687E-04	-.7065E-05	.1120E-04	-.5301E-07
132	-.1070E-06	.1486E-06	-.3419E-04	-.8996E-05	.5555E-05	.1514E-06
133	.0000E+00	.2047E-06	-.3662E-04	-.9621E-05	.0000E+00	.0000E+00
134	-.1954E-06	-.1330E-06	.2294E-05	-.3756E-06	.2859E-04	-.1334E-06
135	-.3442E-06	-.2326E-06	-.2097E-04	-.5938E-05	.2345E-04	-.3018E-06
136	-.2499E-06	-.3760E-07	-.3793E-04	-.9316E-05	.1534E-04	.3239E-06
137	-.1233E-06	.1548E-06	-.4791E-04	-.1121E-04	.7530E-05	-.3279E-07
138	.0000E+00	.1936E-06	-.5119E-04	-.1181E-04	.0000E+00	.0000E+00
139	-.7330E-06	-.6547E-06	.7582E-06	-.2281E-05	.4573E-04	.3719E-07
140	-.3918E-06	-.2314E-06	-.3197E-04	-.1052E-04	.3034E-04	.6734E-06
141	-.3414E-06	.5076E-07	-.5351E-04	-.1373E-04	.1914E-04	-.3780E-07
142	-.2075E-06	.1962E-06	-.6584E-04	-.1520E-04	.9217E-05	.2724E-06
143	.0000E+00	.2820E-06	-.6984E-04	-.1563E-04	.0000E+00	.0000E+00
144	-.8187E-06	-.1515E-05	.4962E-05	.4586E-05	.1173E-03	.3093E-05
145	-.1354E-05	-.3688E-07	-.6328E-04	-.2520E-04	.4954E-04	.4569E-06
146	-.1089E-05	.3253E-06	-.9352E-04	-.3641E-04	.2284E-04	.8679E-06
147	-.5828E-06	.4493E-06	-.1071E-03	-.3924E-04	.9295E-05	-.3624E-07
148	.0000E+00	.4161E-06	-.1110E-03	-.3958E-04	.0000E+00	.0000E+00
149	-.6745E-05	-.1623E-05	.4002E-05	-.5293E-05	.1533E-03	.1872E-05
150	-.3841E-05	-.2173E-06	-.9682E-04	-.3015E-04	.8074E-04	.2737E-05

ESTRIBO 2 OF 4+300

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
151	-.2122E-05	.2877E-06	-.1454E-03	-.4048E-04	.3542E-04	-.2386E-06
152	-.9485E-06	.2710E-06	-.1654E-03	-.4518E-04	.1283E-04	.4225E-06
153	.0000E+00	.3328E-06	-.1707E-03	-.4603E-04	.0000E+00	.0000E+00

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000
3	.0000	.0000	.0000	.0000	.0000	.0000
4	.0000	.0000	.0000	.0000	.0000	.0000
5	.0000	.0000	.0000	.0000	.0000	.0000
6	.0000	.0000	.0000	.0000	.0000	.0000
7	.0000	.0000	.0000	.0000	.0000	.0000
8	.0000	.0000	.0000	.0000	.0000	.0000
9	54.3746	-36.9536	-13.8201	-1.6288	8.5609	-43.8874
10	30.8865	-27.6433	-16.5551	-3.7008	-.2144	-63.0661
11	6.2875	10.4918	-21.9948	-4.1958	.0069	-34.5958
12	-4.7124	46.3687	-23.4048	-4.7040	.0337	-14.1022
13	.0000	.0000	.0000	.0000	.0000	.0000
14	.0000	.0000	.0000	.0000	.0000	.0000
15	.0000	.0000	.0000	.0000	.0000	.0000
16	.0000	.0000	.0000	.0000	.0000	.0000
17	.0000	.0000	.0000	.0000	.0000	.0000
18	.0000	.0000	.0000	.0000	.0000	.0000
19	.0000	.0000	.0000	.0000	.0000	.0000
20	.0000	.0000	.0000	.0000	.0000	.0000
21	-7.8800	.0000	.0000	.0000	.0000	.0000
22	-7.8800	.0000	.0000	.0000	.0000	.0000
23	-7.8800	.0000	.0000	.0000	.0000	.0000
24	-7.8800	.0000	.0000	.0000	.0000	.0000
25	.0000	.0000	.0000	.0000	.0000	.0000
26	.0000	.0000	.0000	.0000	.0000	.0000
27	.0000	.0000	.0000	.0000	.0000	.0000
28	.0000	.0000	.0000	.0000	.0000	.0000
29	.0000	.0000	.0000	.0000	.0000	.0000
30	.0000	.0000	.0000	.0000	.0000	.0000
31	.0000	.0000	.0000	.0000	.0000	.0000
32	.0000	.0000	.0000	.0000	.0000	.0000
33	-6.8100	.0000	.0000	.0000	.0000	.0000
34	-6.8100	.0000	.0000	.0000	.0000	.0000
35	-6.8100	.0000	.0000	.0000	.0000	.0000
36	-6.8100	.0000	.0000	.0000	.0000	.0000
37	.0000	.0000	.0000	.0000	.0000	.0000
38	.0000	.0000	.0000	.0000	.0000	.0000
39	.0000	.0000	.0000	.0000	.0000	.0000
40	.0000	.0000	.0000	.0000	.0000	.0000
41	.0000	.0000	.0000	.0000	.0000	.0000
42	.0000	.0000	.0000	.0000	.0000	.0000
43	.0000	.0000	.0000	.0000	.0000	.0000
44	.0000	.0000	.0000	.0000	.0000	.0000
45	-5.7400	.0000	.0000	.0000	.0000	.0000
46	-5.7400	.0000	.0000	.0000	.0000	.0000
47	-5.7400	.0000	.0000	.0000	.0000	.0000
48	-5.7400	.0000	.0000	.0000	.0000	.0000
49	.0000	.0000	.0000	.0000	.0000	.0000
50	.0000	.0000	.0000	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
51	.0000	.0000	.0000	.0000	.0000	.0000
52	.0000	.0000	.0000	.0000	.0000	.0000
53	.0000	.0000	.0000	.0000	.0000	.0000
54	.0000	.0000	.0000	.0000	.0000	.0000
55	-4.6700	.0000	.0000	.0000	.0000	.0000
56	-4.6700	.0000	.0000	.0000	.0000	.0000
57	-4.6700	.0000	.0000	.0000	.0000	.0000
58	-4.6700	.0000	.0000	.0000	.0000	.0000
59	-4.6700	.0000	.0000	.0000	.0000	.0000
60	-4.6700	.0000	.0000	.0000	.0000	.0000
61	.0000	.0000	.0000	.0000	.0000	.0000
62	.0000	.0000	.0000	.0000	.0000	.0000
63	.0000	.0000	.0000	.0000	.0000	.0000
64	.0000	.0000	.0000	.0000	.0000	.0000
65	.0000	.0000	.0000	.0000	.0000	.0000
66	-3.5900	.0000	.0000	.0000	.0000	.0000
67	-3.5900	.0000	.0000	.0000	.0000	.0000
68	-3.5900	.0000	.0000	.0000	.0000	.0000
69	-3.5900	.0000	.0000	.0000	.0000	.0000
70	-3.5900	.0000	.0000	.0000	.0000	.0000
71	-3.5900	.0000	.0000	.0000	.0000	.0000
72	-3.5900	.0000	.0000	.0000	.0000	.0000
73	.0000	.0000	.0000	.0000	.0000	.0000
74	.0000	.0000	.0000	.0000	.0000	.0000
75	.0000	.0000	.0000	.0000	.0000	.0000
76	-2.5200	.0000	.0000	.0000	.0000	.0000
77	-2.5200	.0000	.0000	.0000	.0000	.0000
78	-2.5200	.0000	.0000	.0000	.0000	.0000
79	-2.5200	.0000	.0000	.0000	.0000	.0000
80	-2.5200	.0000	.0000	.0000	.0000	.0000
81	-2.5200	.0000	.0000	.0000	.0000	.0000
82	-2.5200	.0000	.0000	.0000	.0000	.0000
83	-2.5200	.0000	.0000	.0000	.0000	.0000
84	-2.5200	.0000	.0000	.0000	.0000	.0000
85	-1.4500	.0000	.0000	.0000	.0000	.0000
86	-1.4500	.0000	.0000	.0000	.0000	.0000
87	-1.4500	.0000	.0000	.0000	.0000	.0000
88	-1.4500	.0000	.0000	.0000	.0000	.0000
89	-1.4500	.0000	.0000	.0000	.0000	.0000
90	-1.4500	.0000	.0000	.0000	.0000	.0000
91	-1.4500	.0000	.0000	.0000	.0000	.0000
92	-1.4500	.0000	.0000	.0000	.0000	.0000
93	-1.4500	.0000	.0000	.0000	.0000	.0000
94	-1.4500	.0000	.0000	.0000	.0000	.0000
95	-1.4500	.0000	.0000	.0000	.0000	.0000
96	-1.4500	.0000	.0000	.0000	.0000	.0000
97	-.3200	.0000	.0000	.0000	.0000	.0000
98	-.3200	.0000	.0000	.0000	.0000	.0000
99	-.3200	.0000	.0000	.0000	.0000	.0000
100	-.3200	.0000	.0000	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
101	-.3200	.0000	.0000	.0000	.0000	.0000
102	-.3200	.0000	.0000	.0000	.0000	.0000
103	-.3200	.0000	.0000	.0000	.0000	.0000
104	-.3200	.0000	.0000	.0000	.0000	.0000
105	-.3200	.0000	.0000	.0000	.0000	.0000
106	-.3200	.0000	.0000	.0000	.0000	.0000
107	-.3200	.0000	.0000	.0000	.0000	.0000
108	-.3200	.0000	.0000	.0000	.0000	.0000
109	-9.0397	90.5198	-43.5613	-14.4092	2.7464	-.7148
110	-9.0928	76.1169	-3.6740	-14.6278	-.0216	1.0726
111	-4.5136	60.4922	.2898	-7.3646	.0583	.5196
112	-1.8088	53.9276	-2.6859	-5.4590	.0517	.2250
113	-7.9890	26.0580	-2.0137	-2.7046	-.3015	.0442
114	.0000	.0000	.0000	.0000	.0000	.0000
115	.0000	.0000	7.5200	.0000	.0000	.0000
116	.0000	.0000	7.5200	.0000	.0000	.0000
117	.0000	.0000	7.5200	.0000	.0000	.0000
118	-11.2960	.0000	7.5200	.0000	.5253	.0305
119	.0000	.0000	.0000	.0000	.0000	.0000
120	.0000	.0000	6.5000	.0000	.0000	.0000
121	.0000	.0000	6.5000	.0000	.0000	.0000
122	.0000	.0000	6.5000	.0000	.0000	.0000
123	4.5151	.0000	6.5000	.0000	-2.2922	.0122
124	.0000	.0000	.0000	.0000	.0000	.0000
125	.0000	.0000	5.4800	.0000	.0000	.0000
126	.0000	.0000	5.4800	.0000	.0000	.0000
127	.0000	.0000	5.4800	.0000	.0000	.0000
128	23.3708	.0000	5.4800	.0000	-8.6749	-.0598
129	.0000	.0000	.0000	.0000	.0000	.0000
130	.0000	.0000	4.4600	.0000	.0000	.0000
131	.0000	.0000	4.4600	.0000	.0000	.0000
132	.0000	.0000	4.4600	.0000	.0000	.0000
133	35.1667	.0000	4.4600	.0000	-16.9140	.0490
134	.0000	.0000	.0000	.0000	.0000	.0000
135	.0000	.0000	3.4300	.0000	.0000	.0000
136	.0000	.0000	3.4300	.0000	.0000	.0000
137	.0000	.0000	3.4300	.0000	.0000	.0000
138	36.7964	.0000	3.4300	.0000	-23.7952	-.1159
139	.0000	.0000	.0000	.0000	.0000	.0000
140	.0000	.0000	2.4000	.0000	.0000	.0000
141	.0000	.0000	2.4000	.0000	.0000	.0000
142	.0000	.0000	2.4000	.0000	.0000	.0000
143	19.2555	.0000	2.4000	.0000	-13.1202	-.0254
144	.0000	.0000	.0000	.0000	.0000	.0000
145	.0000	-28.1000	1.8800	8.4300	.0000	.0000
146	.0000	-28.1000	1.8800	8.4300	.0000	.0000
147	.0000	-28.1000	1.8800	8.4300	.0000	.0000
148	9.2871	.0000	1.3800	.0000	.0436	-.9211
149	.0000	.0000	.0000	.0000	.0000	.0000
150	.0000	.0000	.3100	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
151	.0000	.0000	.3100	.0000	.0000	.0000
152	.0000	.0000	.3100	.0000	.0000	.0000
153	7.3022	.0000	.3100	.0000	.4625	-.0365
TOTAL	-.5968E-11	.2151E+03	.1236E-10	-.3350E+02	-.5284E+02	-.1556E+03

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000
3	.0000	.0000	.0000	.0000	.0000	.0000
4	.0000	.0000	.0000	.0000	.0000	.0000
5	.0000	.0000	.0000	.0000	.0000	.0000
6	.0000	.0000	.0000	.0000	.0000	.0000
7	.0000	.0000	.0000	.0000	.0000	.0000
8	.0000	.0000	.0000	.0000	.0000	.0000
9	4.3916	-.8375	-.3277	-.0340	.7115	-3.5968
10	1.7002	-.8088	-.4763	-.1013	-.0226	-4.9513
11	-.3551	-.2735	-.6114	-.1005	.0015	-2.4348
12	-.8858	.0059	-.8234	-.1444	.0091	-.6981
13	.0000	.0000	.0000	.0000	.0000	.0000
14	.0000	.0000	.0000	.0000	.0000	.0000
15	.0000	.0000	.0000	.0000	.0000	.0000
16	.0000	.0000	.0000	.0000	.0000	.0000
17	.0000	.0000	.0000	.0000	.0000	.0000
18	.0000	.0000	.0000	.0000	.0000	.0000
19	.0000	.0000	.0000	.0000	.0000	.0000
20	.0000	.0000	.0000	.0000	.0000	.0000
21	.0000	.0000	.0000	.0000	.0000	.0000
22	.0000	.0000	.0000	.0000	.0000	.0000
23	.0000	.0000	.0000	.0000	.0000	.0000
24	.0000	.0000	.0000	.0000	.0000	.0000
25	.0000	.0000	.0000	.0000	.0000	.0000
26	.0000	.0000	.0000	.0000	.0000	.0000
27	.0000	.0000	.0000	.0000	.0000	.0000
28	.0000	.0000	.0000	.0000	.0000	.0000
29	.0000	.0000	.0000	.0000	.0000	.0000
30	.0000	.0000	.0000	.0000	.0000	.0000
31	.0000	.0000	.0000	.0000	.0000	.0000
32	.0000	.0000	.0000	.0000	.0000	.0000
33	.0000	.0000	.0000	.0000	.0000	.0000
34	.0000	.0000	.0000	.0000	.0000	.0000
35	.0000	.0000	.0000	.0000	.0000	.0000
36	.0000	.0000	.0000	.0000	.0000	.0000
37	.0000	.0000	.0000	.0000	.0000	.0000
38	.0000	.0000	.0000	.0000	.0000	.0000
39	.0000	.0000	.0000	.0000	.0000	.0000
40	.0000	.0000	.0000	.0000	.0000	.0000
41	.0000	.0000	.0000	.0000	.0000	.0000
42	.0000	.0000	.0000	.0000	.0000	.0000
43	.0000	.0000	.0000	.0000	.0000	.0000
44	.0000	.0000	.0000	.0000	.0000	.0000
45	.0000	.0000	.0000	.0000	.0000	.0000
46	.0000	.0000	.0000	.0000	.0000	.0000
47	.0000	.0000	.0000	.0000	.0000	.0000
48	.0000	.0000	.0000	.0000	.0000	.0000
49	.0000	.0000	.0000	.0000	.0000	.0000
50	.0000	.0000	.0000	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
51	.0000	.0000	.0000	.0000	.0000	.0000
52	.0000	.0000	.0000	.0000	.0000	.0000
53	.0000	.0000	.0000	.0000	.0000	.0000
54	.0000	.0000	.0000	.0000	.0000	.0000
55	.0000	.0000	.0000	.0000	.0000	.0000
56	.0000	.0000	.0000	.0000	.0000	.0000
57	.0000	.0000	.0000	.0000	.0000	.0000
58	.0000	.0000	.0000	.0000	.0000	.0000
59	.0000	.0000	.0000	.0000	.0000	.0000
60	.0000	.0000	.0000	.0000	.0000	.0000
61	.0000	.0000	.0000	.0000	.0000	.0000
62	.0000	.0000	.0000	.0000	.0000	.0000
63	.0000	.0000	.0000	.0000	.0000	.0000
64	.0000	.0000	.0000	.0000	.0000	.0000
65	.0000	.0000	.0000	.0000	.0000	.0000
66	.0000	.0000	.0000	.0000	.0000	.0000
67	.0000	.0000	.0000	.0000	.0000	.0000
68	.0000	.0000	.0000	.0000	.0000	.0000
69	.0000	.0000	.0000	.0000	.0000	.0000
70	.0000	.0000	.0000	.0000	.0000	.0000
71	.0000	.0000	.0000	.0000	.0000	.0000
72	.0000	.0000	.0000	.0000	.0000	.0000
73	.0000	.0000	.0000	.0000	.0000	.0000
74	.0000	.0000	.0000	.0000	.0000	.0000
75	.0000	.0000	.0000	.0000	.0000	.0000
76	.0000	.0000	.0000	.0000	.0000	.0000
77	.0000	.0000	.0000	.0000	.0000	.0000
78	.0000	.0000	.0000	.0000	.0000	.0000
79	.0000	.0000	.0000	.0000	.0000	.0000
80	.0000	.0000	.0000	.0000	.0000	.0000
81	.0000	.0000	.0000	.0000	.0000	.0000
82	.0000	.0000	.0000	.0000	.0000	.0000
83	.0000	.0000	.0000	.0000	.0000	.0000
84	.0000	.0000	.0000	.0000	.0000	.0000
85	.0000	.0000	.0000	.0000	.0000	.0000
86	.0000	.0000	.0000	.0000	.0000	.0000
87	.0000	.0000	.0000	.0000	.0000	.0000
88	-.1101E-11	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
89	-.1871E-11	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
90	.0000	.0000	.0000	.0000	.0000	.0000
91	.0000	.0000	.0000	.0000	.0000	.0000
92	.0000	.0000	.0000	.0000	.0000	.0000
93	.0000	.0000	.0000	.0000	.0000	.0000
94	.0000	.0000	.0000	.0000	.0000	.0000
95	.0000	.0000	.0000	.0000	.0000	.0000
96	.0000	.0000	.0000	.0000	.0000	.0000
97	-4.5000	.0000	.0000	.0000	.0000	3.6000
98	.0000	.0000	.0000	.0000	.0000	.0000
99	.0000	.0000	.0000	.0000	.0000	.0000
100	.0000	.0000	.0000	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
101	.0000	.0000	.0000	.0000	.0000	.0000
102	.0000	.0000	.0000	.0000	.0000	.0000
103	.0000	.0000	.0000	.0000	.0000	.0000
104	.0000	.0000	.0000	.0000	.0000	.0000
105	.0000	.0000	.0000	.0000	.0000	.0000
106	.0000	.0000	.0000	.0000	.0000	.0000
107	.0000	.0000	.0000	.0000	.0000	.0000
108	.0000	.0000	.0000	.0000	.0000	.0000
109	-1.8735	.3543	-2.4211	-.2994	.1317	.2486
110	-.9643	.7078	.6459	.7732	-.0042	.1564
111	-.6532	.4854	1.4573	1.9217	.0019	.1029
112	-.3095	.2686	1.6898	2.5377	.0015	.0473
113	-.2615	.0978	.8670	1.3641	.2632	.0094
114	.0000	.0000	.0000	.0000	.0000	.0000
115	.0000	.0000	.0000	.0000	.0000	.0000
116	.0000	.0000	.0000	.0000	.0000	.0000
117	.0000	.0000	.0000	.0000	.0000	.0000
118	-.9002	.0000	.0000	.0000	-.2557	-.0017
119	.0000	.0000	.0000	.0000	.0000	.0000
120	.0000	.0000	.0000	.0000	.0000	.0000
121	.0000	.0000	.0000	.0000	.0000	.0000
122	.0000	.0000	.0000	.0000	.0000	.0000
123	-.8916	.0000	.0000	.0000	-1.6478	.0017
124	.0000	.0000	.0000	.0000	.0000	.0000
125	.0000	.0000	.0000	.0000	.0000	.0000
126	.0000	.0000	.0000	.0000	.0000	.0000
127	.0000	.0000	.0000	.0000	.0000	.0000
128	-.1524	.0000	.0000	.0000	-3.1776	-.0046
129	.0000	.0000	.0000	.0000	.0000	.0000
130	.0000	.0000	.0000	.0000	.0000	.0000
131	.0000	.0000	.0000	.0000	.0000	.0000
132	.0000	.0000	.0000	.0000	.0000	.0000
133	.6105	.0000	.0000	.0000	-4.7715	.0047
134	.0000	.0000	.0000	.0000	.0000	.0000
135	.0000	.0000	.0000	.0000	.0000	.0000
136	.0000	.0000	.0000	.0000	.0000	.0000
137	.0000	.0000	.0000	.0000	.0000	.0000
138	1.0401	.0000	.0000	.0000	-6.2863	-.0164
139	.0000	.0000	.0000	.0000	.0000	.0000
140	.0000	.0000	.0000	.0000	.0000	.0000
141	.0000	.0000	.0000	.0000	.0000	.0000
142	.0000	.0000	.0000	.0000	.0000	.0000
143	1.2729	.0000	.0000	.0000	-3.7153	.0054
144	.0000	.0000	.0000	.0000	.0000	.0000
145	.0000	.0000	.0000	.0000	.0000	.0000
146	.0000	.0000	.0000	.0000	.0000	.0000
147	.0000	.0000	.0000	.0000	.0000	.0000
148	1.6350	.0000	.0000	.0000	-.3383	-.0060
149	.0000	.0000	.0000	.0000	.0000	.0000
150	.0000	.0000	.0000	.0000	.0000	.0000

ESTRIBO 2 OF 4+300

REACTIONS AND APPLIED FORCES

LOAD CONDITION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
151	.0000	.0000	.0000	.0000	.0000	.0000
152	.0000	.0000	.0000	.0000	.0000	.0000
153	1.0965	.0000	.0000	.0000	-.2191	.0076
TOTAL	.6244E-12	.3895E-13	-.3147E-12	.5917E+01	-.1932E+02	-.7526E+01

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

MEMBRANE FORCES ARE IN FORCE PER UNIT LENGTH
BENDING MOMENTS ARE IN MOMENTS PER UNIT LENGTH

ELEMENT ID 1 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
9	1.7184E+01	8.5922E+01	1.0334E+01	8.7442E+01	1.5664E+01	81.63
10	4.2936E+00	2.1468E+01	1.4051E+01	2.9349E+01	-3.5867E+00	60.72
21	9.0388E+00	8.4293E+01	1.9219E+01	8.8917E+01	4.4147E+00	76.47
22	-3.8517E+00	1.9840E+01	2.2936E+01	3.3808E+01	-1.7820E+01	58.66
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
9	2.1183E+01	1.0592E+02	-7.1933E+00	1.0652E+02	2.0577E+01	-85.18
10	1.3706E+01	6.8528E+01	-7.8388E+00	6.9627E+01	1.2607E+01	-82.02
21	-5.2228E+00	2.3918E+01	-1.9487E+01	3.3679E+01	-1.4984E+01	-63.39
22	1.0092E+01	2.3857E+01	-2.0133E+01	3.8251E+01	-4.3023E+00	-54.44

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
9	3.4825E-01	1.7413E+00	1.6093E-01	1.7596E+00	3.2990E-01	83.50
10	1.2803E-01	6.4018E-01	4.3761E-01	8.9113E-01	-1.2292E-01	60.17
21	1.9093E-01	1.7098E+00	3.7864E-01	1.7989E+00	1.0177E-01	76.75
22	-2.9286E-02	6.0872E-01	6.5531E-01	1.0185E+00	-4.3911E-01	57.98
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
9	1.7450E+00	8.7251E+00	-6.7110E-01	8.7890E+00	1.6811E+00	-84.56
10	1.0741E+00	5.3705E+00	-7.4085E-01	5.4947E+00	9.4995E-01	-80.49
21	-4.0819E-01	3.2622E+00	-1.8855E+00	4.0581E+00	-1.2042E+00	-67.11
22	1.1420E+00	2.9386E+00	-1.9552E+00	4.1920E+00	-1.1146E-01	-57.34

ELEMENT ID 2 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
10	4.2937E+00	2.1468E+01	1.4051E+01	2.9349E+01	-3.5867E+00	60.72
11	-2.6582E+00	-1.3291E+01	1.7250E+01	1.0076E+01	-2.6025E+01	36.44
22	8.1127E+00	2.2232E+01	3.2841E+01	4.8764E+01	-1.8419E+01	51.07
23	1.1607E+00	-1.2527E+01	3.6039E+01	3.1000E+01	-4.2367E+01	39.62
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
10	1.3706E+01	6.8528E+01	-7.8388E+00	6.9627E+01	1.2607E+01	-82.02
11	7.3490E+00	3.6745E+01	-6.2281E+00	3.8010E+01	6.0839E+00	-78.52
22	9.9019E+00	2.3819E+01	-1.9422E+01	3.7492E+01	-3.7705E+00	-54.86
23	1.0077E+01	1.7606E+01	-1.7811E+01	3.2046E+01	-4.3636E+00	-50.97

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
10	1.2804E-01	6.4018E-01	4.3761E-01	8.9113E-01	-1.2291E-01	60.17
11	4.2592E-02	2.1295E-01	3.5572E-01	4.9355E-01	-2.3801E-01	51.73
22	2.6190E-01	6.6695E-01	8.6200E-01	1.3499E+00	-4.2105E-01	51.61
23	1.7645E-01	2.3973E-01	7.8012E-01	9.8885E-01	-5.7267E-01	46.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
10	1.0741E+00	5.3705E+00	-7.4085E-01	5.4947E+00	9.4995E-01	-80.49
11	5.0923E-01	2.5461E+00	-5.6253E-01	2.6912E+00	3.6420E-01	-75.54
22	1.1256E+00	2.9353E+00	-1.8565E+00	4.0957E+00	-3.4874E-02	-57.99
23	1.1795E+00	2.1168E+00	-1.6782E+00	3.3906E+00	-9.4248E-02	-52.80

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 3 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
11	-2.6582E+00	-1.3291E+01	1.7250E+01	1.0076E+01	-2.6025E+01	36.44
12	-8.3369E+00	-4.1685E+01	1.9499E+01	6.4501E-01	-5.0667E+01	24.73
23	2.9593E+00	-1.2168E+01	3.6939E+01	3.3101E+01	-4.2310E+01	39.21
24	-2.7195E+00	-4.0561E+01	3.9188E+01	2.1876E+01	-6.5157E+01	32.11
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
11	7.3490E+00	3.6745E+01	-6.2281E+00	3.8010E+01	6.0839E+00	-78.52
12	2.9250E+00	1.4625E+01	-4.3569E+00	1.6069E+01	1.4808E+00	-71.66
23	1.0193E+01	1.7629E+01	-1.5431E+01	2.9784E+01	-1.9621E+00	-51.77
24	8.7929E+00	9.3766E+00	-1.3560E+01	2.2648E+01	-4.4787E+00	-45.62

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
11	4.2589E-02	2.1295E-01	3.5572E-01	4.9355E-01	-2.3801E-01	51.73
12	-2.0446E-02	-1.0222E-01	5.9381E-01	5.3388E-01	-6.5655E-01	43.03
23	2.9200E-01	2.6283E-01	7.9307E-01	1.0706E+00	-5.1579E-01	44.47
24	2.2896E-01	-5.2343E-02	1.0311E+00	1.1290E+00	-9.5239E-01	41.12
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
11	5.0923E-01	2.5461E+00	-5.6253E-01	2.6912E+00	3.6420E-01	-75.54
12	1.4442E-01	7.2210E-01	-3.7325E-01	9.0522E-01	-3.8697E-02	-63.87
23	1.1898E+00	2.1189E+00	-1.4035E+00	3.1328E+00	1.7595E-01	-54.16
24	8.3408E-01	1.1299E+00	-1.2143E+00	2.2052E+00	-2.4126E-01	-48.47

ELEMENT ID 4 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
21	-2.3435E+00	2.7381E+01	9.7943E+00	3.0318E+01	-5.2806E+00	73.31
22	-6.2750E+00	7.7236E+00	1.9722E+01	2.1651E+01	-2.0203E+01	54.77
33	6.5982E+00	2.9169E+01	5.9866E+00	3.0659E+01	5.1086E+00	76.03
34	2.6669E+00	9.5120E+00	1.5914E+01	2.2367E+01	-1.0188E+01	51.07
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
21	-4.5409E+00	2.7328E+01	-2.7406E+01	4.3095E+01	-2.0308E+01	-60.09
22	9.9657E+00	2.3228E+01	-2.6153E+01	4.3578E+01	-1.0384E+01	-52.11
33	-1.0278E+00	1.2596E+01	-3.1513E+01	3.8025E+01	-2.6457E+01	-51.10
34	9.6990E+00	8.7098E+00	-3.0260E+01	3.9469E+01	-2.1060E+01	-44.53

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
21	-9.7856E-02	2.6586E-01	3.3312E-01	4.6353E-01	-2.9552E-01	59.32
22	-7.9278E-02	3.5875E-01	3.4775E-01	5.5070E-01	-2.7123E-01	61.10
33	1.2617E-01	3.1067E-01	1.7330E-01	4.1474E-01	2.2095E-02	59.01
34	1.4475E-01	4.0356E-01	1.8793E-01	5.0233E-01	4.5981E-02	62.28
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
21	-3.6503E-01	3.4780E+00	-2.7940E+00	4.9475E+00	-1.8345E+00	-62.26
22	1.1362E+00	2.9097E+00	-2.6894E+00	4.8548E+00	-8.0891E-01	-54.12
33	-1.4088E-01	3.3026E+00	-3.4757E+00	5.4596E+00	-2.2979E+00	-58.18
34	1.5225E+00	2.3407E+00	-3.3711E+00	5.3274E+00	-1.4642E+00	-48.46

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 5 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
22	5.6895E+00	1.0117E+01	2.9627E+01	3.7613E+01	-2.1807E+01	47.14
23	9.7776E-01	-1.3442E+01	3.5840E+01	3.0325E+01	-4.2790E+01	39.31
34	3.4041E+00	9.6592E+00	2.5199E+01	3.1924E+01	-1.8861E+01	48.54
35	-1.3074E+00	-1.3899E+01	3.1411E+01	2.4432E+01	-3.9639E+01	39.33
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
22	9.7760E+00	2.3190E+01	-2.5443E+01	4.2795E+01	-9.8291E+00	-52.38
23	9.9776E+00	1.7110E+01	-2.3821E+01	3.7630E+01	-1.0543E+01	-49.26
34	9.8341E+00	8.7368E+00	-2.8314E+01	3.7605E+01	-1.9034E+01	-44.45
35	1.6812E+01	7.1399E+00	-2.6692E+01	3.9103E+01	-1.5151E+01	-39.87

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
22	2.1190E-01	4.1699E-01	5.5444E-01	8.7828E-01	-2.4940E-01	50.24
23	1.5379E-01	1.2645E-01	7.8368E-01	9.2392E-01	-6.4368E-01	44.50
34	1.6421E-01	4.0744E-01	3.6740E-01	6.7283E-01	-1.0118E-01	54.16
35	1.0611E-01	1.1691E-01	5.9664E-01	7.0817E-01	-4.8515E-01	45.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
22	1.1198E+00	2.9064E+00	-2.5907E+00	4.7535E+00	-7.2730E-01	-54.51
23	1.1708E+00	2.0734E+00	-2.3605E+00	4.0253E+00	-7.8116E-01	-50.41
34	1.5477E+00	2.3457E+00	-3.0985E+00	5.0707E+00	-1.1773E+00	-48.67
35	2.2302E+00	1.7140E+00	-2.8682E+00	4.8519E+00	-9.0773E-01	-42.43

ELEMENT ID 6 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
23	2.7763E+00	-1.3083E+01	3.6739E+01	3.2432E+01	-4.2738E+01	38.91
24	-1.9085E+00	-3.6507E+01	3.7921E+01	2.2473E+01	-6.0888E+01	32.74
35	8.3781E+00	-1.1962E+01	3.1779E+01	3.1575E+01	-3.5159E+01	36.13
36	3.6936E+00	-3.5386E+01	3.2961E+01	2.2471E+01	-5.4164E+01	29.67
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
23	1.0094E+01	1.7133E+01	-2.1441E+01	3.5341E+01	-8.1144E+00	-49.66
24	8.9554E+00	1.0189E+01	-1.8514E+01	2.8096E+01	-8.9517E+00	-45.95
35	1.6693E+01	7.1161E+00	-2.4314E+01	3.6685E+01	-1.2876E+01	-39.43
36	2.0669E+01	5.5093E+00	-2.1387E+01	3.5779E+01	-9.6012E+00	-35.24

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
23	2.6935E-01	1.4956E-01	7.9663E-01	1.0083E+00	-5.8943E-01	42.85
24	2.2191E-01	-8.7649E-02	7.5762E-01	8.4040E-01	-7.0614E-01	39.23
35	3.4798E-01	1.6529E-01	5.6948E-01	8.3340E-01	-3.2013E-01	40.44
36	3.0054E-01	-7.1918E-02	5.3047E-01	6.7652E-01	-4.4790E-01	35.33
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
23	1.1811E+00	2.0754E+00	-2.0858E+00	3.7615E+00	-5.0493E-01	-51.05
24	8.3950E-01	1.1569E+00	-1.7604E+00	2.7658E+00	-7.6933E-01	-47.58
35	2.2167E+00	1.7113E+00	-2.5513E+00	4.5277E+00	-5.9973E-01	-42.17
36	2.0733E+00	1.0557E+00	-2.2258E+00	3.8478E+00	-7.1875E-01	-38.56

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 7 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
33	-2.7317E+00	-1.7481E+01	1.1131E+01	3.2460E+00	-2.3459E+01	28.24
34	-4.8529E-01	-6.2490E+00	1.5312E+01	1.2213E+01	-1.8948E+01	39.67
45	-6.6012E+00	-1.8255E+01	1.2209E+01	1.0997E+00	-2.5956E+01	32.24
46	-4.3549E+00	-7.0230E+00	1.6389E+01	1.0754E+01	-2.2132E+01	42.67
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
33	-1.0412E+00	1.2529E+01	-3.6171E+01	4.2546E+01	-3.1058E+01	-50.31
34	9.7510E+00	8.9693E+00	-3.3202E+01	4.2565E+01	-2.3844E+01	-44.66
45	9.2464E+00	1.3208E+01	-4.0112E+01	5.1388E+01	-2.8933E+01	-46.41
46	2.1120E+01	8.7959E+00	-3.7143E+01	5.2608E+01	-2.2692E+01	-40.29

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
33	5.3967E-03	-2.9320E-01	-1.4577E-02	6.1067E-03	-2.9391E-01	-2.79
34	5.0798E-02	-6.6190E-02	2.6359E-01	2.6231E-01	-2.7770E-01	38.74
45	5.0375E-02	-2.8421E-01	-4.5897E-02	5.6557E-02	-2.9039E-01	-7.67
46	9.5775E-02	-5.7207E-02	2.3227E-01	2.6382E-01	-2.2525E-01	35.89
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
33	-1.8070E-01	3.1036E+00	-4.4218E+00	6.1784E+00	-3.2555E+00	-55.19
34	1.5435E+00	2.4460E+00	-4.0409E+00	6.0608E+00	-2.0713E+00	-48.19
45	1.0995E+00	5.0150E+00	-5.4906E+00	8.8864E+00	-2.7719E+00	-54.81
46	3.5446E+00	3.1147E+00	-5.1097E+00	8.4439E+00	-1.7846E+00	-43.80

ELEMENT ID 8 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
34	2.5206E-01	-6.1016E+00	2.4596E+01	2.1876E+01	-2.7725E+01	41.32
35	-1.4992E+00	-1.4858E+01	2.7318E+01	1.9944E+01	-3.6301E+01	38.13
46	2.4039E+00	-5.6712E+00	1.8864E+01	1.7658E+01	-2.0925E+01	38.96
47	6.5276E-01	-1.4428E+01	2.1586E+01	1.5977E+01	-2.9752E+01	35.37
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
34	9.8860E+00	8.9963E+00	-3.1256E+01	4.0701E+01	-2.1818E+01	-44.59
35	1.6761E+01	6.8884E+00	-2.8546E+01	4.0795E+01	-1.7145E+01	-40.09
46	2.0562E+01	8.6843E+00	-3.3009E+01	4.8162E+01	-1.8916E+01	-39.90
47	2.5855E+01	7.6634E+00	-3.0299E+01	4.8394E+01	-1.4875E+01	-36.65

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
34	7.0267E-02	-6.2304E-02	4.4306E-01	4.5197E-01	-4.4401E-01	40.75
35	8.4181E-02	7.2642E-03	3.5233E-01	4.0015E-01	-3.0870E-01	41.89
46	4.1609E-01	6.8693E-03	2.2488E-01	5.1552E-01	-9.2555E-02	23.85
47	4.3001E-01	7.6437E-02	1.3416E-01	4.7515E-01	3.1295E-02	18.60
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
34	1.5687E+00	2.4510E+00	-3.7683E+00	5.8039E+00	-1.7842E+00	-48.34
35	2.2277E+00	1.7012E+00	-3.3390E+00	5.3138E+00	-1.3850E+00	-42.75
46	3.4346E+00	3.0927E+00	-4.3863E+00	7.6533E+00	-1.1259E+00	-43.88
47	3.6789E+00	2.0620E+00	-3.9570E+00	6.9092E+00	-1.1683E+00	-39.23

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 9 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
35	8.1866E+00	-1.2921E+01	2.7686E+01	2.7262E+01	-3.1996E+01	34.57
36	5.5837E+00	-2.5935E+01	2.9730E+01	2.3473E+01	-4.3825E+01	31.04
47	1.0970E+01	-1.2364E+01	2.3047E+01	2.5135E+01	-2.6529E+01	31.58
48	8.3669E+00	-2.5378E+01	2.5091E+01	2.1731E+01	-3.8743E+01	28.04
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
35	1.6643E+01	6.8646E+00	-2.6168E+01	3.8374E+01	-1.4867E+01	-39.71
36	2.0905E+01	6.6897E+00	-2.2891E+01	3.7766E+01	-1.0172E+01	-36.38
47	2.5971E+01	7.6865E+00	-2.7348E+01	4.5664E+01	-1.2007E+01	-35.76
48	3.5571E+01	6.8877E+00	-2.4071E+01	4.9249E+01	-6.7905E+00	-29.61

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
35	3.2605E-01	5.5644E-02	3.2518E-01	5.4301E-01	-1.6132E-01	33.71
36	2.9837E-01	-8.2774E-02	4.8470E-01	6.2861E-01	-4.1302E-01	34.27
47	6.1283E-01	1.1299E-01	3.3410E-01	7.8014E-01	-5.4322E-02	26.60
48	5.8514E-01	-2.5424E-02	4.9362E-01	8.6025E-01	-3.0053E-01	29.13
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
35	2.2142E+00	1.6985E+00	-3.0220E+00	4.9894E+00	-1.0767E+00	-42.56
36	2.0830E+00	1.1044E+00	-2.6060E+00	4.2452E+00	-1.0578E+00	-39.68
47	3.6868E+00	2.0635E+00	-3.4617E+00	6.4308E+00	-6.8046E-01	-38.40
48	3.7321E+00	1.2451E+00	-3.0457E+00	5.7784E+00	-8.0116E-01	-33.90

ELEMENT ID 10 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
45	-7.1519E+00	-2.1008E+01	1.1711E+01	-4.7279E-01	-2.7687E+01	29.70
46	-5.7263E+00	-1.3880E+01	9.9774E+00	9.7494E-01	-2.0582E+01	33.89
57	-2.4650E+00	-2.0071E+01	9.5617E+00	1.7289E+00	-2.4265E+01	23.68
58	-1.0394E+00	-1.2943E+01	7.8276E+00	2.8422E+00	-1.6824E+01	26.38
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
45	8.1879E+00	7.9156E+00	-4.6858E+01	5.4910E+01	-3.8807E+01	-44.92
46	2.1416E+01	1.0278E+01	-3.9377E+01	5.5616E+01	-2.3922E+01	-40.98
57	5.7009E+01	2.6355E+01	-5.1599E+01	9.5509E+01	-1.2145E+01	-36.73
58	2.9770E+01	6.1467E+00	-4.4117E+01	6.3630E+01	-2.7713E+01	-37.51

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
45	5.5526E-02	-2.5848E-01	9.5503E-02	8.2291E-02	-2.8525E-01	15.66
46	7.3058E-02	-1.7082E-01	-1.9257E-01	1.7905E-01	-2.7681E-01	-28.83
57	2.4495E-01	-2.2058E-01	-6.6873E-02	2.5436E-01	-2.3000E-01	-8.01
58	2.6248E-01	-1.3292E-01	-3.5494E-01	4.7106E-01	-3.4150E-01	-30.44
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
45	8.8240E-01	3.9293E+00	-7.5612E+00	1.0119E+01	-5.3073E+00	-50.70
46	3.6231E+00	3.5072E+00	-6.0102E+00	9.5756E+00	-2.4453E+00	-44.72
57	1.0522E+01	8.0230E+00	-9.3842E+00	1.8739E+01	-1.9448E-01	-41.21
58	5.8141E+00	2.2663E+00	-7.8332E+00	1.2072E+01	-3.9913E+00	-38.62

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 11 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
46	1.0325E+00	-1.2528E+01	1.2452E+01	8.4308E+00	-1.9927E+01	30.72
47	4.0112E-01	-1.5685E+01	1.4758E+01	9.1658E+00	-2.4450E+01	30.71
58	3.7192E+00	-1.1991E+01	7.5315E+00	6.7465E+00	-1.5018E+01	21.90
59	3.0879E+00	-1.5148E+01	9.8375E+00	7.3831E+00	-1.9443E+01	23.59
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
46	2.0859E+01	1.0166E+01	-3.5243E+01	5.1159E+01	-2.0134E+01	-40.69
47	2.5710E+01	6.9395E+00	-3.2186E+01	4.9851E+01	-1.7201E+01	-36.87
58	3.0489E+01	6.2903E+00	-3.7915E+01	5.8188E+01	-2.1409E+01	-36.15
59	3.6768E+01	3.2658E+00	-3.4857E+01	5.8690E+01	-1.8656E+01	-32.17

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
46	3.9337E-01	-1.0675E-01	-1.9995E-01	4.6348E-01	-1.7686E-01	-19.32
47	3.4892E-01	-3.2897E-01	1.3889E-01	3.7628E-01	-3.5632E-01	11.14
58	3.4220E-01	-1.1700E-01	-3.8831E-01	5.6372E-01	-3.3851E-01	-29.70
59	2.9776E-01	-3.3922E-01	-4.9475E-02	3.0158E-01	-3.4304E-01	-4.41
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
46	3.5132E+00	3.4852E+00	-5.2868E+00	8.7860E+00	-1.7877E+00	-44.92
47	3.6608E+00	1.9715E+00	-4.5792E+00	7.4726E+00	-1.8403E+00	-39.77
58	5.9338E+00	2.2902E+00	-6.1385E+00	1.0515E+01	-2.2911E+00	-36.74
59	5.9722E+00	1.1384E+00	-5.4308E+00	9.4996E+00	-2.3890E+00	-33.00

ELEMENT ID 12 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
47	1.0718E+01	-1.3622E+01	1.6220E+01	1.8826E+01	-2.1730E+01	26.56
48	9.8853E+00	-1.7786E+01	1.6571E+01	1.7637E+01	-2.5538E+01	25.07
59	1.2881E+01	-1.3189E+01	9.1066E+00	1.5747E+01	-1.6055E+01	17.47
60	1.2049E+01	-1.7353E+01	9.4576E+00	1.4828E+01	-2.0133E+01	16.38
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
47	2.5826E+01	6.9626E+00	-2.9235E+01	4.7113E+01	-1.4325E+01	-36.06
48	3.5832E+01	8.1946E+00	-2.5139E+01	5.0700E+01	-6.6735E+00	-30.60
59	3.6582E+01	3.2285E+00	-3.1476E+01	5.5526E+01	-1.5716E+01	-31.04
60	5.2441E+01	5.9018E-02	-2.7380E+01	6.4139E+01	-1.1640E+01	-23.14

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
47	5.3175E-01	-2.9241E-01	3.3883E-01	6.5317E-01	-4.1383E-01	19.71
48	5.7067E-01	-9.7817E-02	1.4792E-01	6.0194E-01	-1.2908E-01	11.94
59	8.5156E-01	-2.2844E-01	-1.2568E-01	8.6599E-01	-2.4287E-01	-6.55
60	8.9049E-01	-3.3845E-02	-3.1659E-01	9.8852E-01	-1.3188E-01	-17.21
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
47	3.6687E+00	1.9730E+00	-4.0839E+00	6.9918E+00	-1.3501E+00	-39.14
48	3.7490E+00	1.3295E+00	-3.3769E+00	6.1263E+00	-1.0479E+00	-35.15
59	5.9584E+00	1.1357E+00	-4.6054E+00	8.7456E+00	-1.6515E+00	-31.18
60	6.1959E+00	1.8771E-01	-3.8984E+00	8.1134E+00	-1.7298E+00	-26.19

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 13
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
57	-1.3842E+00	-1.1568E+01	5.1898E+00	7.9446E-01	-1.3747E+01	22.77
58	-1.3654E+00	-1.1474E+01	5.2220E+00	8.4770E-01	-1.3687E+01	22.97
69	-2.2408E+00	-1.1740E+01	4.6295E+00	-3.5773E-01	-1.3623E+01	22.13
70	-2.2219E+00	-1.1646E+01	4.6618E+00	-3.0556E-01	-1.3562E+01	22.35
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
57	1.4831E+01	1.8278E+01	-1.2883E+01	2.9552E+01	3.5573E+00	-48.81
58	7.7421E+00	7.8860E+00	-1.1141E+01	1.8955E+01	-3.3273E+00	-45.19
69	1.7611E+01	-2.2007E+00	-1.3508E+01	2.4456E+01	-9.0457E+00	-26.87
70	1.2692E+01	3.8049E+00	-1.1767E+01	2.0826E+01	-4.3292E+00	-34.66

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
57	1.8235E-01	4.4565E-02	-2.5847E-01	3.8095E-01	-1.5404E-01	-37.54
58	1.6496E-01	-4.2394E-02	-4.8810E-02	1.7587E-01	-5.3309E-02	-12.61
69	-1.6615E-01	-2.5148E-02	-2.7761E-01	1.9077E-01	-3.8207E-01	-52.12
70	-1.8354E-01	-1.1211E-01	-6.7953E-02	-7.1054E-02	-2.2459E-01	-58.86
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
57	3.0748E+00	5.7429E+00	-2.8493E+00	7.5549E+00	1.2627E+00	-57.55
58	1.6960E+00	2.6905E+00	-2.2702E+00	4.5173E+00	-1.3078E-01	-51.18
69	4.7086E+00	1.4064E+00	-3.3936E+00	6.8315E+00	-7.1649E-01	-32.03
70	3.2951E+00	2.1727E+00	-2.8146E+00	5.6039E+00	-1.3606E-01	-39.36

ELEMENT ID 14
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
58	1.4899E+00	-1.0903E+01	5.0443E+00	3.2835E+00	-1.2697E+01	19.57
59	1.3983E+00	-1.1361E+01	1.7109E+00	1.6238E+00	-1.1587E+01	7.51
70	-6.3425E-01	-1.1328E+01	3.7655E+00	5.5858E-01	-1.2521E+01	17.58
71	-7.2579E-01	-1.1786E+01	4.3212E-01	-7.0893E-01	-1.1803E+01	2.23
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
58	7.8973E+00	7.9171E+00	-9.8014E+00	1.7709E+01	-1.8942E+00	-45.03
59	8.3292E+00	2.6422E+00	-8.5026E+00	1.4451E+01	-3.4797E+00	-35.75
70	1.2818E+01	3.8301E+00	-1.0960E+01	2.0170E+01	-3.5214E+00	-33.85
71	1.2585E+01	5.4681E+00	-9.6611E+00	1.9322E+01	-1.2689E+00	-34.89

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
58	2.1280E-01	-3.2836E-02	-6.8838E-02	2.3078E-01	-5.0812E-02	-14.64
59	1.9901E-01	-1.0179E-01	-5.8531E-01	6.5293E-01	-5.5571E-01	-37.79
70	-2.7220E-01	-1.2982E-01	-7.9078E-02	-9.4608E-02	-3.0741E-01	-66.00
71	-2.8599E-01	-1.9877E-01	-5.9553E-01	3.5475E-01	-8.3951E-01	-47.09
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
58	1.7219E+00	2.6957E+00	-1.9042E+00	4.1742E+00	2.4336E-01	-52.17
59	1.4412E+00	1.0019E+00	-1.5259E+00	2.7632E+00	-3.2007E-01	-40.90
70	3.3262E+00	2.1790E+00	-2.4786E+00	5.2967E+00	2.0854E-01	-38.48
71	2.6512E+00	1.8588E+00	-2.1003E+00	4.3923E+00	1.1768E-01	-39.66

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 15
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
59	7.2743E+00	-1.0186E+01	1.2724E+00	7.3666E+00	-1.0278E+01	4.15
60	6.7247E+00	-1.2934E+01	4.0514E+00	7.5269E+00	-1.3736E+01	11.20
71	4.8724E-01	-1.1543E+01	-1.4199E+00	6.5255E-01	-1.1709E+01	-6.64
72	-6.2296E-02	-1.4291E+01	1.3591E+00	6.6352E-02	-1.4420E+01	5.41
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
59	8.2890E+00	2.6341E+00	-7.7722E+00	1.3732E+01	-2.8090E+00	-35.00
60	1.1513E+01	9.4294E-01	-6.4208E+00	1.4544E+01	-2.0881E+00	-25.27
71	1.2598E+01	5.4706E+00	-8.4011E+00	1.8160E+01	-9.1475E-02	-33.51
72	1.8805E+01	7.0525E+00	-7.0496E+00	2.2106E+01	3.7512E+00	-25.09

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
59	5.3128E-01	-3.5325E-02	-6.3103E-01	9.3969E-01	-4.4373E-01	-32.91
60	4.6823E-01	-3.5057E-01	-1.3124E-01	4.8875E-01	-3.7109E-01	-8.89
71	-4.8920E-01	-2.3944E-01	-8.0861E-01	4.5388E-01	-1.1825E+00	-49.39
72	-5.5224E-01	-5.5468E-01	-3.0883E-01	-2.4463E-01	-8.6229E-01	-44.89
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
59	1.4382E+00	1.0013E+00	-1.3476E+00	2.5850E+00	-1.4543E-01	-40.40
60	1.3714E+00	2.0611E-01	-1.0342E+00	1.9758E+00	-3.9828E-01	-30.30
71	2.6556E+00	1.8597E+00	-1.7477E+00	4.0501E+00	4.6514E-01	-38.59
72	2.8416E+00	1.4089E+00	-1.4343E+00	3.7285E+00	5.2195E-01	-31.73

ELEMENT ID 16
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
69	-1.1217E+00	-6.1446E+00	3.9071E+00	1.0115E+00	-8.2778E+00	28.63
70	-1.2972E+00	-7.0223E+00	1.8131E+00	-7.7134E-01	-7.5482E+00	16.18
81	-4.5865E-01	-6.0119E+00	3.2456E+00	1.0360E+00	-7.5065E+00	24.73
82	-6.3418E-01	-6.8896E+00	1.1517E+00	-4.2886E-01	-7.0949E+00	10.11
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
69	1.7885E+01	-8.3334E-01	-1.0342E+01	2.2474E+01	-5.4227E+00	-23.93
70	1.2620E+01	3.4442E+00	-1.0867E+01	1.9828E+01	-3.7632E+00	-33.56
81	1.2127E+01	-1.8422E+00	-8.0802E+00	1.5823E+01	-5.5382E+00	-24.58
82	1.3749E+01	3.3126E-01	-8.6042E+00	1.7951E+01	-3.8705E+00	-26.03

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
69	-1.3226E-01	1.4427E-01	-2.4751E-02	1.4647E-01	-1.3446E-01	-84.93
70	-1.5560E-01	2.7587E-02	-3.1864E-01	2.6754E-01	-3.9555E-01	-53.02
81	-2.5093E-01	1.2056E-01	1.5759E-01	1.7840E-01	-3.0878E-01	69.84
82	-2.7427E-01	3.8717E-03	-1.3630E-01	5.9525E-02	-3.2993E-01	-67.79
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
69	4.7573E+00	1.6496E+00	-2.9990E+00	6.5811E+00	-1.7420E-01	-31.31
70	3.2776E+00	2.0852E+00	-2.9368E+00	5.6781E+00	-3.1525E-01	-39.26
81	4.2733E+00	1.2456E+00	-2.7489E+00	5.8976E+00	-3.7868E-01	-30.58
82	3.9651E+00	1.2464E+00	-2.6866E+00	5.6167E+00	-4.0521E-01	-31.58

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 17 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
70	2.9038E-01	-6.7047E+00	9.1688E-01	4.0856E-01	-6.8229E+00	7.34
71	4.2055E-01	-6.0538E+00	2.2578E+00	1.1301E+00	-6.7634E+00	17.45
82	-5.9084E-01	-6.8810E+00	-2.5263E-01	-5.8071E-01	-6.8912E+00	-2.30
83	-4.6065E-01	-6.2302E+00	1.0882E+00	-2.6222E-01	-6.4286E+00	10.33
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
70	1.2746E+01	3.4693E+00	-1.0060E+01	1.9185E+01	-2.9699E+00	-32.62
71	1.2567E+01	5.3780E+00	-9.3849E+00	1.9022E+01	-1.0770E+00	-34.52
82	1.3634E+01	3.0815E-01	-8.5493E+00	1.7810E+01	-3.8681E+00	-26.03
83	1.5581E+01	3.5466E+00	-7.8744E+00	1.9474E+01	-3.4642E-01	-26.31

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
70	-2.4427E-01	9.8688E-03	-3.2977E-01	2.3620E-01	-4.7060E-01	-55.54
71	-2.0940E-01	1.8424E-01	1.0549E-01	2.1073E-01	-2.3589E-01	75.90
82	-5.0087E-01	-4.1472E-02	-2.9633E-01	1.0376E-01	-6.4610E-01	-63.89
83	-4.6600E-01	1.3289E-01	1.3891E-01	1.6355E-01	-4.9665E-01	77.56
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
70	3.3087E+00	2.0915E+00	-2.6007E+00	5.3711E+00	2.9097E-02	-38.41
71	2.6464E+00	1.8347E+00	-2.3559E+00	4.6312E+00	-1.5006E-01	-40.11
82	3.9414E+00	1.2416E+00	-2.5535E+00	5.4799E+00	-2.9689E-01	-31.07
83	3.5414E+00	1.4357E+00	-2.3087E+00	5.0260E+00	-4.8927E-02	-32.74

ELEMENT ID 18 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
71	1.6337E+00	-5.8113E+00	4.0579E-01	1.6558E+00	-5.8334E+00	3.11
72	1.3406E+00	-7.2768E+00	-4.9802E+00	3.6173E+00	-9.5535E+00	-24.57
83	-2.1800E+00	-6.5739E+00	2.5893E+00	-9.8119E-01	-7.7727E+00	24.84
84	-2.4732E+00	-8.0394E+00	-2.7965E+00	-1.3109E+00	-9.2017E+00	-22.57
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
71	1.2580E+01	5.3805E+00	-8.1248E+00	1.7867E+01	9.3574E-02	-33.05
72	1.8742E+01	6.7347E+00	-7.3677E+00	2.2242E+01	3.2343E+00	-25.41
83	1.5582E+01	3.5469E+00	-7.4585E+00	1.9148E+01	-1.8900E-02	-25.55
84	2.0841E+01	6.5913E+00	-6.7014E+00	2.3497E+01	3.9349E+00	-21.62

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
71	-4.1258E-01	1.4358E-01	-1.0758E-01	1.6366E-01	-4.3266E-01	-79.43
72	-4.1816E-01	1.1570E-01	-1.0702E+00	9.5175E-01	-1.2542E+00	-52.00
83	-9.7833E-01	3.0466E-02	5.1315E-01	2.4561E-01	-1.1935E+00	67.25
84	-9.8391E-01	2.5817E-03	-4.4943E-01	1.7663E-01	-1.1580E+00	-68.83
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
71	2.6508E+00	1.8356E+00	-2.0034E+00	4.2876E+00	1.9876E-01	-39.25
72	2.8243E+00	1.3226E+00	-1.7749E+00	4.0007E+00	1.4625E-01	-33.54
83	3.5429E+00	1.4360E+00	-2.1389E+00	4.8737E+00	1.0516E-01	-31.89
84	3.5575E+00	1.5564E+00	-1.9105E+00	4.7136E+00	4.0031E-01	-31.18

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 19 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
81	2.4728E-02	-3.5950E+00	1.7604E+00	7.3969E-01	-4.3100E+00	22.10
82	1.6686E-01	-2.8843E+00	1.7775E+00	9.8365E-01	-3.7011E+00	24.68
93	5.8681E+00	-2.4264E+00	7.8189E-01	5.9411E+00	-2.4995E+00	5.34
94	6.0102E+00	-1.7158E+00	7.9890E-01	6.0920E+00	-1.7975E+00	5.84
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
81	1.2076E+01	-2.0972E+00	-6.9859E+00	1.4940E+01	-4.9617E+00	-22.30
82	1.3794E+01	5.5490E-01	-7.0110E+00	1.6817E+01	-2.4678E+00	-23.32
93	1.2012E+01	-1.2037E+00	-6.0446E+00	1.4360E+01	-3.5514E+00	-21.23
94	1.3706E+01	-1.8616E-01	-6.0697E+00	1.5985E+01	-2.4644E+00	-20.57

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
81	-2.7443E-01	3.1009E-03	9.9990E-02	3.5373E-02	-3.0670E-01	72.11
82	-2.3449E-01	2.0280E-01	2.0956E-01	2.8701E-01	-3.1870E-01	68.11
93	-2.5363E-02	5.2895E-02	2.9296E-02	6.2647E-02	-3.5115E-02	71.59
94	1.4577E-02	2.5259E-01	1.3886E-01	3.1647E-01	-4.9298E-02	65.30
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
81	4.2613E+00	1.1860E+00	-2.6790E+00	5.8125E+00	-3.6525E-01	-30.07
82	3.9762E+00	1.3020E+00	-2.5410E+00	5.5105E+00	-2.3225E-01	-31.12
93	4.7187E+00	6.3238E-01	-2.5841E+00	5.9698E+00	-6.1872E-01	-25.83
94	4.2836E+00	6.7327E-01	-2.4462E+00	5.5186E+00	-5.6171E-01	-26.79

ELEMENT ID 20 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
82	2.1024E-01	-2.8758E+00	3.7311E-01	2.5471E-01	-2.9202E+00	6.80
83	-1.5066E-01	-4.6803E+00	7.6145E-01	-2.6082E-02	-4.8049E+00	9.29
94	6.3421E+00	-1.6493E+00	1.3721E+00	6.5711E+00	-1.8783E+00	9.48
95	5.9812E+00	-3.4538E+00	1.7604E+00	6.2989E+00	-3.7716E+00	10.23
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
82	1.3678E+01	5.3177E-01	-6.9561E+00	1.6676E+01	-2.4655E+00	-23.31
83	1.5567E+01	3.4759E+00	-6.7203E+00	1.8561E+01	4.8200E-01	-24.01
94	1.3733E+01	-1.8080E-01	-6.0145E+00	1.5973E+01	-2.4202E+00	-20.42
95	1.6547E+01	8.0376E-01	-5.7787E+00	1.8441E+01	-1.0896E+00	-18.14

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
82	-4.6108E-01	1.5746E-01	4.9523E-02	1.6140E-01	-4.6502E-01	85.45
83	-5.4027E-01	-2.3851E-01	2.3932E-03	-2.3849E-01	-5.4029E-01	89.55
94	3.1782E-02	2.5605E-01	3.1784E-01	4.8096E-01	-1.9312E-01	54.72
95	-4.7414E-02	-1.3991E-01	2.7071E-01	1.8097E-01	-3.6829E-01	40.15
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
82	3.9525E+00	1.2973E+00	-2.4080E+00	5.3746E+00	-1.2483E-01	-30.57
83	3.5389E+00	1.4233E+00	-2.2626E+00	4.9787E+00	-1.6524E-02	-32.47
94	4.2895E+00	6.7444E-01	-2.3170E+00	5.4206E+00	-4.5669E-01	-26.02
95	3.9870E+00	6.9381E-01	-2.1716E+00	5.0657E+00	-3.8488E-01	-26.41

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 21
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
83	-1.8701E+00	-5.0240E+00	2.2626E+00	-6.8912E-01	-6.2050E+00	27.56
84	-2.0772E+00	-6.0596E+00	8.7952E-01	-1.8916E+00	-6.2452E+00	11.92
95	7.6200E+00	-3.1262E+00	1.4160E+00	7.8035E+00	-3.3096E+00	7.38
96	7.4129E+00	-4.1617E+00	3.2934E-02	7.4130E+00	-4.1618E+00	.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
83	1.5568E+01	3.4761E+00	-6.3044E+00	1.8257E+01	7.8708E-01	-23.10
84	2.0932E+01	7.0463E+00	-6.0477E+00	2.3196E+01	4.7816E+00	-20.53
95	1.6511E+01	7.9647E-01	-5.6840E+00	1.8351E+01	-1.0440E+00	-17.94
96	2.0104E+01	9.8647E-01	-5.4274E+00	2.1538E+01	-4.4686E-01	-14.79

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
83	-1.0526E+00	-3.4095E-01	3.7664E-01	-1.7864E-01	-1.2149E+00	66.69
84	-1.0557E+00	-3.5624E-01	6.9338E-01	7.0616E-02	-1.4825E+00	58.38
95	4.1829E-01	-4.6808E-02	1.0546E-01	4.4108E-01	-6.9602E-02	12.20
96	4.1524E-01	-6.2095E-02	4.2218E-01	6.6154E-01	-3.0840E-01	30.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
83	3.5404E+00	1.4236E+00	-2.0928E+00	4.8272E+00	1.3682E-01	-31.59
84	3.5741E+00	1.6394E+00	-1.9561E+00	4.7890E+00	4.2449E-01	-31.84
95	3.9791E+00	6.9222E-01	-2.0668E+00	4.9762E+00	-3.0487E-01	-25.75
96	3.7580E+00	5.2165E-01	-1.9301E+00	4.6585E+00	-3.7882E-01	-25.01

ELEMENT ID 22
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
93	6.1001E+00	-1.2667E+00	5.2461E-01	6.1372E+00	-1.3039E+00	4.05
94	5.9103E+00	-2.2153E+00	8.4687E-02	5.9112E+00	-2.2162E+00	.60
105	1.5141E+01	5.4145E-01	8.3028E-01	1.5188E+01	4.9438E-01	3.24
106	1.4951E+01	-4.0713E-01	3.9034E-01	1.4961E+01	-4.1704E-01	1.45
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
93	1.1998E+01	-1.2744E+00	-5.4982E+00	1.3980E+01	-3.2562E+00	-19.82
94	1.3704E+01	-1.9636E-01	-5.6032E+00	1.5682E+01	-2.1736E+00	-19.44
105	1.1368E+01	-2.9065E-02	-5.4136E+00	1.3530E+01	-2.1905E+00	-21.76
106	1.3860E+01	1.1670E-03	-5.5185E+00	1.5789E+01	-1.9278E+00	-19.27

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
93	-1.7865E-02	9.0369E-02	8.1581E-02	1.3415E-01	-6.1647E-02	61.78
94	-6.5065E-02	-1.4563E-01	3.5309E-02	-5.1780E-02	-1.5892E-01	20.62
105	4.2431E-01	1.7882E-01	2.0487E-01	5.4039E-01	6.2735E-02	29.54
106	3.7710E-01	-5.7176E-02	1.5860E-01	4.2886E-01	-1.0893E-01	18.07
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
93	4.7200E+00	6.3866E-01	-2.4892E+00	5.8981E+00	-5.3945E-01	-25.33
94	4.2834E+00	6.7180E-01	-2.3743E+00	5.4605E+00	-5.0538E-01	-26.37
105	4.9701E+00	-5.1850E-03	-2.4266E+00	5.9577E+00	-9.9273E-01	-22.14
106	4.6045E+00	-1.3673E-04	-2.3117E+00	5.5648E+00	-9.6042E-01	-22.56

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 23
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
94	6.2422E+00	-2.1488E+00	6.5787E-01	6.2935E+00	-2.2001E+00	4.46
95	6.3960E+00	-1.3800E+00	2.2236E+00	6.9869E+00	-1.9710E+00	14.88
106	1.6139E+01	-1.6958E-01	-3.7579E-01	1.6148E+01	-1.7823E-01	-1.32
107	1.6293E+01	5.9923E-01	1.1899E+00	1.6383E+01	5.0952E-01	4.31
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
94	1.3731E+01	-1.9101E-01	-5.5480E+00	1.5672E+01	-2.1314E+00	-19.28
95	1.6550E+01	8.1667E-01	-5.5236E+00	1.8295E+01	-9.2889E-01	-17.54
106	1.3825E+01	-5.7801E-03	-5.5933E+00	1.5804E+01	-1.9846E+00	-19.48
107	1.6494E+01	-6.0040E-02	-5.5690E+00	1.8193E+01	-1.7591E+00	-16.97

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
94	-4.7863E-02	-1.4217E-01	2.1428E-01	1.2439E-01	-3.1442E-01	38.80
95	-6.2373E-03	6.5958E-02	3.6028E-01	3.9194E-01	-3.3222E-01	47.86
106	6.5383E-01	-1.8556E-03	-2.4111E-02	6.5472E-01	-2.7410E-03	-2.10
107	6.9546E-01	2.0627E-01	1.2188E-01	7.2415E-01	1.7758E-01	13.24
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
94	4.2892E+00	6.7297E-01	-2.2451E+00	5.3638E+00	-4.0157E-01	-25.58
95	3.9847E+00	6.8210E-01	-2.1316E+00	5.0297E+00	-3.6296E-01	-26.12
106	4.6018E+00	-6.7725E-04	-2.2013E+00	5.4852E+00	-8.8401E-01	-21.86
107	4.2237E+00	-7.3904E-03	-2.0878E+00	5.0804E+00	-8.6411E-01	-22.31

ELEMENT ID 24
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
95	8.0348E+00	-1.0524E+00	1.8792E+00	8.4081E+00	-1.4257E+00	11.23
96	6.9764E+00	-6.3449E+00	-2.7790E+00	7.5329E+00	-6.9014E+00	-11.32
107	1.6871E+01	7.1492E-01	2.4097E+00	1.7222E+01	3.6317E-01	8.31
108	1.5812E+01	-4.5775E+00	-2.2485E+00	1.6057E+01	-4.8225E+00	-6.22
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
95	1.6513E+01	8.0938E-01	-5.4289E+00	1.8207E+01	-8.8468E-01	-17.33
96	2.0122E+01	1.0758E+00	-5.6461E+00	2.1670E+01	-4.7211E-01	-15.33
107	1.6552E+01	-4.8406E-02	-5.6224E+00	1.8277E+01	-1.7734E+00	-17.06
108	1.8142E+01	1.1067E-01	-5.8396E+00	1.9868E+01	-1.6154E+00	-16.47

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
95	4.5948E-01	1.5907E-01	1.9502E-01	5.5544E-01	6.3113E-02	26.20
96	2.1193E-01	-1.0787E+00	-3.6928E-01	3.1012E-01	-1.1769E+00	-14.89
107	7.2689E-01	2.1259E-01	2.7656E-01	8.4737E-01	9.2103E-02	23.54
108	4.7935E-01	-1.0251E+00	-2.8773E-01	5.3250E-01	-1.0783E+00	-10.47
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
95	3.9767E+00	6.8051E-01	-2.0267E+00	4.9409E+00	-2.8362E-01	-25.44
96	3.7762E+00	6.1238E-01	-1.9721E+00	4.7224E+00	-3.3384E-01	-25.63
107	4.2374E+00	-4.6474E-03	-1.9917E+00	5.0260E+00	-7.9321E-01	-21.60
108	3.6563E+00	1.8108E-02	-1.9371E+00	4.4945E+00	-8.2013E-01	-23.40

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 25 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
44	-6.8065E+00	-1.3149E+01	1.0492E+01	9.8347E-01	-2.0939E+01	36.59
45	-6.7980E+00	-1.3106E+01	8.3310E+00	-1.0441E+00	-1.8860E+01	34.63
56	-4.5408E+00	-1.2696E+01	9.8033E+00	1.9993E+00	-1.9236E+01	33.71
57	-4.5323E+00	-1.2653E+01	7.6420E+00	6.1005E-02	-1.7246E+01	31.01
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
44	-1.0234E+01	-4.5511E+00	-1.6067E+01	8.9232E+00	-2.3709E+01	-50.02
45	3.0138E+01	7.3837E+00	-1.2337E+01	3.5543E+01	1.9790E+00	-23.66
56	2.1701E+01	1.8642E+01	-1.8339E+01	3.8574E+01	1.7691E+00	-42.62
57	3.0301E+01	9.2903E+00	-1.4609E+01	3.7790E+01	1.8017E+00	-27.14

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
44	-1.6183E-03	1.4885E-01	-8.0813E-02	1.8403E-01	-3.6796E-02	-66.48
45	-6.6394E-02	-1.7502E-01	2.3633E-02	-6.1475E-02	-1.7994E-01	11.76
56	1.6441E-01	1.8205E-01	-8.9013E-02	2.6268E-01	8.3777E-02	-47.83
57	9.9633E-02	-1.4183E-01	1.5430E-02	1.0062E-01	-1.4281E-01	3.64
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
44	-2.3512E+00	-1.2545E+00	-3.1290E+00	1.3738E+00	-4.9796E+00	-49.97
45	4.2340E+00	1.6574E+00	-2.1631E+00	5.4634E+00	4.2799E-01	-29.61
56	5.0217E+00	7.4517E+00	-4.2552E+00	1.0662E+01	1.8114E+00	-52.97
57	5.7698E+00	2.4324E+00	-3.2893E+00	7.7895E+00	4.1274E-01	-31.55

ELEMENT ID 26 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
55	-5.6459E+00	-1.1494E+01	8.3957E+00	3.2037E-01	-1.7460E+01	35.40
56	-5.5422E+00	-1.0976E+01	8.3589E+00	5.3027E-01	-1.7048E+01	36.00
67	-4.9840E+00	-1.1362E+01	7.7960E+00	2.5007E-01	-1.6596E+01	33.88
68	-4.8804E+00	-1.0844E+01	7.7591E+00	4.5035E-01	-1.6174E+01	34.49
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
55	-7.6413E+00	-4.3709E+00	-1.0558E+01	4.6774E+00	-1.6690E+01	-49.40
56	3.9438E+01	1.0159E+01	-1.0827E+01	4.3006E+01	6.5906E+00	-18.24
67	1.5194E+01	-3.7737E+00	-8.6834E+00	1.8568E+01	-7.1486E+00	-21.24
68	1.2023E+01	-3.5742E+00	-8.9524E+00	1.6097E+01	-7.6483E+00	-24.47

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
55	7.7613E-02	1.3785E-01	-1.2571E-01	2.3701E-01	-2.1538E-02	-51.74
56	6.6007E-02	7.9828E-02	-3.5141E-02	1.0873E-01	3.7104E-02	-50.56
67	3.0551E-03	1.2293E-01	-9.9841E-02	1.7944E-01	-5.3458E-02	-60.49
68	-8.5501E-03	6.4904E-02	-9.2696E-03	6.6056E-02	-9.7019E-03	-82.92
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
55	-2.7538E+00	-1.8666E+00	-4.1074E+00	1.8211E+00	-6.4415E+00	-48.08
56	8.8544E+00	3.9764E+00	-3.7870E+00	1.0920E+01	1.9109E+00	-28.61
67	5.6134E+00	4.2817E+00	-3.7858E+00	8.7914E+00	1.1037E+00	-40.01
68	3.5199E+00	1.3624E+00	-3.4654E+00	6.0706E+00	-1.1883E+00	-36.35

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 27 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
56	-4.1407E+00	-1.0696E+01	8.4031E+00	1.6014E+00	-1.6438E+01	34.35
57	-4.4374E+00	-1.2179E+01	7.0947E+00	-2.2626E-01	-1.6390E+01	30.69
68	-3.5325E+00	-1.0574E+01	7.0600E+00	8.3598E-01	-1.4942E+01	31.75
69	-3.8291E+00	-1.2057E+01	5.7517E+00	-8.7160E-01	-1.5015E+01	27.21
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
56	1.9195E+01	6.1105E+00	-1.4325E+01	2.8401E+01	-3.0953E+00	-32.73
57	3.2818E+01	2.1876E+01	-1.6346E+01	4.4585E+01	1.0109E+01	-35.75
68	1.7527E+01	-2.4733E+00	-1.0135E+01	2.1765E+01	-6.7112E+00	-22.69
69	1.3098E+01	-3.1034E+00	-1.2157E+01	1.9605E+01	-9.6111E+00	-28.16

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
56	1.4721E-01	9.6057E-02	-1.0535E-02	1.4930E-01	9.3972E-02	-11.19
57	1.3502E-01	3.5087E-02	-2.0292E-01	2.9403E-01	-1.2393E-01	-38.08
68	-7.4981E-02	5.1632E-02	-2.0379E-02	5.4832E-02	-7.8180E-02	-81.08
69	-8.7175E-02	-9.3371E-03	-2.1276E-01	1.6803E-01	-2.6454E-01	-50.18
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
56	4.1380E+00	3.0331E+00	-4.0086E+00	7.6320E+00	-4.6093E-01	-41.08
57	6.5718E+00	6.4423E+00	-4.1116E+00	1.0619E+01	2.3949E+00	-44.55
68	4.8013E+00	1.6186E+00	-3.1487E+00	6.7380E+00	-3.1807E-01	-31.59
69	3.8353E+00	1.2317E+00	-3.2518E+00	6.0362E+00	-9.6921E-01	-34.09

ELEMENT ID 28 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
66	-3.9806E+00	-1.2481E+01	9.9391E+00	2.5789E+00	-1.9040E+01	33.42
67	-2.9669E+00	-7.4127E+00	8.6129E+00	3.7053E+00	-1.4085E+01	37.76
78	-9.6677E+00	-1.3618E+01	7.3336E+00	-4.0480E+00	-1.9238E+01	37.46
79	-8.6540E+00	-8.5501E+00	6.0074E+00	-2.5944E+00	-1.4610E+01	45.25
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
66	-6.0373E+00	1.7810E-01	-4.9476E+00	2.9131E+00	-8.7722E+00	-61.07
67	2.8480E+01	-6.3701E-01	-4.6885E+00	2.9216E+01	-1.3733E+00	-8.93
78	1.2160E+01	-1.1836E+01	-5.3189E+00	1.3286E+01	-1.2963E+01	-11.95
79	8.6899E+00	-5.9905E+00	-5.0598E+00	1.0265E+01	-7.5655E+00	-17.29

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
66	2.9351E-02	5.2258E-03	-5.5837E-02	7.4414E-02	-3.9837E-02	-38.90
67	5.5846E-02	1.3770E-01	-7.0198E-03	1.3830E-01	5.5248E-02	-85.13
78	-4.3684E-02	-9.3932E-03	-4.5038E-02	2.1653E-02	-7.4730E-02	-55.42
79	-1.7191E-02	1.2308E-01	3.7780E-03	1.2318E-01	-1.7292E-02	88.46
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
66	-3.4824E+00	-1.4806E+00	-4.1572E+00	1.7945E+00	-6.7575E+00	-51.77
67	1.0145E+01	2.9073E+00	-3.6081E+00	1.1636E+01	1.4159E+00	-22.46
78	7.1462E+00	2.9532E+00	-4.2285E+00	9.7694E+00	3.2996E-01	-31.81
79	3.8907E+00	4.1325E-01	-3.6795E+00	6.2216E+00	-1.9176E+00	-32.35

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 29 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
67	-4.2453E+00	-7.6684E+00	7.3370E+00	1.5771E+00	-1.3491E+01	38.43
68	-4.1519E+00	-7.2014E+00	6.1385E+00	6.4843E-01	-1.2002E+01	38.03
79	-4.5665E+00	-7.7325E+00	5.9894E+00	4.5571E-02	-1.2345E+01	37.60
80	-4.4731E+00	-7.2655E+00	4.7910E+00	-8.7901E-01	-1.0860E+01	36.88
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
67	1.5294E+01	-3.2742E+00	-6.7070E+00	1.7463E+01	-5.4435E+00	-17.92
68	1.1876E+01	-4.3099E+00	-6.9819E+00	1.4471E+01	-6.9055E+00	-20.39
79	1.2228E+01	-5.2828E+00	-6.3052E+00	1.4262E+01	-7.3168E+00	-17.88
80	1.2693E+01	-3.5627E+00	-6.5802E+00	1.5023E+01	-5.8924E+00	-19.50

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
67	3.9310E-03	1.2730E-01	-9.5125E-03	1.2803E-01	3.2018E-03	-85.62
68	-1.7806E-03	9.8746E-02	-8.0446E-02	1.4334E-01	-4.6375E-02	-61.00
79	-6.9031E-02	1.1273E-01	4.5667E-02	1.2355E-01	-7.9860E-02	76.66
80	-7.4743E-02	8.4167E-02	-2.5265E-02	8.8088E-02	-7.8664E-02	-81.18
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
67	5.1383E+00	1.9060E+00	-3.5226E+00	7.3978E+00	-3.5354E-01	-32.68
68	3.5972E+00	1.7488E+00	-3.2642E+00	6.0655E+00	-7.1949E-01	-37.10
79	5.2289E+00	6.8089E-01	-3.3133E+00	6.9735E+00	-1.0637E+00	-27.77
80	5.0184E+00	1.1520E+00	-3.0549E+00	6.7004E+00	-5.2998E-01	-28.84

ELEMENT ID 30 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
68	-2.8040E+00	-6.9317E+00	5.4394E+00	9.4989E-01	-1.0686E+01	34.61
69	-2.7101E+00	-6.4622E+00	5.0292E+00	7.8155E-01	-9.9539E+00	34.77
80	-1.8887E+00	-6.7487E+00	3.7103E+00	1.1657E-01	-8.7539E+00	28.39
81	-1.7947E+00	-6.2792E+00	3.3001E+00	-4.7156E-02	-8.0267E+00	27.90
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
68	1.7380E+01	-3.2091E+00	-8.1646E+00	2.0225E+01	-6.0537E+00	-19.21
69	1.3371E+01	-1.7361E+00	-8.9909E+00	1.7560E+01	-5.9253E+00	-24.98
80	1.1315E+01	-3.8383E+00	-6.8700E+00	1.3966E+01	-6.4892E+00	-21.10
81	1.3339E+01	-1.5999E+00	-7.6964E+00	1.6594E+01	-4.8555E+00	-22.93

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
68	-6.8217E-02	8.5472E-02	-9.1555E-02	1.2816E-01	-1.1090E-01	-65.00
69	-5.3295E-02	1.6008E-01	4.0100E-02	1.6737E-01	-6.0582E-02	79.70
80	-1.4902E-01	6.9297E-02	-6.4743E-02	8.7053E-02	-1.6677E-01	-74.66
81	-1.3410E-01	1.4390E-01	6.6909E-02	1.5917E-01	-1.4936E-01	77.15
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
68	4.8786E+00	2.0051E+00	-2.9475E+00	6.7209E+00	1.6280E-01	-32.01
69	3.8839E+00	1.4750E+00	-2.8572E+00	5.7802E+00	-4.2128E-01	-33.57
80	4.6936E+00	1.0870E+00	-2.9754E+00	6.3696E+00	-5.8891E-01	-29.39
81	4.5044E+00	1.2919E+00	-2.8851E+00	6.2002E+00	-4.0402E-01	-30.45

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 31 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
76	-8.4674E-01	-8.5623E+00	3.6374E+00	5.9765E-01	-1.0007E+01	21.66
77	1.6373E+00	3.8579E+00	5.4035E+00	8.2640E+00	-2.7688E+00	50.81
88	-1.0428E+01	-1.0478E+01	3.0933E+00	-7.3600E+00	-1.3547E+01	44.77
89	-7.9445E+00	1.9417E+00	4.8594E+00	3.9303E+00	-9.9331E+00	67.74
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
76	-2.2494E+00	-4.1464E-01	-1.2422E+00	2.1221E-01	-2.8763E+00	-63.22
77	6.0462E+00	7.4423E-01	1.7034E-01	6.0517E+00	7.3876E-01	1.84
88	4.9658E+00	-4.1873E+00	-1.3547E+00	5.1621E+00	-4.3836E+00	-8.24
89	7.4743E+00	-3.5423E+00	5.7861E-02	7.4746E+00	-3.5426E+00	.30

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
76	1.6336E-03	8.0704E-03	-3.9840E-03	9.9736E-03	-2.6954E-04	-64.47
77	-3.3131E-03	-1.6663E-02	-5.9581E-03	-1.0408E-03	-1.8936E-02	-20.88
88	3.0690E-03	8.3685E-03	8.2766E-03	1.4409E-02	-2.9717E-03	53.88
89	-1.8778E-03	-1.6365E-02	6.3026E-03	4.8027E-04	-1.8723E-02	20.51
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
76	-3.0649E+00	-3.1861E-01	-2.8117E+00	1.4373E+00	-4.8209E+00	-58.02
77	5.9603E+00	-1.8963E-01	-1.6529E+00	6.3763E+00	-6.0570E-01	-14.13
88	6.5129E+00	2.7631E+00	-3.9050E+00	8.9698E+00	3.0622E-01	-32.18
89	5.6075E+00	7.8832E-01	-2.7462E+00	6.8514E+00	-4.5554E-01	-24.37

ELEMENT ID 32 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
77	-1.5217E+01	4.8729E-01	9.1971E+00	4.7283E+00	-1.9458E+01	65.24
78	-1.7607E+01	-1.1464E+01	8.7504E+00	-5.2619E+00	-2.3809E+01	54.67
89	1.9823E+00	3.9269E+00	5.4150E+00	8.4562E+00	-2.5470E+00	50.09
90	-4.0783E-01	-8.0245E+00	4.9682E+00	2.0437E+00	-1.0476E+01	26.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
77	5.2502E+00	5.8502E-01	1.9402E+00	5.9516E+00	-1.1641E-01	19.88
78	2.3644E+01	-4.0977E+00	1.0530E-01	2.3644E+01	-4.0981E+00	.22
89	7.9928E+00	-3.4386E+00	-6.2363E-01	8.0267E+00	-3.4725E+00	-3.11
90	6.9089E+00	-3.4303E+00	-2.4585E+00	7.4637E+00	-3.9852E+00	-12.72

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
77	-9.2534E-03	-1.7840E-02	5.3540E-03	-6.6839E-03	-2.0409E-02	25.64
78	5.0075E-03	5.3465E-02	1.2638E-02	5.6563E-02	1.9096E-03	76.23
89	-4.3799E-03	-1.6877E-02	-1.4639E-02	5.2883E-03	-2.6545E-02	-33.44
90	9.8809E-03	5.4427E-02	-7.3552E-03	5.5610E-02	8.6979E-03	-80.86
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
77	5.4563E+00	-2.9043E-01	-2.2435E+00	6.2283E+00	-1.0625E+00	-18.99
78	1.2807E+01	2.1235E+00	-3.1885E+00	1.3686E+01	1.2442E+00	-15.42
89	5.9201E+00	8.5081E-01	-2.2198E+00	6.7547E+00	1.6201E-02	-20.61
90	5.2554E+00	-1.5080E-01	-3.1648E+00	6.7144E+00	-1.6097E+00	-24.75

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 33 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
78	-8.8881E+00	-9.7206E+00	5.3334E+00	-3.9547E+00	-1.4654E+01	42.77
79	-8.0543E+00	-5.5514E+00	2.6734E+00	-3.8511E+00	-9.7547E+00	57.54
90	2.4053E+00	-7.4618E+00	3.4798E+00	3.5091E+00	-8.5655E+00	17.60
91	3.2392E+00	-3.2927E+00	8.1983E-01	3.3405E+00	-3.3940E+00	7.05
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
78	1.3294E+01	-6.1677E+00	-3.3686E+00	1.3861E+01	-6.7343E+00	-9.55
79	8.3988E+00	-7.4455E+00	-3.8694E+00	9.2933E+00	-8.3400E+00	-13.02
90	9.6811E+00	-2.8759E+00	-3.2988E+00	1.0495E+01	-3.6898E+00	-13.86
91	1.0067E+01	-2.2784E+00	-3.7997E+00	1.1143E+01	-3.3541E+00	-15.81

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
78	-3.2620E-02	4.5927E-02	-5.9433E-03	4.6374E-02	-3.3067E-02	-85.70
79	-3.6192E-02	2.8070E-02	-7.7952E-03	2.9002E-02	-3.7124E-02	-83.18
90	7.5369E-03	5.3971E-02	3.2524E-02	7.0715E-02	-9.2068E-03	62.76
91	3.9651E-03	3.6114E-02	3.0672E-02	5.4669E-02	-1.4590E-02	58.83
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
78	6.7375E+00	9.0964E-01	-3.7714E+00	8.5895E+00	-9.4237E-01	-26.15
79	3.9745E+00	8.3262E-01	-3.4660E+00	6.2089E+00	-1.4018E+00	-32.81
90	6.8155E+00	1.6122E-01	-3.4373E+00	8.2722E+00	-1.2954E+00	-22.97
91	5.9104E+00	5.6492E-01	-3.1319E+00	7.3550E+00	-8.7963E-01	-24.76

ELEMENT ID 34 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
79	-3.9667E+00	-4.7339E+00	2.6554E+00	-1.6673E+00	-7.0333E+00	40.89
80	-3.8048E+00	-3.9241E+00	3.5603E+00	-3.0363E-01	-7.4253E+00	44.52
91	3.7529E+00	-3.1900E+00	5.7533E-01	3.8002E+00	-3.2374E+00	4.71
92	3.9148E+00	-2.3803E+00	1.4802E+00	4.2455E+00	-2.7110E+00	12.59
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
79	1.1937E+01	-6.7378E+00	-5.1148E+00	1.3246E+01	-8.0469E+00	-14.36
80	1.2737E+01	-3.3419E+00	-5.9585E+00	1.4704E+01	-5.3093E+00	-18.27
91	9.1625E+00	-2.4594E+00	-4.1798E+00	1.0510E+01	-3.8065E+00	-17.86
92	1.0416E+01	-2.4773E+00	-5.0234E+00	1.2142E+01	-4.2035E+00	-18.96

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
79	-8.8035E-02	1.7715E-02	3.4093E-02	2.7754E-02	-9.8073E-02	73.59
80	-6.6486E-02	1.2546E-01	9.1824E-02	1.6231E-01	-1.0334E-01	68.13
91	1.8076E-03	3.5669E-02	1.7373E-03	3.5758E-02	1.7186E-03	87.07
92	2.3355E-02	1.4341E-01	5.9467E-02	1.6788E-01	-1.1133E-03	67.63
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
79	5.3128E+00	1.1003E+00	-3.0998E+00	6.9542E+00	-5.4112E-01	-27.90
80	5.0106E+00	1.1129E+00	-3.0168E+00	6.6532E+00	-5.2978E-01	-28.57
91	5.5866E+00	5.0016E-01	-3.0207E+00	6.9921E+00	-9.0540E-01	-24.95
92	5.1134E+00	5.8332E-01	-2.9377E+00	6.5579E+00	-8.6118E-01	-26.18

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 35 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
80	-1.2203E+00	-3.4073E+00	2.4797E+00	3.9627E-01	-5.0239E+00	33.10
81	-1.3113E+00	-3.8623E+00	1.8149E+00	-3.6854E-01	-4.8051E+00	27.45
92	5.1209E+00	-2.1390E+00	1.7301E+00	5.5121E+00	-2.5302E+00	12.74
93	5.0299E+00	-2.5940E+00	1.0653E+00	5.1759E+00	-2.7400E+00	7.81
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
80	1.1359E+01	-3.6175E+00	-6.2483E+00	1.3624E+01	-5.8820E+00	-19.92
81	1.3288E+01	-1.8549E+00	-6.6021E+00	1.5762E+01	-4.3291E+00	-20.54
92	1.0767E+01	-2.4070E+00	-5.5138E+00	1.2770E+01	-4.4101E+00	-19.97
93	1.1670E+01	-1.2722E+00	-5.8675E+00	1.3934E+01	-3.5362E+00	-21.10

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
80	-1.4076E-01	1.1059E-01	5.2347E-02	1.2105E-01	-1.5122E-01	78.69
81	-1.5758E-01	2.6453E-02	9.3078E-03	2.6922E-02	-1.5805E-01	87.11
92	2.2216E-02	1.4320E-01	1.4825E-01	2.4282E-01	-7.7405E-02	56.10
93	5.3887E-03	5.9064E-02	1.0521E-01	1.4080E-01	-7.6350E-02	52.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
80	4.6858E+00	1.0479E+00	-2.9374E+00	6.3218E+00	-5.8808E-01	-29.12
81	4.4924E+00	1.2322E+00	-2.8152E+00	6.1154E+00	-3.9082E-01	-29.96
92	5.1997E+00	6.0058E-01	-2.8268E+00	6.5441E+00	-7.4386E-01	-25.44
93	4.6532E+00	6.1928E-01	-2.7046E+00	6.0101E+00	-7.3766E-01	-26.64

ELEMENT ID 36 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
85	-1.3510E+00	-8.6211E-02	5.2448E-01	1.0298E-01	-1.5402E+00	70.16
86	-1.4640E+00	-6.5147E-01	8.5196E-01	-1.1388E-01	-2.0016E+00	57.75
97	1.4640E+00	4.7682E-01	5.1061E-01	1.6806E+00	2.6024E-01	22.99
98	1.3510E+00	-8.8430E-02	8.3808E-01	1.7360E+00	-4.7342E-01	24.67
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
85	2.3217E-02	-4.9196E-03	3.7323E-01	3.8265E-01	-3.6435E-01	43.92
86	8.8515E-01	-9.5020E-02	4.4346E-01	1.0560E+00	-2.6588E-01	21.07
97	-2.3209E-02	-7.4340E-02	2.3458E-01	1.8719E-01	-2.8474E-01	41.89
98	1.4553E+00	4.3822E-02	3.0481E-01	1.5183E+00	-1.9187E-02	11.68

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
85	1.0787E-03	4.4943E-03	-1.8798E-03	5.3262E-03	2.4677E-04	-66.13
86	-1.0926E-03	-6.3621E-03	-1.6609E-03	-6.1278E-04	-6.8419E-03	-16.11
97	1.0926E-03	4.5068E-03	1.6797E-03	5.1946E-03	4.0482E-04	67.73
98	-1.0787E-03	-6.3494E-03	1.8985E-03	-4.6604E-04	-6.9621E-03	17.88
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
85	-7.9643E-02	-2.1112E+00	-1.3103E+00	5.6254E-01	-2.7534E+00	-26.11
86	2.9333E+00	1.4178E+00	-1.5513E+00	3.9020E+00	4.4909E-01	-31.98
97	7.9657E-02	1.1688E+01	-5.0188E+00	1.3557E+01	-1.7893E+00	-69.58
98	3.0171E+00	-2.4201E+00	-5.2597E+00	6.2193E+00	-5.6222E+00	-31.33

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 37
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
86	-7.1392E+00	-1.7864E+00	1.5608E+00	-1.3646E+00	-7.5611E+00	74.88
87	-6.8123E+00	-1.5190E-01	2.4269E+00	6.3857E-01	-7.6027E+00	71.96
98	6.8122E+00	1.0038E+00	1.5949E+00	7.2213E+00	5.9461E-01	14.39
99	7.1391E+00	2.6383E+00	2.4609E+00	8.2234E+00	1.5540E+00	23.78
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
86	9.1663E-01	-8.8725E-02	5.8095E-01	1.1822E+00	-3.5428E-01	24.57
87	3.1972E+00	2.9915E-01	7.4640E-01	3.3782E+00	1.1821E-01	13.63
98	1.4239E+00	3.7526E-02	3.4542E-01	1.5052E+00	-4.3770E-02	13.24
99	3.8242E+00	-1.6162E-01	5.1086E-01	3.8887E+00	-2.2606E-01	7.19

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
86	-1.7067E-03	-6.4750E-03	5.9857E-03	2.3521E-03	-1.0534E-02	34.14
87	1.7584E-03	1.0851E-02	5.5291E-03	1.3463E-02	-8.5348E-04	64.71
98	-1.7585E-03	-6.4953E-03	-5.6056E-03	1.9585E-03	-1.0212E-02	-33.55
99	1.7068E-03	1.0831E-02	-6.0621E-03	1.3855E-02	-1.3182E-03	-63.48
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
86	3.0338E+00	1.4379E+00	-2.1392E+00	4.5190E+00	-4.7373E-02	-34.77
87	5.8875E+00	-8.6207E-01	-2.0762E+00	6.4750E+00	-1.4496E+00	-15.80
98	2.9167E+00	-2.4402E+00	-2.2270E+00	3.7216E+00	-3.2451E+00	-19.87
99	6.0133E+00	7.7111E-01	-2.1640E+00	6.7912E+00	-6.7693E-03	-19.77

ELEMENT ID 38
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
87	-1.7380E+01	-2.2655E+00	3.3460E+00	-1.5578E+00	-1.8087E+01	78.06
88	-1.8547E+01	-8.0994E+00	3.4442E+00	-7.0661E+00	-1.9580E+01	73.30
99	1.8546E+01	4.9198E+00	3.1451E+00	1.9237E+01	4.2289E+00	12.39
100	1.7380E+01	-9.1411E-01	3.2432E+00	1.7938E+01	-1.4721E+00	9.76
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
87	2.8698E+00	2.3366E-01	1.2240E+00	3.3505E+00	-2.4702E-01	21.44
88	1.0545E+01	-1.5657E+00	3.9897E-01	1.0558E+01	-1.5788E+00	1.88
99	4.1517E+00	-9.6136E-02	2.0992E-01	4.1620E+00	-1.0648E-01	2.82
100	3.4982E+00	-1.1080E-01	-6.1512E-01	3.6001E+00	-2.1276E-01	-9.41

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
87	2.6798E-03	1.1025E-02	-1.0349E-02	1.8010E-02	-4.3057E-03	-55.98
88	-2.8487E-03	-1.6617E-02	-9.1582E-03	1.7242E-03	-2.1190E-02	-26.53
99	2.8487E-03	1.1069E-02	9.3754E-03	1.7196E-02	-3.2778E-03	56.84
100	-2.6798E-03	-1.6573E-02	1.0566E-02	3.0183E-03	-2.2271E-02	28.34
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
87	5.5742E+00	-9.2472E-01	-2.9512E+00	6.7144E+00	-2.0649E+00	-21.12
88	1.2628E+01	2.3841E+00	-3.8358E+00	1.3905E+01	1.1069E+00	-18.42
99	6.3266E+00	8.3377E-01	-2.7106E+00	7.4389E+00	-2.7857E-01	-22.31
100	5.2238E+00	-5.2116E-01	-3.5951E+00	6.9530E+00	-2.2504E+00	-25.69

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 39
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
88	-9.5945E+00	-6.3089E+00	2.8808E+00	-4.6354E+00	-1.1268E+01	59.85
89	-9.1834E+00	-4.2533E+00	1.3471E+00	-3.9092E+00	-9.5275E+00	75.67
100	1.7974E+01	-7.9522E-01	1.4944E+00	1.8093E+01	-9.1345E-01	4.52
101	1.8386E+01	1.2603E+00	-3.9298E-02	1.8386E+01	1.2602E+00	-.13
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
88	5.2796E+00	-2.6187E+00	-7.2078E-01	5.3448E+00	-2.6840E+00	-5.17
89	7.5238E+00	-3.2947E+00	-1.0390E+00	7.6227E+00	-3.3936E+00	-5.44
100	6.0470E+00	3.9897E-01	-1.2033E+00	6.2927E+00	1.5331E-01	-11.54
101	5.6929E+00	-7.8238E-02	-1.5215E+00	6.0694E+00	-4.5479E-01	-13.90

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
88	-1.8876E-03	-1.6414E-02	9.0227E-03	2.4321E-03	-2.0734E-02	25.58
89	5.6231E-03	2.1140E-02	7.5236E-03	2.4189E-02	2.5741E-03	67.94
100	-5.3789E-03	-1.7123E-02	-1.0442E-02	7.2882E-04	-2.3231E-02	-30.32
101	2.1319E-03	2.0430E-02	-1.1941E-02	2.6324E-02	-3.7622E-03	-63.73
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
88	6.1792E+00	1.0944E+00	-3.9122E+00	8.3026E+00	-1.0289E+00	-28.49
89	5.6404E+00	9.5289E-01	-3.4422E+00	7.4611E+00	-8.6772E-01	-27.87
100	8.2239E+00	7.8874E-02	-3.8782E+00	9.7751E+00	-1.4723E+00	-21.80
101	6.5934E+00	-1.0543E-01	-3.4082E+00	8.0225E+00	-1.5345E+00	-22.75

ELEMENT ID 40
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
89	7.4347E-01	-2.2681E+00	1.9026E+00	1.6641E+00	-3.1887E+00	25.82
90	7.6744E-01	-2.1482E+00	2.2822E+00	2.0177E+00	-3.3985E+00	28.72
101	1.4857E+01	5.5475E-01	-6.7936E-01	1.4889E+01	5.2256E-01	-2.71
102	1.4881E+01	6.7464E-01	-2.9979E-01	1.4887E+01	6.6832E-01	-1.21
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
89	8.0424E+00	-3.1910E+00	-1.7205E+00	8.3000E+00	-3.4486E+00	-8.52
90	6.8144E+00	-3.9024E+00	-2.1489E+00	7.2292E+00	-4.3173E+00	-10.93
101	5.4518E+00	-1.2645E-01	-1.8948E+00	6.0345E+00	-7.0918E-01	-17.10
102	7.7370E+00	2.4340E-01	-2.3232E+00	8.3988E+00	-4.1837E-01	-15.90

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
89	3.1210E-03	2.0628E-02	-1.3418E-02	2.7895E-02	-4.1460E-03	-61.56
90	-4.1703E-03	-1.5829E-02	-1.1707E-02	3.0781E-03	-2.3078E-02	-31.76
101	3.5428E-03	2.0724E-02	1.5317E-02	2.9694E-02	-5.4279E-03	59.64
102	-3.7488E-03	-1.5733E-02	1.7027E-02	8.3100E-03	-2.7792E-02	35.31
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
89	5.9530E+00	1.0154E+00	-2.9158E+00	7.3048E+00	-3.3639E-01	-24.87
90	5.2484E+00	-1.8572E-01	-2.6587E+00	6.3328E+00	-1.2702E+00	-22.19
101	6.4723E+00	-1.2964E-01	-3.1470E+00	7.7321E+00	-1.3894E+00	-21.82
102	6.4416E+00	1.9070E-01	-2.8899E+00	7.5729E+00	-9.4063E-01	-21.38

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 41 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
90	3.5806E+00	-1.5854E+00	7.9388E-01	3.6999E+00	-1.7047E+00	8.54
91	3.2443E+00	-3.2670E+00	7.4488E-01	3.3285E+00	-3.3511E+00	6.44
102	1.5039E+01	7.0615E-01	7.3681E-01	1.5077E+01	6.6837E-01	2.94
103	1.4703E+01	-9.7535E-01	6.8779E-01	1.4733E+01	-1.0055E+00	2.51
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
90	9.5866E+00	-3.3480E+00	-2.9892E+00	1.0244E+01	-4.0054E+00	-12.40
91	1.0045E+01	-2.3917E+00	-3.8333E+00	1.1131E+01	-3.4783E+00	-15.83
102	6.4196E+00	-2.0070E-02	-2.8494E+00	7.4994E+00	-1.0998E+00	-20.75
103	8.2107E+00	-8.2768E-02	-3.6935E+00	9.6171E+00	-1.4892E+00	-20.85

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
90	-6.5147E-03	-1.6286E-02	2.8172E-02	1.7193E-02	-3.9993E-02	40.08
91	6.5806E-03	4.9191E-02	4.3731E-02	7.6530E-02	-2.0759E-02	57.99
102	9.9130E-03	-1.3013E-02	-1.3118E-02	1.5870E-02	-1.8970E-02	-24.43
103	2.3009E-02	5.2463E-02	2.4403E-03	5.2664E-02	2.2808E-02	85.30
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
90	6.8086E+00	1.2631E-01	-2.9312E+00	7.9121E+00	-9.7722E-01	-20.63
91	5.9194E+00	6.0952E-01	-3.0679E+00	7.3216E+00	-7.9274E-01	-24.56
102	5.7266E+00	4.7705E-02	-2.7600E+00	6.8469E+00	-1.0726E+00	-22.09
103	5.8625E+00	-4.2862E-02	-2.8967E+00	7.0461E+00	-1.2265E+00	-22.23

ELEMENT ID 42 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
91	3.7581E+00	-3.1643E+00	5.0037E-01	3.7941E+00	-3.2003E+00	4.11
92	3.9739E+00	-2.0854E+00	8.1340E-03	3.9739E+00	-2.0854E+00	.08
103	1.5323E+01	-8.5133E-01	1.5401E-01	1.5324E+01	-8.5279E-01	.55
104	1.5538E+01	2.2754E-01	-3.3823E-01	1.5546E+01	2.2007E-01	-1.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
91	9.1398E+00	-2.5726E+00	-4.2134E+00	1.0498E+01	-3.9309E+00	-17.87
92	1.0439E+01	-2.3604E+00	-4.5365E+00	1.1884E+01	-3.8052E+00	-17.67
103	8.5770E+00	-9.5133E-03	-4.2772E+00	1.0344E+01	-1.7765E+00	-22.45
104	9.6514E+00	5.0551E-02	-4.6003E+00	1.1500E+01	-1.7978E+00	-21.89

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
91	4.4238E-03	4.8746E-02	1.4795E-02	5.3231E-02	-6.1103E-05	73.14
92	-1.2804E-02	-3.7395E-02	1.0178E-02	-9.1380E-03	-4.1061E-02	19.81
103	7.9233E-02	6.3722E-02	6.3275E-02	1.3523E-01	7.7283E-03	41.51
104	6.2004E-02	-2.2418E-02	5.8658E-02	9.2061E-02	-5.2474E-02	27.13
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
91	5.5955E+00	5.4475E-01	-2.9568E+00	6.9586E+00	-8.1833E-01	-24.75
92	5.1094E+00	5.6345E-01	-2.8288E+00	6.4653E+00	-7.9239E-01	-25.61
103	5.9806E+00	-1.9229E-02	-2.8772E+00	7.1374E+00	-1.1760E+00	-21.90
104	5.4296E+00	7.2097E-03	-2.7492E+00	6.5796E+00	-1.1428E+00	-22.70

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 43 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
92	5.1799E+00	-1.8441E+00	2.5799E-01	5.1893E+00	-1.8536E+00	2.10
93	5.2618E+00	-1.4343E+00	8.0804E-01	5.3580E+00	-1.5304E+00	6.78
104	1.4836E+01	8.6970E-02	-5.1296E-01	1.4854E+01	6.9151E-02	-1.99
105	1.4918E+01	4.9681E-01	3.7063E-02	1.4918E+01	4.9671E-01	.15
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
92	1.0791E+01	-2.2901E+00	-5.0268E+00	1.2499E+01	-3.9987E+00	-18.77
93	1.1656E+01	-1.3428E+00	-5.3211E+00	1.3556E+01	-3.2432E+00	-19.65
104	9.4709E+00	1.4450E-02	-4.9161E+00	1.1564E+01	-2.0782E+00	-23.06
105	1.1571E+01	1.1392E-02	-5.2104E+00	1.3573E+01	-1.9905E+00	-21.02

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
92	-1.3945E-02	-3.7607E-02	9.8957E-02	7.3885E-02	-1.2544E-01	41.59
93	1.2884E-02	9.6537E-02	1.5749E-01	2.1766E-01	-1.0824E-01	52.44
104	1.6675E-01	-1.4859E-03	-2.1504E-03	1.6677E-01	-1.5134E-03	-.73
105	1.9358E-01	1.3266E-01	5.6384E-02	2.2720E-01	9.9031E-02	30.81
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
92	5.1957E+00	5.8071E-01	-2.7178E+00	6.4535E+00	-6.7706E-01	-24.83
93	4.6545E+00	6.2556E-01	-2.6097E+00	5.9368E+00	-6.5677E-01	-26.17
104	5.3898E+00	-7.5917E-04	-2.6445E+00	6.4705E+00	-1.0815E+00	-22.23
105	5.0040E+00	1.5924E-03	-2.5364E+00	6.0650E+00	-1.0594E+00	-22.70

ELEMENT ID 44 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
12	-8.3368E+00	-4.1685E+01	1.9499E+01	6.4509E-01	-5.0667E+01	24.73
109	-1.8419E+01	-9.2096E+01	1.1994E+01	-1.6516E+01	-9.4000E+01	9.02
24	2.8607E+00	-3.9445E+01	3.8638E+01	2.5757E+01	-6.2342E+01	30.65
114	-7.2216E+00	-8.9856E+01	3.1134E+01	3.1955E+00	-1.0027E+02	18.50
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
12	2.9250E+00	1.4625E+01	-4.3569E+00	1.6069E+01	1.4808E+00	-71.66
109	-4.1465E-01	-2.0733E+00	-2.4413E+00	1.3344E+00	-3.8223E+00	-35.62
24	9.0179E+00	9.4215E+00	-9.8391E+00	1.9061E+01	-6.2149E-01	-45.59
114	6.6782E+00	5.8458E+00	-7.9236E+00	1.4197E+01	-1.6725E+00	-43.50

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
12	-2.0442E-02	-1.0222E-01	5.9381E-01	5.3388E-01	-6.5655E-01	43.03
109	-9.6951E-02	-4.8476E-01	4.8050E-01	2.2730E-01	-8.0901E-01	34.01
24	5.7834E-01	1.7534E-02	1.1268E+00	1.4591E+00	-8.6323E-01	38.01
114	5.0182E-01	-3.6501E-01	1.0135E+00	1.1707E+00	-1.0339E+00	33.42
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
12	1.4442E-01	7.2210E-01	-3.7325E-01	9.0522E-01	-3.8697E-02	-63.87
109	-1.3524E-01	-6.7621E-01	-2.7194E-01	-2.2177E-02	-7.8928E-01	-22.58
24	8.4818E-01	1.1327E+00	-9.1295E-01	1.9144E+00	6.6454E-02	-49.43
114	1.3675E-01	4.4869E-01	-8.1164E-01	1.1192E+00	-5.3377E-01	-50.44

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 45
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
24	3.6717E+00	-3.5390E+01	3.7371E+01	2.6308E+01	-5.8027E+01	31.20
114	-9.5231E-01	-5.8511E+01	2.2162E+01	6.5919E+00	-6.6055E+01	18.80
36	1.1924E+01	-3.3740E+01	3.1779E+01	2.8223E+01	-5.0039E+01	27.15
119	7.3005E+00	-5.6860E+01	1.6570E+01	1.1327E+01	-6.0886E+01	13.66
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
24	9.1804E+00	1.0234E+01	-1.4792E+01	2.4509E+01	-5.0947E+00	-46.02
114	5.7135E+00	1.0221E+00	-9.9208E+00	1.3562E+01	-6.8265E+00	-38.35
36	2.0495E+01	5.4745E+00	-1.7106E+01	3.1666E+01	-5.6971E+00	-33.15
119	2.6832E+01	7.1844E+00	-1.2234E+01	3.2698E+01	1.3180E+00	-25.62

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
24	5.7128E-01	-1.7772E-02	8.5328E-01	1.1794E+00	-6.2592E-01	35.48
114	4.5474E-01	-6.0048E-01	5.0527E-01	6.5765E-01	-8.0340E-01	21.88
36	4.0771E-01	-5.0487E-02	5.7864E-01	8.0095E-01	-4.4373E-01	34.20
119	2.9118E-01	-6.3319E-01	2.3064E-01	3.4553E-01	-6.8754E-01	13.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
24	8.5361E-01	1.1598E+00	-1.4591E+00	2.4738E+00	-4.6043E-01	-47.99
114	9.6228E-02	2.4610E-01	-1.0914E+00	1.2652E+00	-9.2284E-01	-46.96
36	2.0687E+00	1.0548E+00	-1.8249E+00	3.4558E+00	-3.3225E-01	-37.24
119	1.3154E+00	3.8937E-01	-1.4572E+00	2.3814E+00	-6.7664E-01	-36.19

ELEMENT ID 46
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
36	1.3815E+01	-2.4289E+01	2.8549E+01	2.9085E+01	-3.9559E+01	28.14
119	1.2441E+01	-3.1156E+01	1.7437E+01	1.8557E+01	-3.7272E+01	19.33
48	1.8533E+01	-2.3345E+01	2.3360E+01	2.8965E+01	-3.3777E+01	24.06
124	1.7160E+01	-3.0212E+01	1.2249E+01	2.0139E+01	-3.3192E+01	13.67
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
36	2.0731E+01	6.6549E+00	-1.8610E+01	3.3589E+01	-6.2034E+00	-34.64
119	2.6037E+01	3.2082E+00	-1.3341E+01	3.2180E+01	-2.9350E+00	-24.73
48	3.6071E+01	6.9878E+00	-1.8791E+01	4.5290E+01	-2.2311E+00	-26.13
124	4.7526E+01	1.3154E+01	-1.3522E+01	5.2208E+01	8.4720E+00	-19.10

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
36	4.0554E-01	-6.1342E-02	5.3286E-01	7.5385E-01	-4.0965E-01	33.17
119	3.8145E-01	-1.8182E-01	4.1175E-01	5.9867E-01	-3.9904E-01	27.81
48	9.1434E-01	4.0419E-02	2.5498E-01	9.8329E-01	-2.8537E-02	15.13
124	8.9025E-01	-8.0055E-02	1.3388E-01	9.0838E-01	-9.8189E-02	7.71
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
36	2.0785E+00	1.1035E+00	-2.2051E+00	3.8493E+00	-6.6734E-01	-38.77
119	1.2982E+00	3.0326E-01	-1.6707E+00	2.5439E+00	-9.4251E-01	-36.71
48	3.7668E+00	1.2521E+00	-2.4171E+00	5.2340E+00	-2.1511E-01	-31.26
124	3.3187E+00	1.0665E+00	-1.8828E+00	4.3864E+00	-1.2673E-03	-29.56

S H E L L E L E M E N T F O R C E S

ELEMENT ID 47
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
48	2.0051E+01	-1.5753E+01	1.4839E+01	2.5402E+01	-2.1103E+01	19.83
124	2.1007E+01	-1.0975E+01	9.8011E+00	2.3771E+01	-1.3740E+01	15.75
60	1.9724E+01	-1.5818E+01	1.1508E+01	2.3125E+01	-1.9219E+01	16.46
129	2.0680E+01	-1.1041E+01	6.4701E+00	2.1949E+01	-1.2309E+01	11.10
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
48	3.6333E+01	8.2946E+00	-1.9859E+01	4.6622E+01	-1.9950E+00	-27.39
124	4.6826E+01	9.6532E+00	-1.0965E+01	4.9819E+01	6.6600E+00	-15.27
60	5.1662E+01	-9.6736E-02	-1.9892E+01	5.8424E+01	-6.8581E+00	-18.77
129	8.8155E+01	7.8277E+00	-1.0998E+01	8.9633E+01	6.3493E+00	-7.66

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
48	8.9986E-01	-3.1972E-02	-9.0716E-02	9.0861E-01	-4.0721E-02	-5.51
124	1.0818E+00	8.7797E-01	1.0005E-02	1.0823E+00	8.7748E-01	2.80
60	7.8102E-01	-5.5743E-02	8.6543E-02	7.8987E-01	-6.4600E-02	5.84
129	9.6300E-01	8.5419E-01	1.8726E-01	1.1036E+00	7.1359E-01	36.90
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
48	3.7837E+00	1.3364E+00	-2.7483E+00	5.5685E+00	-4.4832E-01	-33.00
124	3.2995E+00	9.7063E-01	-1.7606E+00	4.2459E+00	2.4188E-02	-28.26
60	6.1301E+00	1.7454E-01	-2.8327E+00	7.2622E+00	-9.5757E-01	-21.78
129	7.1142E+00	3.4574E-01	-1.8450E+00	7.5845E+00	-1.2453E-01	-14.30

ELEMENT ID 48
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
60	1.1330E+01	-1.2013E+01	5.2818E+00	1.2470E+01	-1.3152E+01	12.17
129	1.2020E+01	-8.5650E+00	1.7941E+00	1.2175E+01	-8.7202E+00	4.94
72	5.9339E+00	-1.3092E+01	1.2126E+00	6.0109E+00	-1.3169E+01	3.63
134	6.6236E+00	-9.6441E+00	-2.2750E+00	6.9357E+00	-9.9563E+00	-7.81
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
60	1.1345E+01	9.0930E-01	-4.8034E+00	1.3219E+01	-9.6497E-01	-21.32
129	1.9388E+01	3.4232E+00	-1.8289E+00	1.9595E+01	3.2163E+00	-6.45
72	1.8954E+01	7.0823E+00	-5.1521E+00	2.0878E+01	5.1582E+00	-20.48
134	3.3535E+01	7.8758E+00	-2.1777E+00	3.3719E+01	7.6923E+00	-4.82

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
60	4.0256E-01	-3.6372E-01	1.1064E-01	4.1821E-01	-3.7937E-01	8.05
129	5.4333E-01	3.4016E-01	-4.1416E-02	5.5145E-01	3.3204E-01	-11.09
72	3.1249E-01	-3.8172E-01	-3.7244E-01	4.7450E-01	-5.4372E-01	-23.51
134	4.5327E-01	3.2215E-01	-5.2450E-01	9.1629E-01	-1.4087E-01	-41.44
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
60	1.3572E+00	2.0327E-01	-8.0400E-01	1.7698E+00	-2.0936E-01	-27.17
129	1.5628E+00	2.0506E-01	-3.7015E-01	1.6571E+00	1.1071E-01	-14.30
72	2.8956E+00	1.4197E+00	-1.0170E+00	3.4141E+00	9.0107E-01	-27.02
134	3.2472E+00	7.8572E-01	-5.8315E-01	3.3784E+00	6.5456E-01	-12.68

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 49 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
72	7.3367E+00	-6.0775E+00	-5.1267E+00	9.0717E+00	-7.8124E+00	-18.70
134	5.7249E+00	-1.4136E+01	7.4033E-01	5.7525E+00	-1.4164E+01	2.13
84	-1.1460E+01	-9.8371E+00	-5.8547E+00	-4.7380E+00	-1.6559E+01	-48.95
139	-1.3072E+01	-1.7896E+01	1.2172E-02	-1.3072E+01	-1.7896E+01	.14
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
72	1.8891E+01	6.7645E+00	-5.4702E+00	2.0993E+01	4.6616E+00	-21.03
134	3.3452E+01	7.4607E+00	-3.9019E+00	3.4026E+01	6.8876E+00	-8.36
84	2.0099E+01	6.4429E+00	-7.0118E+00	2.3058E+01	3.4837E+00	-22.88
139	4.2593E+01	7.7761E+00	-5.4436E+00	4.3425E+01	6.9448E+00	-8.68

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
72	4.4655E-01	2.8866E-01	-1.1338E+00	1.5042E+00	-7.6894E-01	-43.01
134	2.2479E-01	-8.2014E-01	-1.8733E-01	2.5736E-01	-8.5271E-01	-9.86
84	-3.2898E+00	-4.5864E-01	-7.9928E-01	-2.4858E-01	-3.4999E+00	-75.28
139	-3.5116E+00	-1.5674E+00	1.4718E-01	-1.5564E+00	-3.5226E+00	85.70
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
72	2.8783E+00	1.3334E+00	-1.3576E+00	3.6678E+00	5.4388E-01	-30.18
134	3.2479E+00	7.8913E-01	-8.2778E-01	3.5006E+00	5.3642E-01	-16.98
84	3.4189E+00	1.5287E+00	-1.8119E+00	4.5173E+00	4.3024E-01	-31.23
139	6.3136E+00	1.1401E+00	-1.2820E+00	6.6138E+00	8.3988E-01	-13.18

ELEMENT ID 50 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
84	-1.1064E+01	-7.8572E+00	-2.1787E+00	-6.7556E+00	-1.2166E+01	-63.18
139	-1.2858E+01	-1.6824E+01	9.1367E+00	-5.4914E+00	-2.4190E+01	38.88
96	1.8412E+01	-1.9618E+00	1.4626E-01	1.8413E+01	-1.9629E+00	.41
144	1.6619E+01	-1.0928E+01	1.1461E+01	2.0764E+01	-1.5073E+01	19.88
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
84	2.0190E+01	6.8978E+00	-6.3582E+00	2.2741E+01	4.3462E+00	-21.87
139	4.2479E+01	7.2062E+00	-1.0478E+01	4.5357E+01	4.3284E+00	-15.36
96	2.1021E+01	1.1698E+00	-6.3415E+00	2.2874E+01	-6.8305E-01	-16.29
144	1.2609E+01	3.6954E+00	-1.0461E+01	1.9524E+01	-3.2190E+00	-33.46

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
84	-3.3616E+00	-8.1746E-01	3.4354E-01	-7.7188E-01	-3.4071E+00	82.44
139	-3.6284E+00	-2.1517E+00	1.7557E+00	-9.8537E-01	-4.7947E+00	56.40
96	3.2322E+00	5.0131E-01	8.3977E-01	3.4698E+00	2.6374E-01	15.80
144	2.9654E+00	-8.3289E-01	2.2519E+00	4.0120E+00	-1.8796E+00	24.93
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
84	3.4354E+00	1.6116E+00	-1.8575E+00	4.5928E+00	4.5430E-01	-31.93
139	6.2774E+00	9.5900E-01	-2.4098E+00	7.2068E+00	2.9542E-02	-21.09
96	3.8955E+00	5.4915E-01	-1.9693E+00	4.8065E+00	-3.6182E-01	-24.82
144	1.9663E+00	9.9371E-01	-2.5217E+00	4.0482E+00	-1.0881E+00	-39.54

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 51 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
96	1.7976E+01	-4.1448E+00	-2.6659E+00	1.8293E+01	-4.4615E+00	-6.78
144	1.8341E+01	-2.3179E+00	3.3004E+00	1.8856E+01	-2.8323E+00	8.86
108	6.9850E+00	-6.3432E+00	-8.7264E+00	1.1301E+01	-1.0659E+01	-26.32
149	7.3505E+00	-4.5163E+00	-2.7603E+00	7.9611E+00	-5.1270E+00	-12.47
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
96	2.1039E+01	1.2592E+00	-6.5603E+00	2.3017E+01	-7.1882E-01	-16.78
144	1.2835E+01	4.8248E+00	-5.1379E+00	1.5344E+01	2.3154E+00	-26.03
108	1.7389E+01	-3.9905E-02	-5.2010E+00	1.8823E+01	-1.4740E+00	-15.42
149	2.4846E+01	9.9018E-01	-3.7787E+00	2.5430E+01	4.0596E-01	-8.79

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
96	3.0289E+00	-5.1523E-01	4.8273E-02	3.0296E+00	-5.1588E-01	.78
144	3.2250E+00	4.6548E-01	1.1439E-01	3.2298E+00	4.6074E-01	2.37
108	-1.8656E+00	-1.4942E+00	-1.5072E+00	-1.6132E-01	-3.1985E+00	-48.51
149	-1.6694E+00	-5.1348E-01	-1.4411E+00	4.6118E-01	-2.6441E+00	-55.93
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
96	3.9137E+00	6.3988E-01	-2.0113E+00	4.8700E+00	-3.1646E-01	-25.43
144	1.9422E+00	8.7337E-01	-1.7847E+00	3.2708E+00	-4.5521E-01	-36.66
108	3.5554E+00	-2.0740E-03	-1.8009E+00	4.3079E+00	-7.5459E-01	-22.68
149	3.5124E+00	9.6088E-02	-1.5743E+00	4.1272E+00	-5.1873E-01	-21.33

ELEMENT ID 52 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
109	-2.2103E+01	-1.1052E+02	4.4691E+00	-2.1878E+01	-1.1074E+02	2.89
110	-1.5615E+01	-7.8076E+01	6.1791E+00	-1.5010E+01	-7.8681E+01	5.60
114	-1.8583E+01	-1.0981E+02	1.3651E+01	-1.6584E+01	-1.1181E+02	8.33
115	-1.2096E+01	-7.7372E+01	1.5361E+01	-8.6614E+00	-8.0806E+01	12.60
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
109	6.7860E+00	3.3930E+01	-4.2186E+00	3.4570E+01	6.1454E+00	-81.37
110	2.9945E+00	1.4972E+01	-2.5681E+00	1.5500E+01	2.4671E+00	-78.40
114	4.0899E+00	-2.7852E+00	-8.6498E+00	9.9602E+00	-8.6555E+00	-34.16
115	8.3489E+00	2.7304E+00	-6.9992E+00	1.3082E+01	-2.0023E+00	-34.07

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
109	-1.1635E-01	-5.8172E-01	7.3598E-01	4.2285E-01	-1.1209E+00	36.23
110	-1.0981E-01	-5.4905E-01	6.5991E-01	3.6606E-01	-1.0249E+00	35.80
114	-1.7285E+00	-9.0415E-01	1.3620E+00	1.0663E-01	-2.7393E+00	53.42
115	-1.7220E+00	-8.7149E-01	1.2859E+00	5.7646E-02	-2.6511E+00	54.15
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
109	2.0495E-01	1.0247E+00	-4.6991E-01	1.2384E+00	-8.7186E-03	-65.55
110	-1.9664E-01	-9.8321E-01	-3.7787E-01	-4.4529E-02	-1.1353E+00	-21.93
114	2.3615E-02	-4.6079E-01	-1.1412E+00	9.4800E-01	-1.3852E+00	-39.01
115	4.7997E-01	-4.9232E-01	-1.0491E+00	1.1501E+00	-1.1625E+00	-32.57

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 53 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
110	-1.5615E+01	-7.8076E+01	6.1791E+00	-1.5010E+01	-7.8681E+01	5.60
111	-1.2731E+01	-6.3654E+01	1.4212E+00	-1.2691E+01	-6.3694E+01	1.60
115	-1.6372E+01	-7.8227E+01	7.7867E+00	-1.5407E+01	-7.9192E+01	7.07
116	-1.3488E+01	-6.3805E+01	3.0290E+00	-1.3306E+01	-6.3987E+01	3.43
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
110	2.9945E+00	1.4972E+01	-2.5681E+00	1.5500E+01	2.4671E+00	-78.40
111	1.5518E+00	7.7590E+00	-9.6229E-01	7.9047E+00	1.4060E+00	-81.39
115	8.2403E+00	2.7087E+00	-5.3787E+00	1.1523E+01	-5.7369E-01	-31.39
116	4.4723E+00	2.9455E-01	-3.7730E+00	6.6960E+00	-1.9292E+00	-30.51

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
110	-1.0981E-01	-5.4905E-01	6.5991E-01	3.6606E-01	-1.0249E+00	35.80
111	-3.9344E-02	-1.9672E-01	4.0988E-01	2.9933E-01	-5.3540E-01	39.57
115	-1.3507E+00	-7.9721E-01	1.0867E+00	4.7413E-02	-2.1953E+00	52.14
116	-1.2802E+00	-4.4489E-01	8.3666E-01	7.2563E-02	-1.7977E+00	58.26
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
110	-1.9664E-01	-9.8321E-01	-3.7787E-01	-4.4529E-02	-1.1353E+00	-21.93
111	-4.5322E-01	-2.2661E+00	-2.3249E-01	-4.2388E-01	-2.2954E+00	-7.19
115	4.7858E-01	-4.9260E-01	-8.8640E-01	1.0037E+00	-1.0177E+00	-30.64
116	3.5154E-01	-8.3976E-01	-7.4102E-01	7.0663E-01	-1.1948E+00	-25.60

ELEMENT ID 54 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
111	-1.2731E+01	-6.3654E+01	1.4213E+00	-1.2691E+01	-6.3694E+01	1.60
112	-1.1624E+01	-5.8120E+01	9.7373E-01	-1.1604E+01	-5.8141E+01	1.20
116	-1.3174E+01	-6.3743E+01	2.3422E+00	-1.3066E+01	-6.3851E+01	2.65
117	-1.2067E+01	-5.8209E+01	1.8947E+00	-1.1990E+01	-5.8287E+01	2.35
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
111	1.5518E+00	7.7590E+00	-9.6229E-01	7.9047E+00	1.4060E+00	-81.39
112	1.1944E+00	5.9720E+00	-1.4975E-01	5.9766E+00	1.1897E+00	-88.21
116	4.4744E+00	2.9496E-01	-1.8896E+00	5.2020E+00	-4.3269E-01	-21.06
117	1.4272E+00	-1.4315E+00	-1.0771E+00	1.7876E+00	-1.7919E+00	-18.50

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
111	-3.9344E-02	-1.9672E-01	4.0988E-01	2.9933E-01	-5.3539E-01	39.57
112	-1.1793E-03	-5.8949E-03	1.8189E-01	1.7837E-01	-1.8544E-01	44.63
116	-1.0508E+00	-3.9901E-01	6.3982E-01	-6.8814E-03	-1.4430E+00	58.50
117	-1.0127E+00	-2.0819E-01	4.1183E-01	-3.4757E-02	-1.1861E+00	67.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
111	-4.5322E-01	-2.2661E+00	-2.3249E-01	-4.2388E-01	-2.2954E+00	-7.19
112	-5.9106E-01	-2.9553E+00	-1.0739E-01	-5.8619E-01	-2.9602E+00	-2.60
116	3.5325E-01	-8.3942E-01	-5.1916E-01	5.4758E-01	-1.0337E+00	-20.52
117	2.0591E-01	-1.0829E+00	-3.9406E-01	3.1684E-01	-1.1938E+00	-15.72

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 55 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
112	-1.1624E+01	-5.8120E+01	9.7373E-01	-1.1604E+01	-5.8141E+01	1.20
113	-1.1279E+01	-5.6395E+01	-2.7821E-06	-1.1279E+01	-5.6395E+01	.00
117	-1.1083E+01	-5.8012E+01	9.4651E-01	-1.1064E+01	-5.8031E+01	1.15
118	-1.0739E+01	-5.6287E+01	-2.7201E-02	-1.0739E+01	-5.6287E+01	-.03
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
112	1.1944E+00	5.9720E+00	-1.4975E-01	5.9766E+00	1.1897E+00	-88.21
113	1.2726E+00	6.3629E+00	0.0000E+00	6.3629E+00	1.2726E+00	90.00
117	1.4418E+00	-1.4286E+00	-3.4307E-01	1.4822E+00	-1.4690E+00	-6.72
118	-1.1818E+00	-2.9191E+00	-1.9332E-01	-1.1605E+00	-2.9403E+00	-6.27

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
112	-1.1794E-03	-5.8949E-03	1.8189E-01	1.7837E-01	-1.8544E-01	44.63
113	8.7758E-03	4.3881E-02	1.0078E-07	4.3881E-02	8.7758E-03	90.00
117	-8.7389E-01	-1.8043E-01	2.5343E-01	-9.7688E-02	-9.5663E-01	71.92
118	-8.6393E-01	-1.3066E-01	7.1549E-02	-1.2374E-01	-8.7085E-01	84.48
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
112	-5.9106E-01	-2.9553E+00	-1.0739E-01	-5.8619E-01	-2.9602E+00	-2.60
113	-6.3252E-01	-3.1626E+00	0.0000E+00	-6.3252E-01	-3.1626E+00	.00
117	2.0671E-01	-1.0827E+00	-2.0090E-01	2.3728E-01	-1.1133E+00	-8.65
118	1.5063E-01	-1.1806E+00	-9.3510E-02	1.5716E-01	-1.1871E+00	-4.00

ELEMENT ID 56 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
114	-1.1060E+01	-7.2196E+01	1.0515E+01	-9.3024E+00	-7.3954E+01	9.49
115	-9.4175E+00	-6.3982E+01	1.5023E+01	-5.5547E+00	-6.7845E+01	14.42
119	-2.9658E+00	-7.0577E+01	7.8572E+00	-2.0647E+00	-7.1478E+01	6.54
120	-1.3230E+00	-6.2363E+01	1.2365E+01	1.0867E+00	-6.4773E+01	11.03
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
114	5.9581E+00	6.5558E+00	-1.2101E+01	1.8362E+01	-5.8477E+00	-45.71
115	7.8344E+00	1.5713E-01	-8.3331E+00	1.3170E+01	-5.1790E+00	-32.63
119	2.3918E+01	1.0332E+00	-1.3304E+01	3.0023E+01	-5.0722E+00	-24.65
120	1.7739E+01	2.8965E+00	-9.5361E+00	2.2401E+01	-1.7659E+00	-26.06

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
114	-1.7851E+00	-1.1867E+00	5.5684E-01	-8.5378E-01	-2.1180E+00	59.12
115	-1.5763E+00	-1.4316E-01	9.3452E-01	3.1789E-01	-2.0374E+00	63.74
119	-1.9585E+00	-1.2214E+00	2.8856E-03	-1.2214E+00	-1.9585E+00	89.78
120	-1.7498E+00	-1.7785E-01	3.8056E-01	-9.0564E-02	-1.8371E+00	77.08
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
114	9.9907E-02	-7.9326E-02	-1.6247E+00	1.6374E+00	-1.6168E+00	-43.42
115	4.6024E-01	-5.9099E-01	-1.3691E+00	1.4011E+00	-1.5319E+00	-34.50
119	1.1493E+00	2.1419E-01	-1.8930E+00	2.6316E+00	-1.2681E+00	-38.06
120	1.5264E+00	5.3697E-02	-1.6374E+00	2.5854E+00	-1.0053E+00	-32.89

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 57
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
115	-1.3694E+01	-6.4837E+01	7.4485E+00	-1.2631E+01	-6.5900E+01	8.12
116	-1.2245E+01	-5.7593E+01	-3.1033E-01	-1.2243E+01	-5.7595E+01	-.39
120	3.6477E-01	-6.2025E+01	5.5680E+00	8.5780E-01	-6.2518E+01	5.06
121	1.8135E+00	-5.4782E+01	-2.1906E+00	1.8982E+00	-5.4866E+01	-2.21
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
115	7.7257E+00	1.3541E-01	-6.7126E+00	1.1642E+01	-3.7806E+00	-30.26
116	4.5328E+00	5.9706E-01	-4.7264E+00	7.6846E+00	-2.5548E+00	-33.70
120	1.7620E+01	2.8729E+00	-7.1212E+00	2.0498E+01	-4.3995E-03	-22.00
121	9.8419E+00	-1.0310E+00	-5.1350E+00	1.1884E+01	-3.0727E+00	-21.68

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
115	-1.2050E+00	-6.8893E-02	7.3531E-01	2.9223E-01	-1.5661E+00	63.84
116	-1.1635E+00	1.3894E-01	4.6261E-01	2.8654E-01	-1.3110E+00	72.31
120	-1.5010E+00	-1.2809E-01	2.3184E-01	-8.9996E-02	-1.5391E+00	80.67
121	-1.4595E+00	7.9745E-02	-4.0851E-02	8.0828E-02	-1.4605E+00	-88.48
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
115	4.5885E-01	-5.9126E-01	-1.2063E+00	1.2494E+00	-1.3818E+00	-33.24
116	3.5046E-01	-8.4517E-01	-9.6622E-01	8.8885E-01	-1.3836E+00	-29.13
120	1.5101E+00	5.0430E-02	-1.3356E+00	2.3023E+00	-7.4178E-01	-30.67
121	1.3800E+00	-1.3836E-01	-1.0955E+00	1.9537E+00	-7.1205E-01	-27.64

ELEMENT ID 58
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
116	-1.1932E+01	-5.7531E+01	-9.9709E-01	-1.1910E+01	-5.7552E+01	-1.25
117	-1.1392E+01	-5.4835E+01	9.0399E-01	-1.1374E+01	-5.4853E+01	1.19
121	2.2007E+00	-5.4704E+01	-2.5021E+00	2.3105E+00	-5.4814E+01	-2.51
122	2.7399E+00	-5.2008E+01	-6.0114E-01	2.7465E+00	-5.2015E+01	-.63
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
116	4.5349E+00	5.9749E-01	-2.8430E+00	6.0244E+00	-8.9194E-01	-27.65
117	1.3848E+00	-1.6434E+00	-1.6792E+00	2.1317E+00	-2.3903E+00	-23.98
121	9.8241E+00	-1.0345E+00	-3.3725E+00	1.0786E+01	-1.9967E+00	-15.92
122	4.4536E+00	-2.1151E+00	-2.2087E+00	5.1272E+00	-2.7887E+00	-16.96

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
116	-9.3408E-01	1.8482E-01	2.6578E-01	2.4474E-01	-9.9400E-01	77.29
117	-9.3620E-01	1.7423E-01	2.7329E-01	2.3784E-01	-9.9982E-01	76.90
121	-1.0102E+00	1.6960E-01	-1.3886E-02	1.6977E-01	-1.0103E+00	-89.33
122	-1.0123E+00	1.5901E-01	-6.3667E-03	1.5905E-01	-1.0123E+00	-89.69
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
116	3.5217E-01	-8.4483E-01	-7.4436E-01	7.0880E-01	-1.2015E+00	-25.60
117	2.0138E-01	-1.1056E+00	-5.1339E-01	3.7893E-01	-1.2831E+00	-19.08
121	1.3767E+00	-1.3902E-01	-8.3385E-01	1.7456E+00	-5.0796E-01	-23.87
122	1.2395E+00	-2.0924E-01	-6.0288E-01	1.4575E+00	-4.2731E-01	-19.89

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 59
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
117	-1.0409E+01	-5.4638E+01	-4.4154E-02	-1.0409E+01	-5.4638E+01	-.06
118	-1.0228E+01	-5.3737E+01	-2.7212E-02	-1.0228E+01	-5.3737E+01	-.04
122	2.6580E+00	-5.2025E+01	-5.6423E-01	2.6638E+00	-5.2030E+01	-.59
123	2.8382E+00	-5.1124E+01	-5.4731E-01	2.8438E+00	-5.1129E+01	-.58
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
117	1.3994E+00	-1.6405E+00	-9.4520E-01	1.6693E+00	-1.9104E+00	-15.94
118	-1.1522E+00	-2.7711E+00	-1.9333E-01	-1.1294E+00	-2.7939E+00	-6.72
122	4.4750E+00	-2.1108E+00	-1.2456E+00	4.7027E+00	-2.3386E+00	-10.36
123	1.2947E+00	-3.0443E+00	-4.9378E-01	1.3502E+00	-3.0997E+00	-6.41

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
117	-7.9741E-01	2.0198E-01	1.1490E-01	2.1502E-01	-8.1045E-01	83.53
118	-7.9307E-01	2.2369E-01	7.1546E-02	2.2870E-01	-7.9808E-01	85.99
122	-8.1079E-01	1.9931E-01	8.0770E-03	1.9937E-01	-8.1085E-01	89.54
123	-8.0645E-01	2.2101E-01	-3.5274E-02	2.2222E-01	-8.0766E-01	-88.04
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
117	2.0218E-01	-1.1054E+00	-3.2023E-01	2.7639E-01	-1.1796E+00	-13.05
118	1.4822E-01	-1.1926E+00	-9.3510E-02	1.5471E-01	-1.1991E+00	-3.97
122	1.2406E+00	-2.0902E-01	-3.5421E-01	1.3225E+00	-2.9095E-01	-13.02
123	1.1883E+00	-2.4685E-01	-1.2750E-01	1.1996E+00	-2.5809E-01	-5.04

ELEMENT ID 60
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
119	3.2033E+00	-3.9732E+01	1.0407E+01	5.5930E+00	-4.2122E+01	12.93
120	1.7163E+00	-4.7167E+01	9.2530E+00	3.4091E+00	-4.8860E+01	10.37
124	1.7925E+01	-3.6788E+01	7.0973E+00	1.8830E+01	-3.7694E+01	7.27
125	1.6438E+01	-4.4223E+01	5.9430E+00	1.7014E+01	-4.4800E+01	5.54
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
119	2.5784E+01	1.0363E+01	-1.5217E+01	3.5132E+01	1.0145E+00	-31.56
120	1.7181E+01	1.0943E-01	-1.0025E+01	2.1812E+01	-4.5216E+00	-24.79
124	5.3924E+01	4.2601E+00	-1.5184E+01	5.8199E+01	-1.4229E-02	-15.72
125	2.8517E+01	7.8106E+00	-9.9927E+00	3.2552E+01	3.7748E+00	-21.99

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
119	-1.8501E+00	-6.7976E-01	3.1891E-01	-5.9850E-01	-1.9314E+00	75.71
120	-1.7095E+00	2.3323E-02	-1.9637E-01	4.5298E-02	-1.7315E+00	-83.62
124	-6.0466E-01	-4.3065E-01	-7.2989E-02	-4.0409E-01	-6.3122E-01	-70.00
125	-4.6404E-01	2.7243E-01	-5.8826E-01	5.9820E-01	-7.8981E-01	-61.02
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
119	1.2024E+00	4.7977E-01	-2.2619E+00	3.1317E+00	-1.4495E+00	-40.46
120	1.5073E+00	-4.2041E-02	-1.7574E+00	2.6532E+00	-1.1880E+00	-33.11
124	3.8573E+00	5.4809E-01	-2.3647E+00	5.0888E+00	-6.8339E-01	-27.51
125	2.8009E+00	6.0572E-01	-1.8602E+00	3.8632E+00	-4.5657E-01	-29.73

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 61
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
120	3.4039E+00	-4.6830E+01	2.4560E+00	3.5237E+00	-4.6950E+01	2.79
121	2.3256E+00	-5.2221E+01	-1.0040E+00	2.3441E+00	-5.2240E+01	-1.05
125	2.2055E+01	-4.3100E+01	3.2622E+00	2.2218E+01	-4.3263E+01	2.86
126	2.0976E+01	-4.8491E+01	-1.9786E-01	2.0977E+01	-4.8492E+01	-.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
120	1.7063E+01	8.5793E-02	-7.6104E+00	1.9975E+01	-2.8262E+00	-20.94
121	9.9919E+00	-2.8113E-01	-5.6159E+00	1.2466E+01	-2.7553E+00	-23.78
125	2.8647E+01	7.8369E+00	-8.1441E+00	3.1456E+01	5.0286E+00	-19.03
126	1.5566E+01	2.5430E+00	-6.1497E+00	1.8011E+01	9.8068E-02	-21.68

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
120	-1.4608E+00	7.3072E-02	-3.4509E-01	1.4713E-01	-1.5349E+00	-77.89
121	-1.4923E+00	-8.4458E-02	-2.1713E-01	-5.1732E-02	-1.5250E+00	-81.43
125	1.0074E-01	3.8537E-01	-5.2744E-01	7.8936E-01	-3.0324E-01	-52.55
126	6.9239E-02	2.2785E-01	-3.9948E-01	5.5582E-01	-2.5874E-01	-50.61
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
120	1.4909E+00	-4.5306E-02	-1.4557E+00	2.3687E+00	-9.2310E-01	-31.09
121	1.3846E+00	-1.1563E-01	-1.1725E+00	2.0264E+00	-7.5746E-01	-28.70
125	2.8021E+00	6.0596E-01	-1.5399E+00	3.5953E+00	-1.8729E-01	-27.25
126	2.4272E+00	3.2280E-01	-1.2567E+00	3.0141E+00	-2.6406E-01	-25.03

ELEMENT ID 62
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
121	2.7129E+00	-5.2144E+01	-1.3156E+00	2.7444E+00	-5.2176E+01	-1.37
122	2.8349E+00	-5.1534E+01	-1.0669E+00	2.8559E+00	-5.1555E+01	-1.12
126	1.9942E+01	-4.8698E+01	-6.5977E-01	1.9948E+01	-4.8705E+01	-.55
127	2.0064E+01	-4.8088E+01	-4.1117E-01	2.0066E+01	-4.8090E+01	-.35
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
121	9.9741E+00	-2.8468E-01	-3.8535E+00	1.1260E+01	-1.5709E+00	-18.46
122	4.4198E+00	-2.2840E+00	-2.6027E+00	5.3117E+00	-3.1759E+00	-18.91
126	1.5660E+01	2.5617E+00	-4.4530E+00	1.7031E+01	1.1913E+00	-17.11
127	9.2619E+00	3.3933E-01	-3.2022E+00	1.0292E+01	-6.9095E-01	-17.84

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
121	-1.0430E+00	5.4033E-03	-1.9016E-01	3.8828E-02	-1.0764E+00	-80.03
122	-1.0330E+00	5.5522E-02	-1.4025E-01	7.3302E-02	-1.0508E+00	-82.78
126	3.2288E-02	2.2046E-01	-2.8023E-01	4.2198E-01	-1.6923E-01	-54.28
127	4.2313E-02	2.7058E-01	-2.3033E-01	4.1350E-01	-1.0061E-01	-58.18
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
121	1.3812E+00	-1.1630E-01	-9.1084E-01	1.8116E+00	-5.4663E-01	-25.29
122	1.2378E+00	-2.1746E-01	-6.4810E-01	1.4846E+00	-4.6424E-01	-20.85
126	2.4352E+00	3.2439E-01	-9.7188E-01	2.8145E+00	-5.4922E-02	-21.32
127	2.3354E+00	1.9048E-01	-7.0914E-01	2.5486E+00	-2.2774E-02	-16.74

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 63
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
122	2.7530E+00	-5.1550E+01	-1.0301E+00	2.7725E+00	-5.1569E+01	-1.09
123	2.6980E+00	-5.1825E+01	-5.4730E-01	2.7035E+00	-5.1830E+01	-.58
127	1.8606E+01	-4.8379E+01	-3.5992E-01	1.8608E+01	-4.8381E+01	-.31
128	1.8551E+01	-4.8654E+01	1.2280E-01	1.8551E+01	-4.8655E+01	.10
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
122	4.4413E+00	-2.2798E+00	-1.6397E+00	4.8199E+00	-2.6584E+00	-13.00
123	1.3047E+00	-2.9943E+00	-4.9377E-01	1.3607E+00	-3.0503E+00	-6.47
127	9.2593E+00	3.3880E-01	-1.8522E+00	9.6286E+00	-3.0502E-02	-11.28
128	6.0807E+00	-8.5897E-01	-7.0635E-01	6.1519E+00	-9.3014E-01	-5.75

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
122	-8.3149E-01	9.5820E-02	-1.2580E-01	1.1258E-01	-8.4825E-01	-82.41
123	-8.3963E-01	5.5121E-02	-3.5275E-02	5.6510E-02	-8.4101E-01	-87.75
127	-3.6248E-02	2.5486E-01	-1.0287E-01	2.8755E-01	-6.8929E-02	-72.38
128	-4.4388E-02	2.1417E-01	-1.2347E-02	2.1475E-01	-4.4976E-02	-87.27
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
122	1.2389E+00	-2.1724E-01	-3.9944E-01	1.3413E+00	-3.1961E-01	-14.37
123	1.1881E+00	-2.4816E-01	-1.2750E-01	1.1993E+00	-2.5939E-01	-5.03
127	2.3345E+00	1.9030E-01	-4.1960E-01	2.4137E+00	1.1111E-01	-10.69
128	2.3035E+00	1.4327E-01	-1.4766E-01	2.3136E+00	1.3322E-01	-3.89

ELEMENT ID 64
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
124	2.2542E+01	-1.3703E+01	-3.7234E+00	2.2920E+01	-1.4082E+01	-5.81
125	1.7236E+01	-4.0229E+01	8.1948E+00	1.8382E+01	-4.1375E+01	7.96
129	4.4054E+01	-9.4013E+00	-6.5847E-01	4.4062E+01	-9.4094E+00	-.71
130	3.8749E+01	-3.5927E+01	1.1259E+01	4.0410E+01	-3.7587E+01	8.39
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
124	5.5094E+01	1.0105E+01	-1.0765E+01	5.7537E+01	7.6620E+00	-12.79
125	2.8131E+01	5.8856E+00	-1.0124E+01	3.2049E+01	1.9679E+00	-21.15
129	5.6310E+01	5.9987E+00	-8.9230E+00	5.7845E+01	4.4630E+00	-9.77
130	3.0818E+01	5.3523E+00	-8.2827E+00	3.3274E+01	2.8954E+00	-16.52

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
124	-3.7473E-01	7.1897E-01	-1.2740E+00	1.5585E+00	-1.2143E+00	-56.62
125	-6.4093E-01	-6.1201E-01	-4.1678E-01	-2.0944E-01	-1.0435E+00	-45.99
129	3.3077E+00	1.4554E+00	-7.0882E-01	3.5478E+00	1.2153E+00	-18.71
130	3.0415E+00	1.2445E-01	1.4837E-01	3.0490E+00	1.1692E-01	2.90
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
124	3.8623E+00	5.7295E-01	-2.1537E+00	4.9275E+00	-4.9224E-01	-26.32
125	2.7918E+00	5.6033E-01	-1.9424E+00	3.9161E+00	-5.6394E-01	-30.06
129	4.7490E+00	6.6126E-01	-2.1000E+00	5.6356E+00	-2.2532E-01	-22.89
130	3.4785E+00	3.6955E-01	-1.8887E+00	4.3702E+00	-5.2212E-01	-25.27

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 65 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
125	2.2854E+01	-3.9106E+01	5.5139E+00	2.3340E+01	-3.9593E+01	5.05
126	2.2005E+01	-4.3350E+01	5.6092E-01	2.2009E+01	-4.3355E+01	.49
130	3.1836E+01	-3.7309E+01	7.4402E+00	3.2628E+01	-3.8101E+01	6.07
131	3.0987E+01	-4.1554E+01	2.4873E+00	3.1073E+01	-4.1639E+01	1.96
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
125	2.8263E+01	5.9119E+00	-8.2758E+00	3.0993E+01	3.1812E+00	-18.26
126	1.5667E+01	3.0461E+00	-6.9833E+00	1.8769E+01	-5.5542E-02	-23.95
130	3.1636E+01	5.5160E+00	-8.7214E+00	3.4280E+01	2.8716E+00	-16.87
131	2.1864E+01	2.5471E+00	-7.4289E+00	2.4390E+01	2.0573E-02	-18.78

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
125	-7.6133E-02	-4.9905E-01	-3.5596E-01	1.2644E-01	-7.0162E-01	-29.64
126	-1.9515E-02	-2.1596E-01	-4.4931E-01	3.4218E-01	-5.7766E-01	-38.83
130	1.5011E+00	-1.8361E-01	-5.3645E-02	1.5028E+00	-1.8532E-01	-1.82
131	1.5577E+00	9.9473E-02	-1.4700E-01	1.5723E+00	8.4802E-02	-5.70
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
125	2.7930E+00	5.6057E-01	-1.6221E+00	3.6458E+00	-2.9223E-01	-27.73
126	2.4303E+00	3.3823E-01	-1.3536E+00	3.0949E+00	-3.2639E-01	-26.15
130	3.5786E+00	3.8956E-01	-1.7297E+00	4.3366E+00	-3.6842E-01	-23.66
131	3.6115E+00	2.1722E-01	-1.4612E+00	4.1539E+00	-3.2514E-01	-20.36

ELEMENT ID 66 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
126	2.0970E+01	-4.3557E+01	9.9034E-02	2.0970E+01	-4.3557E+01	.09
127	2.0383E+01	-4.6493E+01	1.1600E+00	2.0403E+01	-4.6513E+01	.99
131	2.8073E+01	-4.2137E+01	2.4134E+00	2.8156E+01	-4.2220E+01	1.97
132	2.7486E+01	-4.5072E+01	3.4744E+00	2.7652E+01	-4.5238E+01	2.74
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
126	1.5761E+01	3.0649E+00	-5.2866E+00	1.7674E+01	1.1519E+00	-19.89
127	9.2355E+00	2.0727E-01	-3.6617E+00	1.0534E+01	-1.0912E+00	-19.52
131	2.1848E+01	2.5439E+00	-5.8545E+00	2.3485E+01	9.0717E-01	-15.62
132	1.5476E+01	1.0876E+00	-4.2296E+00	1.6628E+01	-6.3656E-02	-15.23

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
126	-5.6470E-02	-2.2335E-01	-3.3006E-01	2.0054E-01	-4.8036E-01	-37.91
127	-3.8381E-02	-1.3290E-01	-1.3531E-01	5.7686E-02	-2.2897E-01	-35.37
131	8.1473E-01	-4.9118E-02	-8.2087E-02	8.2247E-01	-5.6849E-02	-5.38
132	8.3282E-01	4.1329E-02	1.1266E-01	8.4854E-01	2.5606E-02	7.95
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
126	2.4383E+00	3.3983E-01	-1.0687E+00	2.8867E+00	-1.0861E-01	-22.76
127	2.3350E+00	1.8874E-01	-7.5224E-01	2.5724E+00	-4.8649E-02	-17.51
131	3.6046E+00	2.1585E-01	-1.1346E+00	3.9494E+00	-1.2893E-01	-16.90
132	3.5188E+00	1.2797E-01	-8.1810E-01	3.7059E+00	-5.9089E-02	-12.88

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 67 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
127	1.8925E+01	-4.6784E+01	1.2112E+00	1.8947E+01	-4.6807E+01	1.06
128	1.9015E+01	-4.6334E+01	1.2282E-01	1.9015E+01	-4.6334E+01	.11
132	2.6560E+01	-4.5257E+01	1.1721E+00	2.6579E+01	-4.5277E+01	.93
133	2.6650E+01	-4.4807E+01	8.3700E-02	2.6650E+01	-4.4807E+01	.07
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
127	9.2329E+00	2.0676E-01	-2.3118E+00	9.7906E+00	-3.5087E-01	-13.56
128	6.0896E+00	-8.1488E-01	-7.0635E-01	6.1611E+00	-8.8640E-01	-5.78
132	1.5492E+01	1.0908E+00	-2.4685E+00	1.5904E+01	6.7939E-01	-9.46
133	1.2355E+01	3.7747E-01	-8.6308E-01	1.2417E+01	3.1560E-01	-4.10

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
127	-1.1694E-01	-1.4862E-01	-7.8589E-03	-1.1510E-01	-1.5046E-01	-13.19
128	-8.4342E-02	1.4371E-02	-1.2345E-02	1.5892E-02	-8.5863E-02	-82.98
132	5.5499E-01	-1.4231E-02	-1.7547E-02	5.5553E-01	-1.4771E-02	-1.76
133	5.8759E-01	1.4876E-01	-2.2034E-02	5.8869E-01	1.4765E-01	-2.87
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
127	2.3341E+00	1.8856E-01	-4.6270E-01	2.4297E+00	9.3034E-02	-11.67
128	2.3033E+00	1.4228E-01	-1.4766E-01	2.3134E+00	1.3224E-01	-3.89
132	3.5179E+00	1.2779E-01	-4.7813E-01	3.5841E+00	6.1647E-02	-7.88
133	3.4778E+00	1.1277E-01	-1.6309E-01	3.4857E+00	1.0488E-01	-2.77

ELEMENT ID 68 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
129	4.3278E+01	-1.3282E+01	1.1445E+01	4.5506E+01	-1.5510E+01	11.02
130	4.1154E+01	-2.3904E+01	1.2756E+01	4.3566E+01	-2.6315E+01	10.71
134	9.1844E+00	-2.0101E+01	7.0934E+00	1.0812E+01	-2.1729E+01	12.92
135	7.0603E+00	-3.0722E+01	8.4046E+00	8.8455E+00	-3.2507E+01	11.99
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
129	5.6486E+01	6.8769E+00	-4.5507E+00	5.6900E+01	6.4629E+00	-5.20
130	3.0975E+01	6.1399E+00	-8.8518E+00	3.3807E+01	3.3078E+00	-17.74
134	1.5343E+01	4.7942E+00	-6.7727E+00	1.8653E+01	1.4845E+00	-26.04
135	3.7650E+01	-1.8965E+00	-1.1074E+01	4.0540E+01	-4.7863E+00	-14.63

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
129	3.2387E+00	1.1107E+00	1.0212E+00	3.6495E+00	6.9999E-01	21.91
130	3.0802E+00	3.1814E-01	6.9537E-01	3.2454E+00	1.5296E-01	13.36
134	-7.1165E-01	3.2067E-01	9.7288E-01	9.0584E-01	-1.2968E+00	58.97
135	-8.7016E-01	-4.7191E-01	6.4711E-01	6.0169E-03	-1.3481E+00	53.55
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
129	4.7140E+00	4.8579E-01	-1.8730E+00	5.4243E+00	-2.2458E-01	-20.77
130	3.5117E+00	5.3534E-01	-2.0841E+00	4.5844E+00	-5.3735E-01	-27.24
134	1.1795E+00	4.6284E-01	-2.3338E+00	3.1823E+00	-1.5400E+00	-40.64
135	5.2588E+00	-4.1875E-01	-2.5449E+00	6.2325E+00	-1.3924E+00	-20.94

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 69 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
130	3.4241E+01	-2.5286E+01	8.9372E+00	3.5554E+01	-2.6599E+01	8.36
131	3.2462E+01	-3.4181E+01	5.3968E+00	3.2896E+01	-3.4615E+01	4.60
135	2.1252E+01	-2.7884E+01	1.0261E+01	2.3308E+01	-2.9941E+01	11.33
136	1.9473E+01	-3.6778E+01	6.7210E+00	2.0265E+01	-3.7570E+01	6.72
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
130	3.1793E+01	6.3035E+00	-9.2905E+00	3.4820E+01	3.2767E+00	-18.05
131	2.1841E+01	2.4309E+00	-7.5364E+00	2.4423E+01	-1.5173E-01	-18.92
135	3.5965E+01	-2.2337E+00	-8.8207E+00	3.7903E+01	-4.1722E+00	-12.39
136	2.8630E+01	-3.8355E-01	-7.0666E+00	3.0260E+01	-2.0132E+00	-12.99

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
130	1.5398E+00	1.0068E-02	4.9334E-01	1.6851E+00	-1.3523E-01	16.41
131	1.5374E+00	-1.9396E-03	3.2182E-01	1.6020E+00	-6.6512E-02	11.35
135	4.5001E-01	-2.0789E-01	8.5255E-01	1.0349E+00	-7.9275E-01	34.45
136	4.4760E-01	-2.1990E-01	6.8103E-01	8.7227E-01	-6.4457E-01	31.95
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
130	3.6118E+00	5.5536E-01	-1.9250E+00	4.5415E+00	-3.7432E-01	-25.78
131	3.6038E+00	1.7857E-01	-1.5171E+00	4.1791E+00	-3.9677E-01	-20.77
135	5.0360E+00	-4.6331E-01	-1.9755E+00	5.6721E+00	-1.0994E+00	-17.85
136	4.9657E+00	-2.5643E-01	-1.5676E+00	5.4002E+00	-6.9086E-01	-15.49

ELEMENT ID 70 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
131	2.9547E+01	-3.4764E+01	5.3230E+00	2.9985E+01	-3.5201E+01	4.70
132	2.9030E+01	-3.7348E+01	3.7110E+00	2.9237E+01	-3.7555E+01	3.19
136	2.5207E+01	-3.5632E+01	3.8027E+00	2.5444E+01	-3.5868E+01	3.56
137	2.4690E+01	-3.8217E+01	2.1908E+00	2.4766E+01	-3.8293E+01	1.99
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
131	2.1825E+01	2.4277E+00	-5.9620E+00	2.3511E+01	7.4170E-01	-15.79
132	1.5457E+01	9.9133E-01	-4.1987E+00	1.6587E+01	-1.3905E-01	-15.07
136	2.8497E+01	-4.1017E-01	-5.3264E+00	2.9447E+01	-1.3604E+00	-10.12
137	2.1373E+01	2.6932E-01	-3.5632E+00	2.1959E+01	-3.1605E-01	-9.33

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
131	7.9445E-01	-1.5053E-01	3.8673E-01	9.3254E-01	-2.8862E-01	19.65
132	8.6319E-01	1.9316E-01	1.9835E-01	9.1751E-01	1.3884E-01	15.31
136	6.2263E-01	-1.8489E-01	4.1969E-01	8.0125E-01	-3.6350E-01	23.05
137	6.9137E-01	1.5880E-01	2.3132E-01	7.7781E-01	7.2354E-02	20.49
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
131	3.5969E+00	1.7720E-01	-1.1905E+00	3.9705E+00	-1.9643E-01	-17.42
132	3.5193E+00	1.3039E-01	-8.3051E-01	3.7119E+00	-6.2198E-02	-13.06
136	4.9547E+00	-2.5864E-01	-1.1819E+00	5.2101E+00	-5.1406E-01	-12.20
137	4.7137E+00	-2.4924E-01	-8.2191E-01	4.8463E+00	-3.8181E-01	-9.16

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 71 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
132	2.8105E+01	-3.7534E+01	1.4086E+00	2.8135E+01	-3.7564E+01	1.23
133	2.7662E+01	-3.9749E+01	8.3700E-02	2.7662E+01	-3.9749E+01	.07
137	2.6905E+01	-3.7773E+01	2.3502E+00	2.6991E+01	-3.7859E+01	2.08
138	2.6462E+01	-3.9989E+01	1.0253E+00	2.6478E+01	-4.0005E+01	.88
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
132	1.5473E+01	9.9454E-01	-2.4376E+00	1.5873E+01	5.9516E-01	-9.30
133	1.2332E+01	2.6140E-01	-8.6308E-01	1.2393E+01	2.0000E-01	-4.07
137	2.1258E+01	2.4623E-01	-2.1764E+00	2.1481E+01	2.3160E-02	-5.85
138	1.8335E+01	5.6426E-01	-6.0189E-01	1.8355E+01	5.4390E-01	-1.94

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
132	5.8536E-01	1.3759E-01	6.8144E-02	5.9550E-01	1.2745E-01	8.46
133	5.7345E-01	7.8042E-02	-2.2033E-02	5.7443E-01	7.7064E-02	-2.54
137	6.7378E-01	1.5528E-01	2.0569E-01	7.4546E-01	8.3589E-02	19.21
138	6.6186E-01	9.5724E-02	1.1552E-01	6.8453E-01	7.3062E-02	11.10
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
132	3.5184E+00	1.3021E-01	-4.9055E-01	3.5880E+00	6.0616E-02	-8.07
133	3.4757E+00	1.0212E-01	-1.6309E-01	3.4836E+00	9.4252E-02	-2.76
137	4.7083E+00	-2.5032E-01	-4.8195E-01	4.7547E+00	-2.9673E-01	-5.50
138	4.6146E+00	-2.2326E-01	-1.5449E-01	4.6195E+00	-2.2819E-01	-1.83

ELEMENT ID 72 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
134	7.3875E+00	-2.9085E+01	-2.8882E+00	7.6148E+00	-2.9313E+01	-4.50
135	8.3696E+00	-2.4175E+01	2.0102E+00	8.4933E+00	-2.4299E+01	3.52
139	2.7333E+01	-2.5097E+01	-6.1266E+00	2.8039E+01	-2.5803E+01	-6.58
140	2.8315E+01	-2.0186E+01	-1.2284E+00	2.8346E+01	-2.0217E+01	-1.45
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
134	1.4849E+01	2.3240E+00	-2.0567E+01	3.0086E+01	-1.2913E+01	-36.53
135	3.7927E+01	-5.1269E-01	-1.0231E+01	4.0481E+01	-3.0660E+00	-14.01
139	8.4256E+01	7.1932E+00	-2.4527E+01	9.1400E+01	4.9287E-02	-16.24
140	4.6561E+01	-4.9899E+00	-1.4191E+01	5.0209E+01	-8.6382E+00	-14.42

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
134	-1.1686E+00	-1.9639E+00	-6.3726E-01	-8.1509E-01	-2.3174E+00	-29.02
135	-8.0728E-01	-1.5742E-01	4.8433E-01	1.0088E-01	-1.0656E+00	61.93
139	1.4918E+00	-1.4319E+00	-5.9015E-01	1.6065E+00	-1.5465E+00	-10.99
140	1.8531E+00	3.7463E-01	5.3141E-01	2.0243E+00	2.0345E-01	17.86
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
134	1.0794E+00	-3.7121E-02	-4.2908E+00	4.8481E+00	-3.8058E+00	-41.29
135	5.2994E+00	-2.1568E-01	-2.5916E+00	6.3261E+00	-1.2424E+00	-21.61
139	1.2208E+01	1.1776E+00	-4.9891E+00	1.4130E+01	-7.4413E-01	-21.07
140	7.0821E+00	-9.5793E-01	-3.2899E+00	8.2567E+00	-2.1325E+00	-19.65

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 73 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
135	2.2561E+01	-2.1337E+01	3.8671E+00	2.2899E+01	-2.1675E+01	5.00
136	2.1016E+01	-2.9064E+01	4.9418E+00	2.1498E+01	-2.9547E+01	5.58
140	2.4746E+01	-2.0900E+01	-2.4900E+00	2.4882E+01	-2.1035E+01	-3.11
141	2.3201E+01	-2.8627E+01	-1.4153E+00	2.3240E+01	-2.8665E+01	-1.56
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
135	3.6242E+01	-8.4978E-01	-7.9777E+00	3.7885E+01	-2.4928E+00	-11.64
136	2.8551E+01	-7.7744E-01	-5.4296E+00	2.9524E+01	-1.7504E+00	-10.16
140	4.8080E+01	-4.6861E+00	-5.8458E+00	4.8720E+01	-5.3260E+00	-6.25
141	3.4834E+01	-2.4341E+00	-3.2979E+00	3.5123E+01	-2.7237E+00	-5.02

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
135	5.1290E-01	1.0661E-01	6.8978E-01	1.0288E+00	-4.0932E-01	36.80
136	5.7311E-01	4.0766E-01	5.4783E-01	1.0444E+00	-6.3655E-02	40.71
140	2.7429E-01	5.8903E-02	2.9623E-01	4.8180E-01	-1.4860E-01	35.01
141	3.3451E-01	3.5995E-01	1.5428E-01	5.0203E-01	1.9242E-01	47.36
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
135	5.0766E+00	-2.6024E-01	-2.0223E+00	5.7563E+00	-9.3996E-01	-18.58
136	4.9556E+00	-3.0687E-01	-1.5104E+00	5.3583E+00	-7.0957E-01	-14.93
140	7.2984E+00	-9.1467E-01	-1.9770E+00	7.7495E+00	-1.3658E+00	-12.85
141	6.3359E+00	-9.4630E-01	-1.4651E+00	6.6197E+00	-1.2300E+00	-10.96

ELEMENT ID 74 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
136	2.6750E+01	-2.7917E+01	2.0236E+00	2.6825E+01	-2.7992E+01	2.12
137	2.6227E+01	-3.0528E+01	1.7070E+00	2.6279E+01	-3.0580E+01	1.72
141	2.5284E+01	-2.8210E+01	4.3768E+00	2.5640E+01	-2.8566E+01	4.65
142	2.4762E+01	-3.0821E+01	4.0601E+00	2.5057E+01	-3.1116E+01	4.16
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
136	2.8418E+01	-8.0407E-01	-3.6895E+00	2.8877E+01	-1.2627E+00	-7.09
137	2.1405E+01	4.2684E-01	-2.3507E+00	2.1665E+01	1.6665E-01	-6.32
141	3.4995E+01	-2.4019E+00	-1.4353E+00	3.5050E+01	-2.4569E+00	-2.19
142	2.4470E+01	-2.5494E-01	-9.6554E-02	2.4470E+01	-2.5532E-01	-.22

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
136	7.4814E-01	4.4267E-01	2.8649E-01	9.2007E-01	2.7074E-01	30.97
137	7.1572E-01	2.8055E-01	2.5243E-01	8.3140E-01	1.6487E-01	24.62
141	7.8791E-01	4.5062E-01	2.3829E-01	9.1120E-01	3.2734E-01	27.36
142	7.5549E-01	2.8850E-01	2.0423E-01	8.3220E-01	2.1179E-01	20.59
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
136	4.9446E+00	-3.0909E-01	-1.1247E+00	5.1752E+00	-5.3973E-01	-11.59
137	4.7144E+00	-2.4575E-01	-7.7424E-01	4.8325E+00	-3.6380E-01	-8.67
141	6.3510E+00	-9.4330E-01	-1.0142E+00	6.4893E+00	-1.0817E+00	-7.77
142	5.7048E+00	-8.4432E-01	-6.6373E-01	5.7714E+00	-9.1091E-01	-5.73

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 75 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
137	2.8443E+01	-3.0085E+01	1.8665E+00	2.8502E+01	-3.0145E+01	1.82
138	2.8292E+01	-3.0838E+01	1.0253E+00	2.8310E+01	-3.0856E+01	.99
142	2.2199E+01	-3.1334E+01	8.2644E-01	2.2212E+01	-3.1347E+01	.88
143	2.2049E+01	-3.2087E+01	-1.4695E-02	2.2049E+01	-3.2087E+01	-.02
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
137	2.1289E+01	4.0374E-01	-9.6400E-01	2.1334E+01	3.5934E-01	-2.64
138	1.8223E+01	9.1095E-03	-6.0188E-01	1.8243E+01	-1.0757E-02	-1.89
142	2.4665E+01	-2.1587E-01	5.0985E-01	2.4675E+01	-2.2632E-01	1.17
143	1.8000E+01	2.7346E+00	8.7196E-01	1.8050E+01	2.6850E+00	3.26

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
137	6.9813E-01	2.7703E-01	2.2680E-01	7.9704E-01	1.7811E-01	23.56
138	7.3055E-01	4.3917E-01	1.1551E-01	7.7079E-01	3.9893E-01	19.20
142	1.1550E+00	3.6841E-01	3.8824E-02	1.1569E+00	3.6650E-01	2.82
143	1.1875E+00	5.3055E-01	-7.2459E-02	1.1954E+00	5.2265E-01	-6.22
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
137	4.7090E+00	-2.4684E-01	-4.3429E-01	4.7468E+00	-2.8461E-01	-4.97
138	4.6114E+00	-2.3895E-01	-1.5449E-01	4.6164E+00	-2.4386E-01	-1.82
142	5.7152E+00	-8.4224E-01	-3.9021E-01	5.7384E+00	-8.6537E-01	-3.39
143	5.4884E+00	-7.8035E-01	-1.1041E-01	5.4903E+00	-7.8229E-01	-1.01

ELEMENT ID 76 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
139	1.0411E+01	-8.6070E+00	2.4484E+00	1.0721E+01	-8.9171E+00	7.22
140	7.0044E+00	-2.5638E+01	-3.3045E+00	7.3356E+00	-2.5969E+01	-5.72
144	8.7219E-01	-1.0515E+01	-1.9931E+00	1.2110E+00	-1.0853E+01	-9.65
145	-2.5339E+00	-2.7546E+01	-7.7458E+00	-3.2938E-01	-2.9750E+01	-15.89
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
139	4.9974E+00	3.1502E+00	-3.4174E+00	7.6137E+00	5.3382E-01	-37.44
140	1.4568E+00	-5.2559E+00	-6.0301E-01	1.5105E+00	-5.3096E+00	-5.09
144	2.2526E+01	3.7620E+00	-2.8814E+00	2.2959E+01	3.3295E+00	-8.54
145	8.3831E+00	1.0268E+01	-6.7138E-02	1.0270E+01	8.3807E+00	-87.96

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
139	4.7182E-01	-9.7511E-01	1.1621E+00	1.1172E+00	-1.6205E+00	29.05
140	7.4503E-01	3.9092E-01	-4.2717E-03	7.4508E-01	3.9087E-01	-.69
144	-1.3119E+00	-1.3318E+00	1.0094E+00	-3.1245E-01	-2.3313E+00	44.72
145	-1.0387E+00	3.4191E-02	-1.5696E-01	5.6682E-02	-1.0612E+00	-81.85
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
139	7.3766E-01	5.3152E-01	-7.3887E-01	1.3806E+00	-1.1144E-01	-41.03
140	2.0679E-01	-8.8390E-01	-2.8114E-01	2.7500E-01	-9.5211E-01	-13.64
144	3.4240E+00	5.8907E-01	-1.0349E+00	3.7616E+00	2.5145E-01	-18.07
145	1.2741E+00	5.6397E-01	-5.7722E-01	1.5967E+00	2.4136E-01	-29.20

S H E L L E L E M E N T F O R C E S

ELEMENT ID 77
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
140	5.6662E+00	-2.5906E+01	-3.7776E+00	6.1119E+00	-2.6351E+01	-6.73
141	4.8706E+00	-2.9884E+01	-9.0695E-01	4.8942E+00	-2.9907E+01	-1.49
145	4.4168E+00	-2.6156E+01	-1.5600E+00	4.4962E+00	-2.6235E+01	-2.91
146	3.6212E+00	-3.0134E+01	1.3106E+00	3.6720E+00	-3.0185E+01	2.22
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
140	1.5369E+00	-5.2399E+00	-1.6294E-01	1.5408E+00	-5.2438E+00	-1.38
141	1.4674E+00	-1.9760E+00	3.4647E-01	1.5019E+00	-2.0105E+00	5.69
145	8.6151E+00	1.0315E+01	-1.8414E-01	1.0334E+01	8.5953E+00	-83.89
146	2.9037E+00	5.8298E+00	3.2527E-01	5.8655E+00	2.8679E+00	83.73

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
140	1.5295E-01	2.7251E-01	-9.2467E-02	3.2284E-01	1.0262E-01	-61.44
141	1.7369E-01	3.7622E-01	-8.8068E-02	4.0916E-01	1.4075E-01	-69.49
145	5.9021E-01	3.5996E-01	-2.7283E-01	7.7121E-01	1.7896E-01	-33.56
146	6.1095E-01	4.6367E-01	-2.6843E-01	8.1566E-01	2.5897E-01	-37.33
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
140	2.1820E-01	-8.8162E-01	-2.1191E-01	2.5762E-01	-9.2104E-01	-10.54
141	1.5361E-01	-9.5246E-01	-7.6407E-02	1.5886E-01	-9.5772E-01	-3.93
145	1.3167E+00	5.7247E-01	-3.2194E-01	1.4366E+00	4.5253E-01	-20.43
146	5.8825E-01	1.4863E-01	-1.8644E-01	6.5666E-01	8.0208E-02	-20.15

ELEMENT ID 78
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
141	5.6517E+00	-2.9728E+01	1.2651E+00	5.6969E+00	-2.9773E+01	2.05
142	5.8464E+00	-2.8754E+01	3.8009E+00	6.2590E+00	-2.9167E+01	6.20
146	3.9172E+00	-3.0075E+01	-1.4159E+00	3.9761E+00	-3.0133E+01	-2.38
147	4.1119E+00	-2.9101E+01	1.1198E+00	4.1497E+00	-2.9139E+01	1.93
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
141	1.4759E+00	-1.9743E+00	4.4469E-01	1.5323E+00	-2.0307E+00	7.23
142	1.0961E+00	-9.8483E-01	2.8740E-01	1.1351E+00	-1.0238E+00	7.72
146	2.8707E+00	5.8231E+00	1.1668E+00	6.2286E+00	2.4652E+00	70.84
147	1.6138E+00	6.7120E+00	1.0095E+00	6.9047E+00	1.4211E+00	79.20

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
141	3.4372E-01	4.1023E-01	-5.6565E-02	4.4259E-01	3.1136E-01	-60.23
142	3.3815E-01	3.8239E-01	-7.5506E-02	4.3895E-01	2.8159E-01	-53.16
146	1.1007E+00	5.6162E-01	-2.8679E-01	1.2247E+00	4.3758E-01	-23.39
147	1.0951E+00	5.3378E-01	-3.0573E-01	1.2295E+00	3.9942E-01	-23.72
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
141	1.5440E-01	-9.5231E-01	-5.2628E-02	1.5690E-01	-9.5480E-01	-2.72
142	1.4447E-01	-8.2639E-01	-2.0926E-02	1.4492E-01	-8.2684E-01	-1.23
146	5.8602E-01	1.4818E-01	-7.1159E-02	5.9729E-01	1.3690E-01	-9.00
147	3.1942E-01	-8.9648E-02	-3.9458E-02	3.2319E-01	-9.3419E-02	-5.46

S H E L L E L E M E N T F O R C E S

ELEMENT ID 79
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
142	4.8856E+00	-2.8946E+01	2.5883E+00	5.0824E+00	-2.9143E+01	4.35
143	7.2182E+00	-1.7283E+01	-5.5246E-03	7.2182E+00	-1.7283E+01	-.01
147	2.9261E+00	-2.9338E+01	7.7564E+00	4.6939E+00	-3.1106E+01	12.84
148	5.2586E+00	-1.7675E+01	5.1626E+00	6.3672E+00	-1.8784E+01	12.12
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
142	1.1064E+00	-9.8277E-01	3.1938E-01	1.1541E+00	-1.0305E+00	8.50
143	1.7698E+00	4.2468E+00	4.5983E-02	4.2477E+00	1.7689E+00	88.94
147	1.5920E+00	6.7076E+00	-1.0799E+00	6.9263E+00	1.3733E+00	-78.56
148	-7.1419E-01	-3.1247E+00	-1.3533E+00	-1.0723E-01	-3.7316E+00	-24.16

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
142	4.8798E-01	4.1236E-01	-1.3753E-01	5.9280E-01	3.0753E-01	-37.31
143	4.5715E-01	2.5822E-01	-2.7173E-02	4.6080E-01	2.5458E-01	-7.64
147	1.2520E+00	5.6515E-01	-1.2447E-01	1.2738E+00	5.4329E-01	-9.96
148	1.2212E+00	4.1102E-01	-1.4119E-02	1.2214E+00	4.1077E-01	-1.00
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
142	1.4502E-01	-8.2628E-01	-6.5019E-03	1.4506E-01	-8.2633E-01	-.38
143	1.4336E-01	-7.7146E-01	-5.8222E-03	1.4340E-01	-7.7150E-01	-.36
147	3.1552E-01	-9.0427E-02	-5.3566E-03	3.1559E-01	-9.0498E-02	-.76
148	2.4834E-01	-1.5552E-01	-4.6769E-03	2.4840E-01	-1.5557E-01	-.66

ELEMENT ID 80
LOAD COND 1

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
144	2.1637E+00	-4.0569E+00	-1.2377E+01	1.1816E+01	-1.3709E+01	-37.95
145	3.4833E+00	2.5409E+00	-5.5492E+00	8.5812E+00	-2.5571E+00	-42.57
149	1.5149E+01	-1.4599E+00	-8.1837E+00	1.8504E+01	-4.8146E+00	-22.29
150	1.6469E+01	5.1377E+00	-1.3557E+00	1.6629E+01	4.9778E+00	-6.73
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
144	2.2582E+01	4.0404E+00	-6.3558E-01	2.2604E+01	4.0186E+00	-1.96
145	5.9966E+00	-1.6640E+00	-3.3560E-01	6.0113E+00	-1.6787E+00	-2.50
149	2.0183E+01	2.8299E+00	-1.8165E+00	2.0371E+01	2.6418E+00	-5.91
150	1.0691E+01	-2.8822E-01	-1.5165E+00	1.0897E+01	-4.9383E-01	-7.72

LOAD COND 2

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
144	-1.1172E+00	-3.5810E-01	-1.3637E+00	6.7791E-01	-2.1532E+00	-52.78
145	-1.1359E+00	-4.5159E-01	-2.1209E-01	-3.9118E-01	-1.1963E+00	-74.10
149	5.8848E+00	1.0423E+00	-1.7998E+00	6.4804E+00	4.4662E-01	-18.31
150	5.8661E+00	9.4878E-01	-6.4818E-01	5.9501E+00	8.6477E-01	-7.38
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
144	3.3917E+00	4.2755E-01	-7.2404E-01	3.5591E+00	2.6014E-01	-13.02
145	1.2741E+00	5.6362E-01	-6.8216E-01	1.6879E+00	1.4973E-01	-31.25
149	2.8222E+00	4.0057E-01	-6.5626E-01	2.9886E+00	2.3416E-01	-14.23
150	2.0188E+00	-1.1264E-01	-6.1438E-01	2.1832E+00	-2.7705E-01	-14.98

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 81 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
145	1.0434E+01	3.9309E+00	6.3672E-01	1.0496E+01	3.8692E+00	5.54
146	1.0230E+01	2.9083E+00	6.2421E-01	1.0282E+01	2.8554E+00	4.84
150	3.8948E+00	2.6232E+00	-3.7248E+00	7.0377E+00	-5.1971E-01	-40.16
151	3.6904E+00	1.6005E+00	-3.7373E+00	6.5261E+00	-1.2352E+00	-37.19
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
145	6.2287E+00	-1.6176E+00	-4.5265E-01	6.2547E+00	-1.6436E+00	-3.29
146	1.1828E+00	-2.7742E+00	1.8041E-01	1.1911E+00	-2.7825E+00	2.61
150	1.0522E+01	-3.2204E-01	3.8193E-02	1.0522E+01	-3.2218E-01	.20
151	2.4191E+00	-2.9591E-01	6.7125E-01	2.5760E+00	-4.5280E-01	13.16

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
145	4.9307E-01	-1.2581E-01	-3.2794E-01	6.3452E-01	-2.6725E-01	-23.33
146	5.3007E-01	5.9210E-02	-4.8810E-01	8.3655E-01	-2.4727E-01	-32.13
150	3.4529E+00	4.6617E-01	-6.2972E-01	3.5803E+00	3.3883E-01	-11.43
151	3.4899E+00	6.5119E-01	-7.8988E-01	3.6949E+00	4.4620E-01	-14.55
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
145	1.3166E+00	5.7212E-01	-4.2688E-01	1.5107E+00	3.7798E-01	-24.46
146	5.8285E-01	1.2166E-01	-2.6402E-01	7.0280E-01	1.7103E-03	-24.43
150	1.9783E+00	-1.2075E-01	-4.1479E-01	2.0573E+00	-1.9974E-01	-10.78
151	9.9117E-01	2.2460E-02	-2.5193E-01	1.0528E+00	-3.9143E-02	-13.74

ELEMENT ID 82 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
146	1.0526E+01	2.9675E+00	-2.1024E+00	1.1071E+01	2.4221E+00	-14.54
147	1.0451E+01	2.5937E+00	5.5517E-01	1.0490E+01	2.5546E+00	4.02
151	3.4845E+00	1.5593E+00	2.0190E+00	4.7587E+00	2.8514E-01	32.25
152	3.4097E+00	1.1854E+00	4.6766E+00	7.1045E+00	-2.5094E+00	38.31
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
146	1.1499E+00	-2.7808E+00	1.0220E+00	1.3997E+00	-3.0307E+00	13.74
147	-9.2711E-01	-5.9922E+00	9.8672E-01	-7.4168E-01	-6.1776E+00	10.64
151	2.5418E+00	-2.7134E-01	6.6923E-01	2.6929E+00	-4.2243E-01	12.72
152	-7.2577E-01	7.9364E-01	6.3399E-01	1.0234E+00	-9.5556E-01	70.08

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
146	1.0198E+00	1.5716E-01	-5.0646E-01	1.2537E+00	-7.6759E-02	-24.79
147	9.8336E-01	-2.4987E-02	-2.4730E-01	1.0407E+00	-8.2371E-02	-13.06
151	2.3783E+00	4.2885E-01	-3.9017E-01	2.4535E+00	3.5365E-01	-10.91
152	2.3418E+00	2.4670E-01	-1.3101E-01	2.3500E+00	2.3854E-01	-3.56
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
146	5.8063E-01	1.2121E-01	-1.4874E-01	6.2458E-01	7.7260E-02	-16.46
147	3.2073E-01	-8.3059E-02	-6.9731E-02	3.3244E-01	-9.4761E-02	-9.53
151	1.0056E+00	2.5351E-02	-1.7454E-01	1.0358E+00	-4.7991E-03	-9.80
152	4.8822E-01	-4.6390E-03	-9.5530E-02	5.0609E-01	-2.2507E-02	-10.59

ESTRIBO 2 OF 4+300

S H E L L E L E M E N T F O R C E S

ELEMENT ID 83 ----------
LOAD COND 1 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
147	9.2650E+00	2.3565E+00	7.1917E+00	1.3789E+01	-2.1675E+00	32.17
148	6.8453E+00	-9.7418E+00	5.1626E+00	8.3209E+00	-1.1217E+01	15.95
152	1.0327E+01	2.5689E+00	1.5457E+00	1.0624E+01	2.2723E+00	10.86
153	7.9077E+00	-9.5293E+00	-4.8338E-01	7.9211E+00	-9.5427E+00	-1.59
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
147	-9.4887E-01	-5.9966E+00	-1.1028E+00	-7.1847E-01	-6.2270E+00	-11.80
148	2.9674E-01	1.9300E+00	-1.3534E+00	2.6940E+00	-4.6728E-01	-60.55
152	-6.8064E-01	8.0266E-01	8.0036E-01	1.1522E+00	-1.0301E+00	66.41
153	-1.1177E+00	-1.1490E+00	5.4976E-01	-5.8335E-01	-1.6833E+00	44.19

LOAD COND 2 ----------

JOINT	F11	F22	F12	FMAX	FMIN	ANGLE
147	1.1402E+00	6.3847E-03	-6.6039E-02	1.1441E+00	2.5514E-03	-3.32
148	1.1648E+00	1.2939E-01	-1.4118E-02	1.1650E+00	1.2920E-01	-.78
152	1.8847E+00	1.5528E-01	-1.5213E-01	1.8980E+00	1.4200E-01	-4.99
153	1.9093E+00	2.7829E-01	-1.0021E-01	1.9155E+00	2.7215E-01	-3.50
JOINT	M11	M22	M12	MMAX	MMIN	ANGLE
147	3.1684E-01	-8.3837E-02	-3.5629E-02	3.1999E-01	-8.6980E-02	-5.04
148	2.4833E-01	-1.5560E-01	-4.6771E-03	2.4838E-01	-1.5565E-01	-.66
152	4.9781E-01	-2.7210E-03	-4.2653E-02	5.0142E-01	-6.3296E-03	-4.84
153	3.4899E-01	4.1188E-03	-1.1701E-02	3.4939E-01	3.7222E-03	-1.94

ANEJO Nº 3

MODELO DE CIMENTACIÓN DE PILA 1

ANEXO 3

Project Details

Title:
Client
Site
Building
Description

Design Details

Job ID:
Version:
Company:
Designed by:
Checked by:
Notes:

Joint Coordinates (m)

Joint	Label	x	y	z	Type
1		0,0	0,0	0,0	Rigid
2		0,0	1,2	0,0	Rigid
3		0,0	2,4	0,0	Rigid
4		0,0	3,6	0,0	Rigid
5		0,0	4,8	0,0	Rigid
6		0,0	6,0	0,0	Rigid
7		0,0	7,2	0,0	Rigid
8		0,0	8,4	0,0	Rigid
9		1,3	8,4	0,0	Rigid
10		2,5	0,0	0,0	Rigid
11		2,5	1,2	0,0	Rigid
12		2,5	2,4	0,0	Rigid
13		2,5	3,6	0,0	Rigid
14		2,5	4,8	0,0	Rigid
15		2,5	6,0	0,0	Rigid
16		2,5	7,2	0,0	Rigid
17		2,5	8,4	0,0	Rigid

Member Geometry (m,deg)

Member	Label	Joint1	Joint2	Length	Slope	Orient.
1		1	2	1,2	90,0	0,0
2		2	3	1,2	90,0	0,0
3		3	4	1,2	90,0	0,0
4		4	5	1,2	90,0	0,0
5		5	6	1,2	90,0	0,0
6		6	7	1,2	90,0	0,0
7		7	8	1,2	90,0	0,0
8		8	9	1,3	0,0	0,0
9		9	17	1,3	0,0	0,0
10		10	11	1,2	90,0	0,0
11		11	12	1,2	90,0	0,0
12		12	13	1,2	90,0	0,0
13		13	14	1,2	90,0	0,0
14		14	15	1,2	90,0	0,0
15		15	16	1,2	90,0	0,0
16		16	17	1,2	90,0	0,0

Member Types

Member	Label	Øx'	Øy'	Øz'	Member Type	Self Weight
1		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
2		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
3		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
4		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
5		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
6		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
7		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
8		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
9		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
10		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
11		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
12		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
13		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
14		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
15		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes
16		Rigid/Rigid	Rigid/Rigid	Rigid/Rigid	Normal	Yes

Member Sections

Member	Label	Group	Section
1		Custom 1	PANT 2.7 x 0.60
2		Custom 1	PANT 2.7 x 0.60
3		Custom 1	PANT 2.7 x 0.60
4		Custom 1	PANT 2.7 x 0.60
5		Custom 1	PANT 2.7 x 0.60
6		Custom 1	PANT 2.7 x 0.60
7		Custom 1	PANT 2.7 x 0.60
8		Custom 1	ENCEP. PILA
9		Custom 1	ENCEP. PILA
10		Custom 1	PANT 2.7 x 0.60
11		Custom 1	PANT 2.7 x 0.60
12		Custom 1	PANT 2.7 x 0.60
13		Custom 1	PANT 2.7 x 0.60
14		Custom 1	PANT 2.7 x 0.60
15		Custom 1	PANT 2.7 x 0.60
16		Custom 1	PANT 2.7 x 0.60

Section Properties

Section	A cm^2	Ix cm^4	Iy cm^4	J cm^4	E kg/cm^2	G kg/cm^2
PANT 2.7 x 0.60	16200,0	4860000,5	98415007,4	16718954,9	360000,0	150000,0
ENCEP. PILA	33750,0	43945311,7	205031246,8	124707999,2	360000,0	150000,0
Total Mass (kg)		89133,8				

Joint Restraints (mm,deg)

Joint	Label	Joint Axes	dx	dy	dz	Øx	Øy	Øz
1		Local	-	0,0	-	-	-	-
10		Local	-	0,0	-	-	-	-

Joint Springs (t/m,t-m/rad)

Joint	Label	Spring Type	Stiffness
5		kx'	3240,0
6		kx'	3240,0
7		kx'	3240,0
14		kx'	3240,0
15		kx'	3240,0
16		kx'	3240,0
2		kx'	32400,0
3		kx'	32400,0
11		kx'	32400,0
12		kx'	32400,0
4		kx'	17820,0
13		kx'	17820,0

Self Weight Load Cases(cm/s^2)

Name	Loading Type	Design	X Accel.	Y Accel.	Z Accel.
No self weight load cases selected.					

Static Load Cases

Name	Loading Type	Design	Joint Loads	Joint Disps	Member Disps	Thermal Disps
Load Case 1	Unknown	Strength+Serv.	3	0	0	0
Load Case 2	Unknown	Strength+Serv.	3	0	0	0

Combined Load Cases

Name	Loading Type	Design	Factored Cases	Factor
No combined load cases selected.				

Joint Loads(tonne,t-m) Load Case 1

Joint	Label	Load	Mag
9		Px	4,0

9	Py	-534,7
9	Mz	-71,1

There are no prescribed joint displacements in Load Case 1

There are no member loads in Load Case 1

There are no thermal loads in Load Case 1

Joint Loads(tonne,t-m) Load Case 2

Joint	*Label*	*Load*	*Mag*
9		Py	-513,1
9		Px	4,0
9		Mz	-100,1

There are no prescribed joint displacements in Load Case 2

There are no member loads in Load Case 2

There are no thermal loads in Load Case 2

Analysis Settings

Load Case	*LC Type*	*Analysis*	*Options*	*Settings*
Load Case 1	Static	Linear		
Load Case 2	Static	Linear		

Joint Displacements (mm,deg)

Joint Label	*Load Case*	*dx'*	*dy'*	*dz'*	*Øx'*	*Øy'*	*Øz'*
1	Load Case 1	-0,0	0,0	0,0	0,0	0,0	0,0
1	Load Case 2	-0,0	0,0	0,0	0,0	0,0	0,0
2	Load Case 1	-0,0	-0,0	0,0	0,0	0,0	0,0
2	Load Case 2	-0,0	-0,0	0,0	0,0	0,0	0,0
3	Load Case 1	-0,0	-0,1	0,0	0,0	0,0	0,0
3	Load Case 2	-0,0	-0,1	0,0	0,0	0,0	0,0
4	Load Case 1	-0,0	-0,1	0,0	0,0	0,0	-0,0
4	Load Case 2	-0,0	-0,1	0,0	0,0	0,0	-0,0
5	Load Case 1	-0,0	-0,2	0,0	0,0	0,0	-0,0
5	Load Case 2	-0,0	-0,2	0,0	0,0	0,0	-0,0
6	Load Case 1	0,0	-0,2	0,0	0,0	0,0	-0,0
6	Load Case 2	0,0	-0,2	0,0	0,0	0,0	-0,0
7	Load Case 1	0,1	-0,3	0,0	0,0	0,0	-0,0
7	Load Case 2	0,1	-0,3	0,0	0,0	0,0	-0,0
8	Load Case 1	0,3	-0,3	0,0	0,0	0,0	-0,0
8	Load Case 2	0,3	-0,3	0,0	0,0	0,0	-0,0
9	Load Case 1	0,3	-0,5	0,0	0,0	0,0	-0,0
9	Load Case 2	0,3	-0,5	0,0	0,0	0,0	-0,0
10	Load Case 1	-0,1	0,0	0,0	0,0	0,0	-0,0
10	Load Case 2	-0,1	0,0	0,0	0,0	0,0	-0,0
11	Load Case 1	-0,0	-0,1	0,0	0,0	0,0	-0,0
11	Load Case 2	-0,0	-0,1	0,0	0,0	0,0	-0,0
12	Load Case 1	0,0	-0,1	0,0	0,0	0,0	-0,0
12	Load Case 2	0,0	-0,1	0,0	0,0	0,0	-0,0
13	Load Case 1	0,1	-0,2	0,0	0,0	0,0	-0,0
13	Load Case 2	0,1	-0,2	0,0	0,0	0,0	-0,0
14	Load Case 1	0,2	-0,2	0,0	0,0	0,0	-0,0
14	Load Case 2	0,2	-0,2	0,0	0,0	0,0	-0,0
15	Load Case 1	0,3	-0,3	0,0	0,0	0,0	-0,0
15	Load Case 2	0,3	-0,3	0,0	0,0	0,0	-0,0
16	Load Case 1	0,3	-0,4	0,0	0,0	0,0	0,0
16	Load Case 2	0,3	-0,4	0,0	0,0	0,0	-0,0
17	Load Case 1	0,3	-0,4	0,0	0,0	0,0	0,0
17	Load Case 2	0,3	-0,4	0,0	0,0	0,0	0,0

Joint Reactions (tonne,t-m)

Joint Label	*Load Case*	*Rx'*	*Ry'*	*Rz'*	*Mx'*	*My'*	*Mz'*
1	Load Case 1	-0,0	236,0	0,0	0,0	0,0	-0,0
1	Load Case 2	0,0	213,9	0,0	0,0	0,0	-0,0

2	Load Case 1	0,4	0,0	0,0	0,0	0,0	0,0
2	Load Case 2	0,5	0,0	0,0	0,0	0,0	-0,0
3	Load Case 1	0,7	0,0	0,0	0,0	0,0	0,0
3	Load Case 2	0,7	0,0	0,0	0,0	0,0	0,0
4	Load Case 1	0,4	0,0	0,0	0,0	0,0	0,0
4	Load Case 2	0,4	0,0	0,0	0,0	0,0	0,0
5	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0
5	Load Case 2	0,0	0,0	0,0	0,0	0,0	0,0
6	Load Case 1	-0,1	0,0	0,0	0,0	0,0	0,0
6	Load Case 2	-0,2	0,0	0,0	0,0	0,0	0,0
7	Load Case 1	-0,4	0,0	0,0	0,0	0,0	0,0
7	Load Case 2	-0,5	0,0	0,0	0,0	0,0	0,0
8	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0
8	Load Case 2	0,0	0,0	0,0	0,0	0,0	0,0
9	Load Case 1	-0,0	0,0	0,0	0,0	0,0	0,0
9	Load Case 2	-0,0	0,0	0,0	0,0	0,0	0,0
10	Load Case 1	-0,0	298,7	0,0	0,0	0,0	-0,0
10	Load Case 2	0,0	299,2	0,0	0,0	0,0	0,0
11	Load Case 1	1,2	0,0	0,0	0,0	0,0	-0,0
11	Load Case 2	1,2	0,0	0,0	0,0	0,0	0,0
12	Load Case 1	-1,3	0,0	0,0	0,0	0,0	0,0
12	Load Case 2	-1,2	0,0	0,0	0,0	0,0	0,0
13	Load Case 1	-2,2	0,0	0,0	0,0	0,0	0,0
13	Load Case 2	-2,2	0,0	0,0	0,0	0,0	0,0
14	Load Case 1	-0,7	0,0	0,0	0,0	0,0	0,0
14	Load Case 2	-0,7	0,0	0,0	0,0	0,0	0,0
15	Load Case 1	-1,0	0,0	0,0	0,0	0,0	0,0
15	Load Case 2	-1,0	0,0	0,0	0,0	0,0	0,0
16	Load Case 1	-1,1	0,0	0,0	0,0	0,0	0,0
16	Load Case 2	-1,1	0,0	0,0	0,0	0,0	0,0
17	Load Case 1	0,0	0,0	0,0	0,0	0,0	0,0
17	Load Case 2	0,0	0,0	0,0	0,0	0,0	0,0

Sum of Reactions (tonne,t-m) Load Case 1

Rx	-4,0
Ry	534,7
Rz	0,0

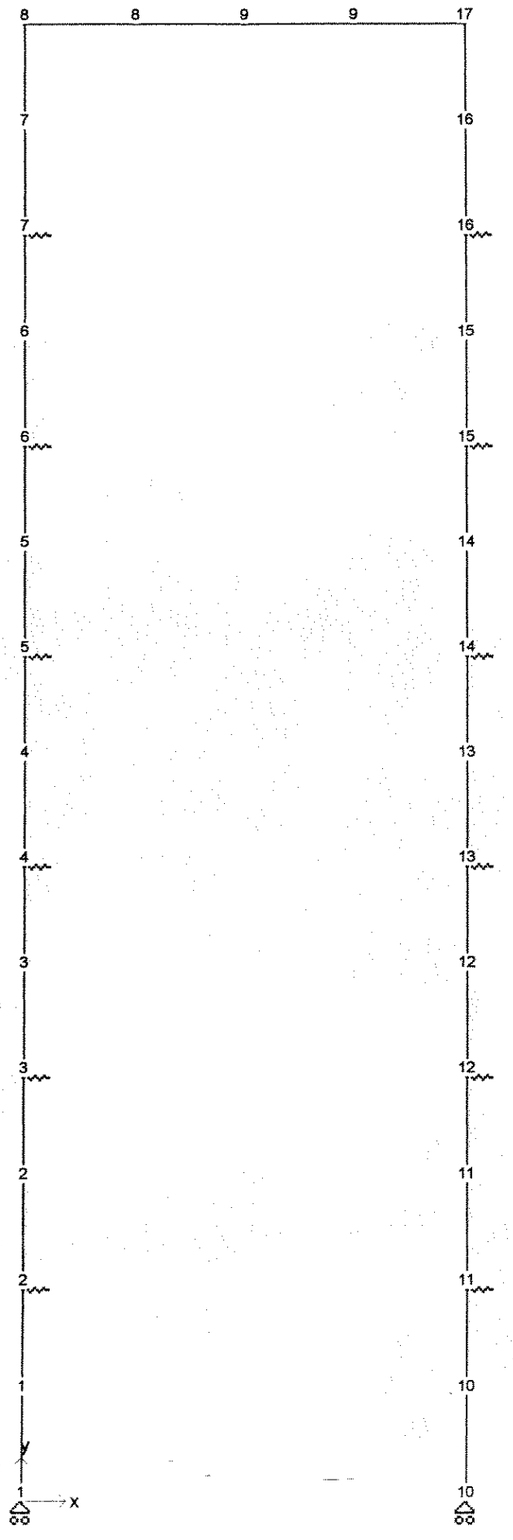
Sum of Reactions (tonne,t-m) Load Case 2

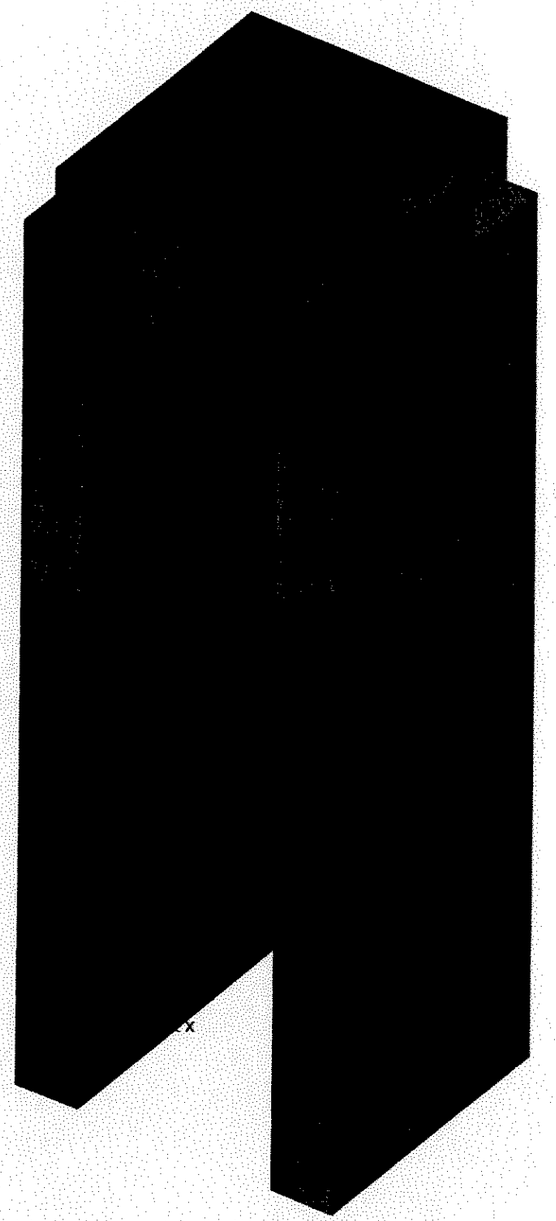
Rx	-4,0
Ry	513,1
Rz	0,0

Member Actions (tonne,t-m)

Member	*Load Case*	*Px'*	*Vy'*	*Vz'*	*Tx'*	*My'*	*Mz'*
1	Load Case 1	236,0	0,0	0,0	0,0	0,0	-0,0
		-236,0	-0,0	0,0	0,0	0,0	0,0
1	Load Case 2	213,9	-0,0	0,0	0,0	0,0	-0,0
		-213,9	0,0	0,0	0,0	0,0	0,0
2	Load Case 1	236,0	-0,4	0,0	0,0	0,0	0,0
		-236,0	0,4	0,0	0,0	0,0	-0,5
2	Load Case 2	213,9	-0,5	0,0	0,0	0,0	-0,0
		-213,9	0,5	0,0	0,0	0,0	-0,6
3	Load Case 1	236,0	-1,1	0,0	0,0	0,0	0,5
		-236,0	1,1	0,0	0,0	0,0	-1,9
3	Load Case 2	213,9	-1,2	0,0	0,0	0,0	0,6
		-213,9	1,2	0,0	0,0	0,0	-2,1
4	Load Case 1	236,0	-1,6	0,0	0,0	0,0	1,9
		-236,0	1,6	0,0	0,0	0,0	-3,8
4	Load Case 2	213,9	-1,6	0,0	0,0	0,0	2,1
		-213,9	1,6	0,0	0,0	0,0	-3,9
5	Load Case 1	236,0	-1,6	0,0	0,0	0,0	3,8
		-236,0	1,6	0,0	0,0	0,0	-5,7
5	Load Case 2	213,9	-1,6	0,0	0,0	0,0	3,9
		-213,9	1,6	0,0	0,0	0,0	-5,8
6	Load Case 1	236,0	-1,5	0,0	0,0	0,0	5,7
		-236,0	1,5	0,0	0,0	0,0	-7,4
6	Load Case 2	213,9	-1,4	0,0	0,0	0,0	5,8
		-213,9	1,4	0,0	0,0	0,0	-7,5
7	Load Case 1	236,0	-1,1	0,0	0,0	0,0	7,4
		-236,0	1,1	0,0	0,0	0,0	-8,7
7	Load Case 2	213,9	-0,9	0,0	0,0	0,0	7,5
		-213,9	0,9	0,0	0,0	0,0	-8,6
8	Load Case 1	1,1	236,0	0,0	0,0	0,0	8,7
		-1,1	-236,0	0,0	0,0	0,0	286,3

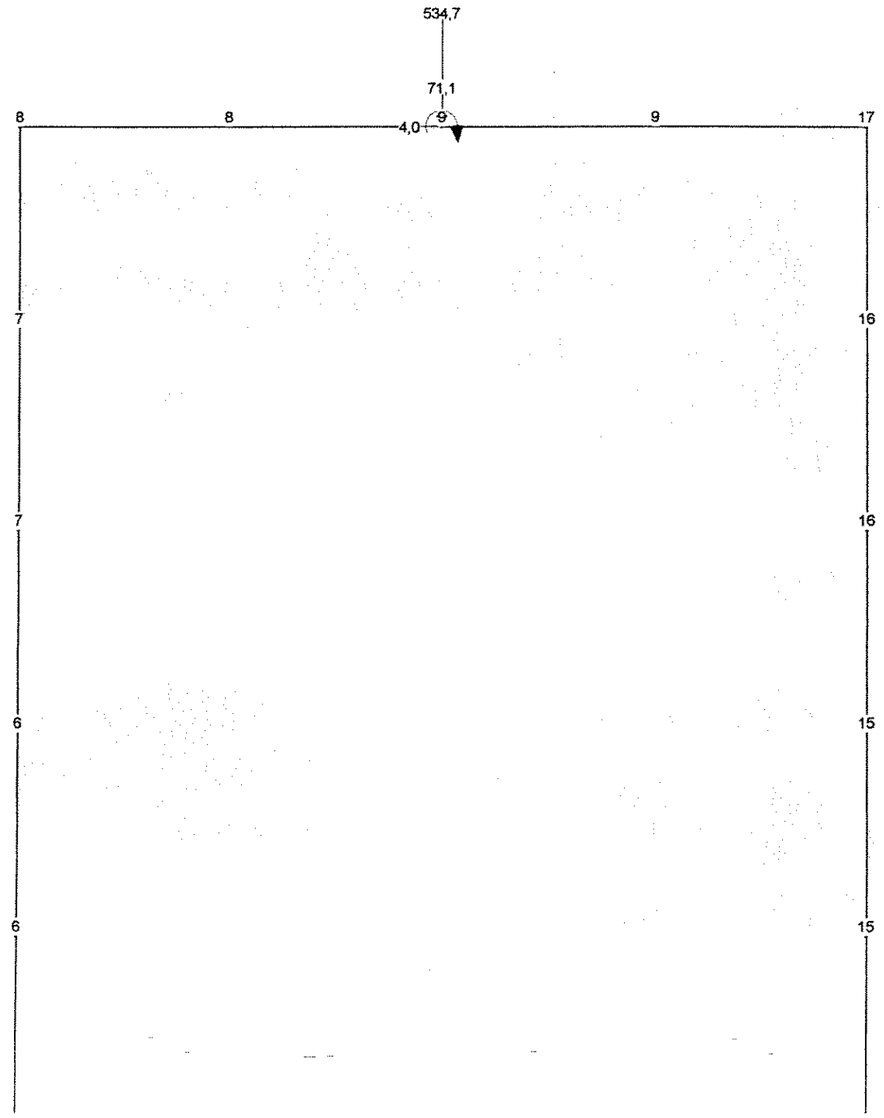
8	Load Case 2	0,9	213,9	0,0	0,0	0,0	8,6
		-0,9	-213,9	0,0	0,0	0,0	258,8
9	Load Case 1	5,1	-298,7	0,0	0,0	0,0	-357,4
		-5,1	298,7	0,0	0,0	0,0	-16,0
9	Load Case 2	4,9	-299,2	0,0	0,0	0,0	-358,9
		-4,9	299,2	0,0	0,0	0,0	-15,1
10	Load Case 1	298,7	0,0	0,0	0,0	0,0	-0,0
		-298,7	-0,0	0,0	0,0	0,0	-0,0
10	Load Case 2	299,2	0,0	0,0	0,0	0,0	0,0
		-299,2	0,0	0,0	0,0	0,0	-0,0
11	Load Case 1	298,7	-1,2	0,0	0,0	0,0	0,0
		-298,7	1,2	0,0	0,0	0,0	-1,4
11	Load Case 2	299,2	-1,2	0,0	0,0	0,0	0,0
		-299,2	1,2	0,0	0,0	0,0	-1,5
12	Load Case 1	298,7	0,1	0,0	0,0	0,0	1,4
		-298,7	-0,1	0,0	0,0	0,0	-1,3
12	Load Case 2	299,2	0,0	0,0	0,0	0,0	1,5
		-299,2	-0,0	0,0	0,0	0,0	-1,5
13	Load Case 1	298,7	2,3	0,0	0,0	0,0	1,3
		-298,7	-2,3	0,0	0,0	0,0	1,5
13	Load Case 2	299,2	2,2	0,0	0,0	0,0	1,5
		-299,2	-2,2	0,0	0,0	0,0	1,2
14	Load Case 1	298,7	3,0	0,0	0,0	0,0	-1,5
		-298,7	-3,0	0,0	0,0	0,0	5,2
14	Load Case 2	299,2	2,9	0,0	0,0	0,0	-1,2
		-299,2	-2,9	0,0	0,0	0,0	4,6
15	Load Case 1	298,7	4,0	0,0	0,0	0,0	-5,2
		-298,7	-4,0	0,0	0,0	0,0	10,0
15	Load Case 2	299,2	3,8	0,0	0,0	0,0	-4,6
		-299,2	-3,8	0,0	0,0	0,0	9,2
16	Load Case 1	298,7	5,1	0,0	0,0	0,0	-10,0
		-298,7	-5,1	0,0	0,0	0,0	16,0
16	Load Case 2	299,2	4,9	0,0	0,0	0,0	-9,2
		-299,2	-4,9	0,0	0,0	0,0	15,1



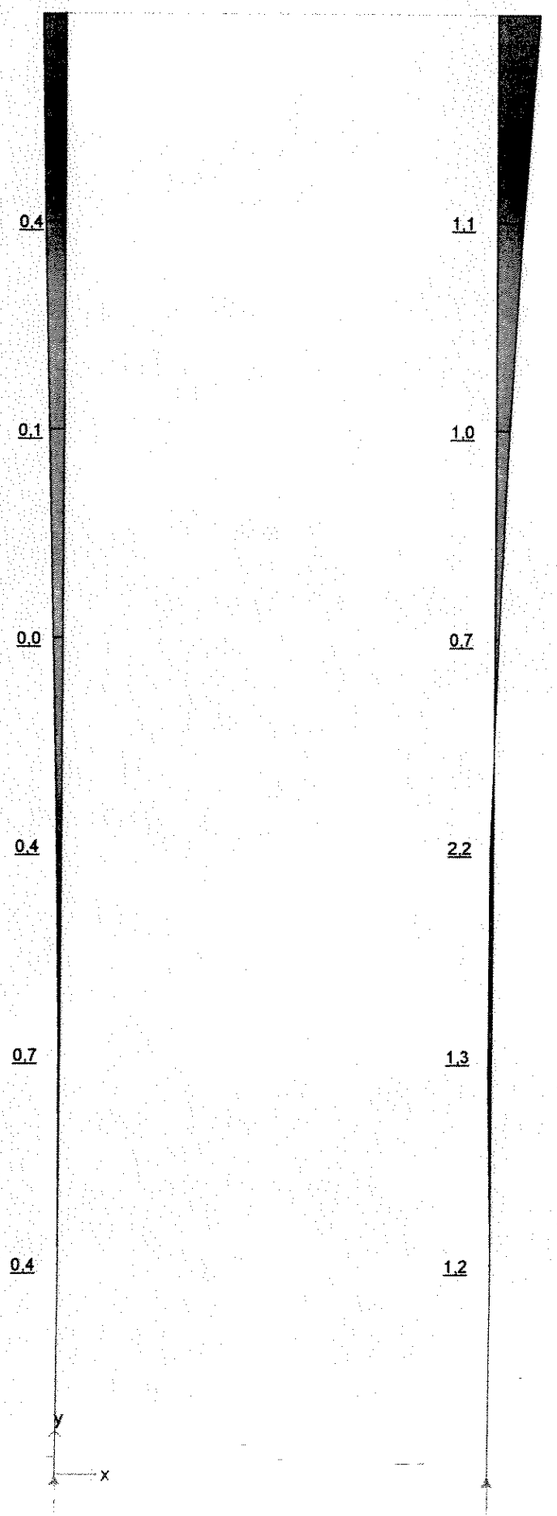


Frame

viernes, 05 de diciembre de 2003
Multiframe3D Version 8.52
Page 1
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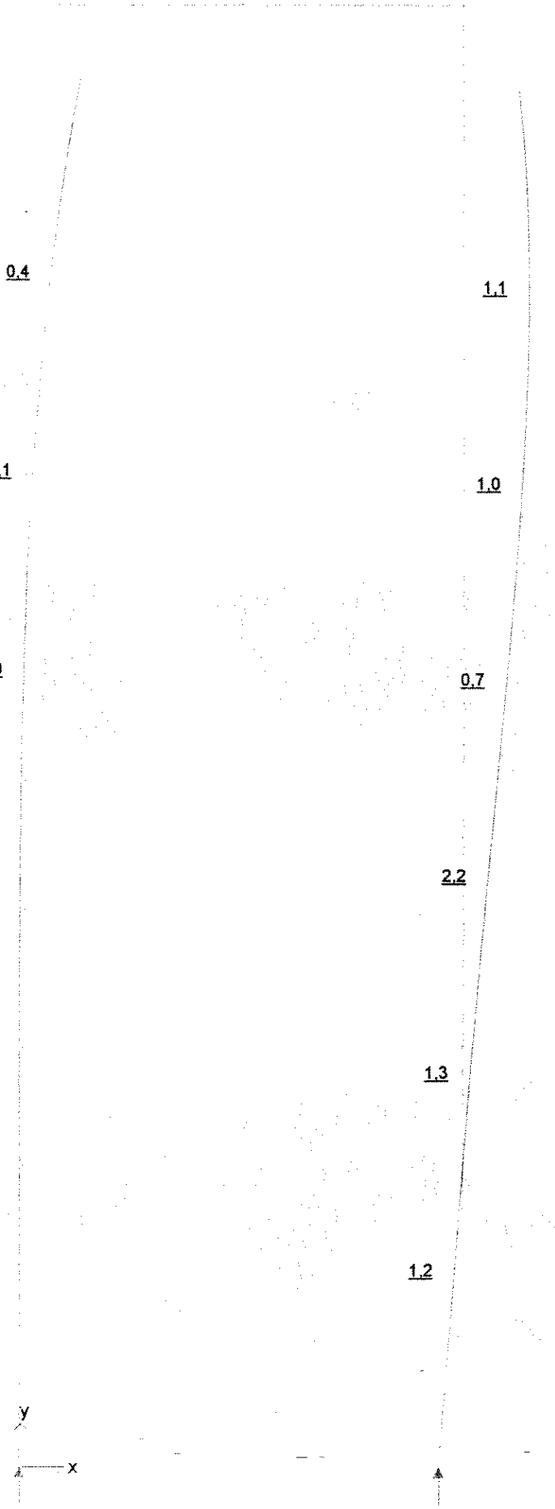


Load View - Load Case 1



Plot View - Static Case: Load Case 1 Mz' (t-m)

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Plot View - Static Case: Load Case 1 Defl. (mm)

• Paso superior 5.9

PASO SUPERIOR PS 5.9 AL PASO DEL AVE POR VILAFRANCA DEL PENEDÈS

ÍNDICE

Memoria

1. Descripción General
2. Bases de cálculo
3. Análisis estructural
    1. Tablero
    2. Pilares intermedios
    3. Estribos
4. Programas utilizados
5. Conclusiones

Anejo de cálculos

A1. Tablero central

1. Definición de la geometría del emparrillado
2. Materiales
3. Apoyos
4. Casos de carga y combinaciones
5. Resultados. Desplazamientos
6. Reacciones
7. Esfuerzos. Envolventes
8. Dimensionamiento de la sección ELS. Pretensado
9. Dimensionamiento en ELU. Cortante y flexión
10. Flexión transversal del tablero

A2. Tableros extremos

1. Definición de la geometría del emparrillado
2. Materiales
3. Apoyos
4. Casos de carga y combinaciones
5. Resultados. Desplazamientos
6. Reacciones
7. Esfuerzos. Envolventes
8. Dimensionamiento de la sección ELS. Pretensado
9. Dimensionamiento en ELU. Cortante y flexión
10. Flexión transversal del tablero

A3. Apoyos

A4. Pilas

1. Cargas aplicadas y obtención de desplazamientos y esfuerzos
2. Dimensionamiento a flexocompresión y cortante
3. Capacidad portante
4. Coronación

A5. Estribo 1

1. Cargas aplicadas y obtención de desplazamientos y esfuerzos
2. Dimensionamiento a flexión y cortante
3. Estructuras laterales de contención
4. Elementos de coronación

A6. Estribo 2

1. Cargas aplicadas y cálculo de estabilidad y resistencia
2. Dimensionamiento a flexión y cortante
3. Muros laterales de contención
4. Elementos de coronación

MEMORIA DE CÁLCULOS ESTRUCTURALES

1. DESCRIPCIÓN GENERAL

Se dimensiona un paso superior de tres vanos con luces de cálculo 14+17,1+14 m, con un ancho de tablero de 9,0 m, formado por una calzada central de 7,0 m y dos aceras laterales.

El tablero está formado por dos vigas artesa prefabricadas pretensadas, con losa superior hormigonada in situ sobre encofrado de prelosa de hormigón.

Cada viga se apoya en pilares intermedios materializados mediante un módulo de pantalla o en los cargaderos de los estribos cerrados. El estribo 1 se conforma con pantallas, tanto en la parte frontal como los módulos laterales más próximos a esta. Los últimos módulos de cierre de más baja altura se completan con muros. El estribo 2 se hace en su totalidad con muros de hormigón armado sobre cimentaciones superficiales.

2. BASES DE CÁLCULO

- Normativas utilizadas

Cimentaciones:

- "Normas Tecnológicas de la Edificación NTE. Acondicionamieno del Terreno A+C "

Acciones:

- "Norma Básica de la Edificación. Acciones en la edificación. NBE-AE-88" [0]
- "Instrucción relativa a las acciones a considerar en el proyecto de puentes de carreteras IAP-98 O.M. de 12 de febrero de 1.998 (B.O.E. del 4 de marzo)." [1]

Estructuras de Hormigón Armado:

- "Instrucción de Hormigón Estructural. EHE-98, R.D.2661/1.998 de 11 de diciembre de 1.998." [2]

- Materiales y sus características

- Hormigones

Vigas prefabricadas..... HP-40/B/20/IIa
Estribos, pilas y losa del tablero.....HA-25/B/20/IIa

	EHE Apartado y formulación	HA-25	HP-40
Resistencia a compresión, fck_{28} (MPa)	39.4	25	40
Módulo de elasticidad, Ej (MPa)	39.6 $8500 \cdot \sqrt[3]{f_{cm}}$	27.300	30.900

- Aceros

Pasivos: B-500 S f_{yk} = 500 MPa
f_s = 550 MPa
E_s = 200.000 MPa

Activos: Y 1860 S7 (cordones de 0,6")
f_{pk} = 1860 MPa
f_s = 1700 MPa
E_s = 190.000 MPa

Relajación del 2,0 % para una tensión de 70 % de $f_{max,\,k}$ aplicada durante 1.000 horas.

- **Niveles de control de calidad adoptados**

MATERIALES (EHE)	γ	Nivel de control
Hormigones	1,5	Estadístico
Aceros activo y pasivo	1,15	Normal
EJECUCIÓN (EHE)		Intenso

- **Coeficientes de ponderación de las acciones**

TIPO DE ACCIÓN	ELU		ELS	
	Efecto favorable	Efecto desfavorable	Efecto favorable	Efecto desfavorable
Permanente	$\gamma_G = 1,00$	$\gamma_G = 1,35$	$\gamma_G = 1,00$	$\gamma_G = 1,00$
Pretensado	$\gamma_P = 1,00$	$\gamma_P = 1,00$	$\gamma_P = 0,95$	$\gamma_P = 1,05$
Permanente de valor no constante	$\gamma_{G^*} = 1,00$	$\gamma_{G^*} = 1,50$	$\gamma_{G^*} = 1,00$	$\gamma_{G^*} = 1,00$
Variable	$\gamma_Q = 0,00$	$\gamma_Q = 1,50$	$\gamma_Q = 0,00$	$\gamma_Q = 1,00$

Según EHE (Control de ejecución intenso)

3. ANÁLISIS ESTRUCTURAL

1. Tablero

ACCIONES CONSIDERADAS

Acciones permanentes de valor constante

Para el cálculo del tablero se han considerado las cargas permanentes equivalentes al peso propio de la estructura y las cargas muertas de la superestructura (impostas, aceras y aglomerado).

Caso 1

Nº	Tipo de carga	Espesor (m)	Peso (kN/m^3)	Carga (kN/m^2)
1	Peso propio tablero	0,2	25	5
2	Acera (1 m)	0,2	23	4,6
3	Aglomerado	0,08 a 0,15	23	1,84 a 3,45

Las cargas superficiales se aplican a las vigas transversales del emparrillado en función del ancho tributario sobre cada elemento.

La imposta, barandillas y malla de protección se consideran una carga lineal de 3,2 kN/m que se aplica como vertical puntual más un torsor en las vigas transversales sobre la intersección con la viga de borde.

Acciones permanentes de valor no constante

El *pretensado* se considera como una carga variable en el tiempo. Se tiene en cuenta en su estado inicial de máxima tensión para analizar la estructura en vacío al destesar y a largo plazo después de ocurridas las pérdidas diferidas.

Estas pérdidas son las debidas a la relajación del acero de pretensado, la fluencia y la retracción del hormigón.
Las pérdidas de tensión en los tendones debidas a la *relajación* del acero se consideran del 2%
La *retracción* del hormigón se cuantifica según la EHE considerando un espesor ficticio de 167 mm y una HR del 70 %.
La *fluencia* se considera a partir una tensión media de compresión de las vigas aplicada al destensar la bancada de 6,5 MPa.
Estos valores aparecen descritos en el apartado 8 de los anejos A1 y A2.

Sobrecargas

Las *sobrecargas de tráfico* concomitantes aplicadas son de 4 kN/m² sobre toda la superficie del tablero y un carro de 600 kN (6 ejes de 100 kN espaciados a razón de 3x2 a 1,5 m longitudinalmente y 2 m transversalmente). Está aplicado en la posición más desfavorable para el estudio a flexión y a cortante, respectivamente. El carro se considera una carga puntual aplicada en las barras transversales en función de la carga que tributa sobre cada una de las barras adyacentes en cada posición. Las acciones horizontales debidas al frenado/arranque se consideran 1/20 de la sobrecarga en el tablero y actuando en la misma dirección.

En el dimensionamiento de las vigas principales (con el emparrillado) se comprueban los flectores mayores considerando el carro en la sección central (centrado en el tablero o descentrado a 0,5 m del límite de la calzada) y para el cortante en la sección extrema. Las cargas se aplican siempre sobre las vigas transversales excepto el peso de las vigas.

En el dimensionamiento de la flexión transversal del tablero (con el MEF) se pasea el carro transversalmente sobre el mismo y se toma la envolvente de momentos positivos y negativos.

Se considera una variación uniforme de *temperatura* de 35º del conjunto, según la formulación propuesta en la IAP, para la zona climática 3 con tipología de vigas de hormigón.

Las acciones transversales debidas al *viento* son despreciables. Considerando la formulación de la IAP para una velocidad de referencia de 24 m/s, un período de retorno T de 100 años, entorno tipo III y factor de topografía 1, si el punto de aplicación de la carga se encuentra a 10 m, la fuerza total sobre cada elemento de tablero (considerando tráfico pesado en todo el puente afectando la superficie expuesta al viento) sería de 59,6 kNm. Flectando transversalmente la losa de 9 m la tensión en la zona más traccionada es de 0,8 MPa, notablemente inferior a la resistencia a tracción del hormigón.

Las acciones *sísmicas* se desprecian, al tener la aceleración de cálculo un valor inferior a 0,06 g (puente de importancia normal)

COMBINACIÓN DE ACCIONES

Según EHE 13.2:

- Estado Límite Último
  - Situaciones permanentes o transitorias:

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{0,i}Q_{k,i}$$

  - Situaciones accidentales:

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_A A_k+\gamma_{Q,1}\psi_{1,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

- Estado Límite de Servicio
  - Combinación poco probable

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\Psi_{0,1}Q_{k,i}$$

- Combinación frecuente

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}\psi_{1,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

- Combinación cuasipermanente

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\sum_{i>1}\gamma_{Q,i}\Psi_{2,i}Q_{k,i}$$

Las combinaciones más desfavorables de sobrecarga para cada análisis realizado son las siguientes:

Flexión longitudinal de la viga: Cargas permanentes, Sobrecarga de tráfico repartida en todo el tablero, Carro descentrado en centro de luz y acciones diferidas (para el cálculo a tiempo infinito).

Cortante: Cargas permanentes, Sobrecarga de tráfico repartida en todo el tablero, Carro descentrado extremo de vano y acciones diferidas (para el cálculo a tiempo infinito).

Apoyos: Cargas permanentes, Sobrecarga de tráfico repartida en todo el tablero, Carro descentrado extremo de vano y acciones diferidas (para el cálculo a tiempo infinito), frenado y variación uniforme de temperatura.

Flexión transversal del tablero: Cargas permanentes, Sobrecarga de tráfico repartida (en todo el tablero o en bandas alternas), Carro paseado transversalmente.

VERIFICACIONES

Para dimensionar el tablero se realizan las siguientes comprobaciones de esfuerzos:

1. Flectores en la viga
2. Cortante en la viga
3. Reacciones de apoyos de la viga
4. Flexión transversal de la losa (superior e inferior)

Para determinar los esfuerzos sobre las vigas, el tablero se discretiza con un emparrillado plano con las secciones de las barras equivalentes a las del tablero y las vigas, ajustando la inercia a torsión. Se adopta como modelo para comprobar el reparto transversal de flexión y cortante sobre las vigas del tablero para las cargas puntuales. Se obtienen los máximos esfuerzos en las vigas. En los anejos A1 y A2, se muestra la definición de los distintos emparrillados, las cargas aplicadas y los resultados obtenidos.

Los flectores máximos en la viga pésima se utilizan para dimensionar el pretensado (en las secciones centro, cuartos y extremos de vano) utilizando un modelo de análisis evolutivo que considera los diferentes estados tensionales de la viga y viga+losa (situación inicial, bajo cargas permanentes y con sobrecargas).

Para el análisis del pretensado se consideran las pérdidas diferidas siguientes debidas a la relajación del acero (ρ_f = 0,025 a las 1000 h), la fluencia (mediante un coeficiente de fluencia de $\phi(\infty,7) = 2$) y la retracción ($\varepsilon_{cs}(\infty,7)$= 0.00024). Una vez aplicadas estas pérdidas se obtiene le estado final de pretensado (a tiempo infinito) para el cual se verifica la estructura en situación permanente.

Los criterios de dimensionamiento en ELS son:
1) Evitar la fisuración por tracción del hormigón en la fibra más traccionada para cualquier estado de carga, aunque en el caso de máxima sobrecarga poco frecuente se permite sobrepasar ligeramente la resistencia a tracción, comprobándose que el ancho de fisuras no supere 0,2 mm para la totalidad de las cargas exteriores.
La comprobación del ELS de fisuración de las vigas se basa en el criterio de no superar los 200 MPa de incremento de tensión en la armadura activa adherente

por cargas exteriores, tal como se describe en el apartado 8 de los anejos A1 y A2.

2) Las tensiones de compresión se limitan a 0,4 f_{ck} para cargas permanentes y en el resto de los casos no resultan limitadoras a 0,6 f_{ck}.

Con esto, los tendones utilizados resultan ser 34 ϕ0,6" Y 1860 S7, con una sección de 140 mm^2 por tendón.

Las tensiones extremas obtenidas en las distintas fases en centro de vanos son:

		Viga en taller	Viga + losa con máxima sobrecarga
Vano central	Tensión superior (kN/m^2)	5.313,5	13.271,0
	Tensión inferior (kN/m^2)	10.378,0	-3.986,1
Vigas extremas	Tensión superior (kN/m^2)	3.755,3	9.250,3
	Tensión inferior (kN/m^2)	11.392,3	416,3

Compresión positiva (+)

Se muestran los cálculos a ELS de fisuración en el apartado 8 de los anejos A1 y A2.

Una vez dimensionada la viga para ELS se comprueba su capacidad última en un cálculo seccional considerando una predeformación en los tendones de pretensado, para verificar su comportamiento ante el ELU, resultando para la sección un M_u = 6.978,1 kN·m.

El cortante se comprueba mediante los criterios de la EHE para elementos flexocomprimidos, obteniendo la distribución de cercos. El cortante en el extremo de la viga resulta ser V_d = 1.338,04 kN.

Las reacciones en los apoyos obtenidas en los emparrillados permiten dimensionar los apoyos de neopreno, los estribos y pilares. También se estudian de manera independiente las armaduras de refuerzo de los anclajes.

La flexión transversal de la losa se determina mediante un modelo de EF con lámina a nivel de tablero y barras excéntricas para representar las almas de vigas. Se hace un reparto de las cargas puntuales colocadas en las posiciones más desfavorables mediante un modelo de EF lámina de 4 nodos combinados con barras excéntricas que simulan la rigidez de las vigas.

Las vigas, elementos de una dimensión, tienen nodos comunes con la lámina que representa la losa y una excentricidad equivalente a la distancia entre los c.d.g. de ambas. El modelo es el implementado en el módulo láminas de Robot v 16.

Se determina el reparto de las cargas puntuales que actúan sobre la losa y el efecto del resto de cargas para obtener las envolventes de flectores transversales de la losa, considerando conjuntamente el efecto de flexión local y el global.
Se presenta gráficamente en el apartado 10 el resultado del análisis a flexión. Los valores obtenidos son fruto de las envolventes de los flectores de cálculo en las direcciones longitudinal y transversal de la losa. Se obtienen por el método de Wood & Armer e incluyen los efectos combinados de flectores y torsores de la losa.
Resultan unos momentos transversales de cálculo M_{d+} = 85 kN y M_{d-} = 60 kN.

De esta manera se ajustan las dimensiones geométricas y el pretensado, tal como se especifica en los planos.

2. Pilares intermedios

Se han realizado fundamentalmente dos verificaciones:

1. Capacidad portante del terreno bajo la pantalla ante cargas verticales
2. Verificación del conjunto pantalla-suelo ante cargas horizontales

En la primera se ha comprobado que bajo las reacciones máximas en los apoyos las pantallas empotradas en la roca (argilita) generen unas tensiones que sean admisibles por esta, solamente movilizadas a través del fuste.

En la segunda se aplican en la cabeza de la pantalla las cargas horizontales debidas al frenado y las diferencias de retracción y fluencia del tablero a un lado y otro del apoyo. En un modelo de análisis plástico para barras (RIDO) se simula el comportamiento del pilar y el terreno.

Se limita el desplazamiento en cabeza a L/250, siendo L la longitud entre la parte superior y el punto de giro. El dimensionamiento frente a ELU de tensiones normales se realiza con las parejas de esfuerzos M_d = 461,7 kN·m, N_d = 900 kN y M_d = 347,75 kN·m, N_d = 1300 kN. El cortante de cálculo es V_d = 360,5 kN.

Las características geotécnicas se han obtenido del anejo de geotecnia del proyecto. Los criterios considerados son los siguientes:

- El rozamiento entre pantalla y terreno en activo y pasivo δ=0
- El coeficiente de minoración de la cohesión es 2
- El coeficiente de balasto horizontal se considera la mitad del vertical, obtenido a partir de los módulos de deformación del anejo geotécnico.
- Las pantallas se empotran 2,5 m en la roca.
- El empuje pasivo se considera en toda su magnitud.

3. Estribos

Se ejecutan mediante pantallas o muros con cimentación directa.

Los criterios para las pantallas son similares a los expuestos anteriormente para los pilares intermedios.

Los criterios para los muros son los siguientes:

ACCIONES CONSIDERADAS

Las cargas consideradas son las obtenidas de los pesos específicos de los materiales, según NBE. Las sobrecargas en el terreno del trasdós son de 10 kN/m^2, equivalentes al tráfico rodado. También se consideran las cargas transmitidas por el tablero, tanto horizontales como verticales.

GEOTECNIA

Las cargas admisibles del terreno, así como las características del mismo a considerar en el análisis de las estructuras, se obtienen del estudio geotécnico.

A continuación se muestran en forma de tablas las propiedades utilizadas para el cálculo de muros y de pantallas respectivamente.

Propiedades de los terrenos utilizados para el cálculo de muros:

		Ángulo de rozamiento interno Ø (º)	Cohesión c (kN/m^2)	Tensión admisible (kN/m^2)
Muros estribo 1	Base	32	6,5	400
	Relleno	30	0	-
Muros cargadero	Base	32	6,5	300

estribo 2	Relleno	30	0	-
Muros cerramiento estribo 2	Base	30	0	200
	Relleno	30	0	-

Propiedades de los terrenos utilizados para el cálculo de pantallas:

		Ángulo de rozamiento interno Ø (º)	Cohesión c (kN/m^2)	Módulo de deformación E (kN/m^2)
Pantallas estribo 1	Estrato 1	32	6,5	50.000
	Estrato 2	28	25	152.400

El coeficiente de balasto horitzontal se considera la mitad del vertical, obtenido a partir del módulo de deformación del terreno según Vésic:

$K_H = \frac{K_v}{2}$; $K_v = 0{,}65\frac{E}{b(1+\nu^2)}$ Dónde se considera ν=0,3 i b=canto

MÓDULOS DE MUROS

La descripción de los cálculos estructurales de cada módulo aislado se detalla al final de esta memoria. A continuación se describen, de manera general, las bases, criterios y modelos considerados para el dimensionamiento y los aspectos de mayor interés.

Se calculan los módulos por separado considerando los empujes de Rankine con los respectivos coeficientes obtenidos del terreno. Se verifica la seguridad a deslizamiento y vuelco. En el caso de muros sin vigas apoyadas los coeficientes de seguridad para cargas sin mayorar son de 1,5, 1,8 y 1/1,25 respectivamente. En caso de que el muro sirva como apoyo a vigas del tablero estos son 1,75 y 2,25. La carga sobre el terreno se limita al 125% de la resistencia admisible del terreno en la punta siempre que no se sobrepase el 100% en el cdg de la cimentación. Se dimensiona el armado del muro y la zapata con los esfuerzos mayorados que se obtienen y describen en el anejo.

El empuje pasivo sobre la zapata del terreno en el intradós se considera en el equilibrio sin reducción.

Se desprecia el rozamiento entre el paramento vertical y el terreno y bajo la zapata se considera el equivalente a tg ϕ.

El resto de la información aparece descrita en el documento anexo para cada módulo.

4. PROGRAMAS UTILIZADOS

A continuación se describen los programas informáticos utilizados:

- Programa ROBOT MILLENIUM

Programa de análisis de barras y de elementos finitos que determina desplazamientos, esfuerzos y tensiones en una estructura, resultantes de las condiciones de contorno impuestas, la geometría y las fuerzas aplicadas.

- Programa ROBOT EXPERT

Se trata de un módulo que permite la comprobación y cálculo de muros. Realiza las comprobaciones de capacidad portante del terreno, deslizamiento y vuelco del muro y además permite obtener las leyes de esfuerzos producidos por la cargas aplicadas y el terreno definido.

- Programa RIDO

Es un modelo de análisis elasto-plástico para barras que simula el comportamiento de pantallas y se obtienen las solicitaciones y deformaciones de la pantalla.

- Prontuario informático del hormigón estructural

El prontuario informático del hormigón armado versión 3.0, edición del 2001, elaborado por la Cátedra de Hormigón Armado y Pretensado de la E.T.S. de Ingenieros de Caminos, Canales y Puertos de la Universidad Politécnica de Madrid, es un compendio de utilidades basadas en la Instrucción EHE, cuyo principal objetivo es el dimensionamiento y comprobación de elementos estructurales de hormigón armado (vigas, pilares, losas, etc.).

- Programa SECCIÓN

Es un programa elaborado por Julián Díaz del Valle, Catedrático de Mecánica de Medios Continuos y Teoría de Estructuras de la E.T.S. de Ingenieros de Caminos Canales y Puertos de Santander. El programa permite la comprobación del estado límite último de agotamiento de secciones sometidas a solicitaciones normales.

- Programa EXCEL

Las tablas de cálculo Excel son bien conocidas y no necesitan una explicación aparte.

5. CONCLUSIONES

El dimensionamiento del tablero queda justificado con los criterios de la normativa vigente y se describe detalladamente en los anejos siguientes.

Manuel Valdés López
Dr. Ing. de Caminos, Canales y Puertos
Nº. Colegiado 14647

ANEJO DE CÁLCULOS

A1. Tablero central

1. Definición de la geometría del emparrillado

Nudos


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47
48
49
50
51
52
53
54
55
Z
Y
X

Nudos: Valores: 1

Filtrar	Nudo
Lista compl	1A55
Selección	1A55
Número tot	55
Número sel	55

Nudo	X (m)	Y (m)	Apoyo - código	Apoyo
1	0.0	1.00	fil	Rotula
2	0.0	3.30	fil	Rotula
3	0.0	4.50		
4	0.0	5.70	fil	Rotula
5	0.0	8.00	fil	Rotula
6	1.70	1.00		
7	1.70	3.30		
8	1.70	4.50		
9	1.70	5.70		
10	1.70	8.00		
11	3.40	1.00		
12	3.40	3.30		
13	3.40	4.50		
14	3.40	5.70		
15	3.40	8.00		
16	5.10	1.00		
17	5.10	3.30		
18	5.10	4.50		
19	5.10	5.70		
20	5.10	8.00		
21	6.80	1.00		
22	6.80	3.30		
23	6.80	4.50		
24	6.80	5.70		
25	6.80	8.00		
26	8.50	1.00		
27	8.50	3.30		
28	8.50	4.50		
29	8.50	5.70		
30	8.50	8.00		
31	10.20	1.00		
32	10.20	3.30		
33	10.20	4.50		
34	10.20	5.70		
35	10.20	8.00		
36	11.90	1.00		
37	11.90	3.30		
38	11.90	4.50		
39	11.90	5.70		
40	11.90	8.00		
41	13.60	1.00		
42	13.60	3.30		
43	13.60	4.50		
44	13.60	5.70		
45	13.60	8.00		
46	15.30	1.00		
47	15.30	3.30		
48	15.30	4.50		
49	15.30	5.70		
50	15.30	8.00		
51	17.00	1.00	fil	Rotula
52	17.00	3.30	fil	Rotula
53	17.00	4.50		
54	17.00	5.70	fil	Rotula

Nudo	X (m)	Y (m)	Apoyo - código	Apoyo
55	17.00	8.00	fll	Rotula

2. Materiales

Barras



Barras: Valores: 1

Filtrar	Barra	Elemento
Lista compl	1A94	1A94
Selección	1A94	1A94
Número tot	94	94
Número sel	94	94

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
1	1	6	biga1	HA - 40	1.70	0.0	Barra
2	6	11	biga1	HA - 40	1.70	0.0	Barra
3	11	16	biga1	HA - 40	1.70	0.0	Barra
4	16	21	biga1	HA - 40	1.70	0.0	Barra
5	21	26	biga1	HA - 40	1.70	0.0	Barra
6	26	31	biga1	HA - 40	1.70	0.0	Barra
7	31	36	biga1	HA - 40	1.70	0.0	Barra
8	36	41	biga1	HA - 40	1.70	0.0	Barra
9	41	46	biga1	HA - 40	1.70	0.0	Barra
10	46	51	biga1	HA - 40	1.70	0.0	Barra
11	2	7	biga1	HA - 40	1.70	0.0	Barra
12	7	12	biga1	HA - 40	1.70	0.0	Barra
13	12	17	biga1	HA - 40	1.70	0.0	Barra
14	17	22	biga1	HA - 40	1.70	0.0	Barra
15	22	27	biga1	HA - 40	1.70	0.0	Barra
16	27	32	biga1	HA - 40	1.70	0.0	Barra
17	32	37	biga1	HA - 40	1.70	0.0	Barra
18	37	42	biga1	HA - 40	1.70	0.0	Barra
19	42	47	biga1	HA - 40	1.70	0.0	Barra
20	47	52	biga1	HA - 40	1.70	0.0	Barra
21	4	9	biga1	HA - 40	1.70	0.0	Barra
22	9	14	biga1	HA - 40	1.70	0.0	Barra

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
23	14	19	biga1	HA - 40	1.70	0.0	Barra
24	19	24	biga1	HA - 40	1.70	0.0	Barra
25	24	29	biga1	HA - 40	1.70	0.0	Barra
26	29	34	biga1	HA - 40	1.70	0.0	Barra
27	34	39	biga1	HA - 40	1.70	0.0	Barra
28	39	44	biga1	HA - 40	1.70	0.0	Barra
29	44	49	biga1	HA - 40	1.70	0.0	Barra
30	49	54	biga1	HA - 40	1.70	0.0	Barra
31	5	10	biga1	HA - 40	1.70	0.0	Barra
32	10	15	biga1	HA - 40	1.70	0.0	Barra
33	15	20	biga1	HA - 40	1.70	0.0	Barra
34	20	25	biga1	HA - 40	1.70	0.0	Barra
35	25	30	biga1	HA - 40	1.70	0.0	Barra
36	30	35	biga1	HA - 40	1.70	0.0	Barra
37	35	40	biga1	HA - 40	1.70	0.0	Barra
38	40	45	biga1	HA - 40	1.70	0.0	Barra
39	45	50	biga1	HA - 40	1.70	0.0	Barra
40	50	55	biga1	HA - 40	1.70	0.0	Barra
41	3	8	biga2	HA - 25	1.70	0.0	Barra
42	8	13	biga2	HA - 25	1.70	0.0	Barra
43	13	18	biga2	HA - 25	1.70	0.0	Barra
44	18	23	biga2	HA - 25	1.70	0.0	Barra
45	23	28	biga2	HA - 25	1.70	0.0	Barra
46	28	33	biga2	HA - 25	1.70	0.0	Barra
47	33	38	biga2	HA - 25	1.70	0.0	Barra
48	38	43	biga2	HA - 25	1.70	0.0	Barra
49	43	48	biga2	HA - 25	1.70	0.0	Barra
50	48	53	biga2	HA - 25	1.70	0.0	Barra
51	1	2	travessa1	HA - 25	2.30	0.0	Barra
52	2	3	travessa1	HA - 25	1.20	0.0	Barra
53	3	4	travessa1	HA - 25	1.20	0.0	Barra
54	4	5	travessa1	HA - 25	2.30	0.0	Barra

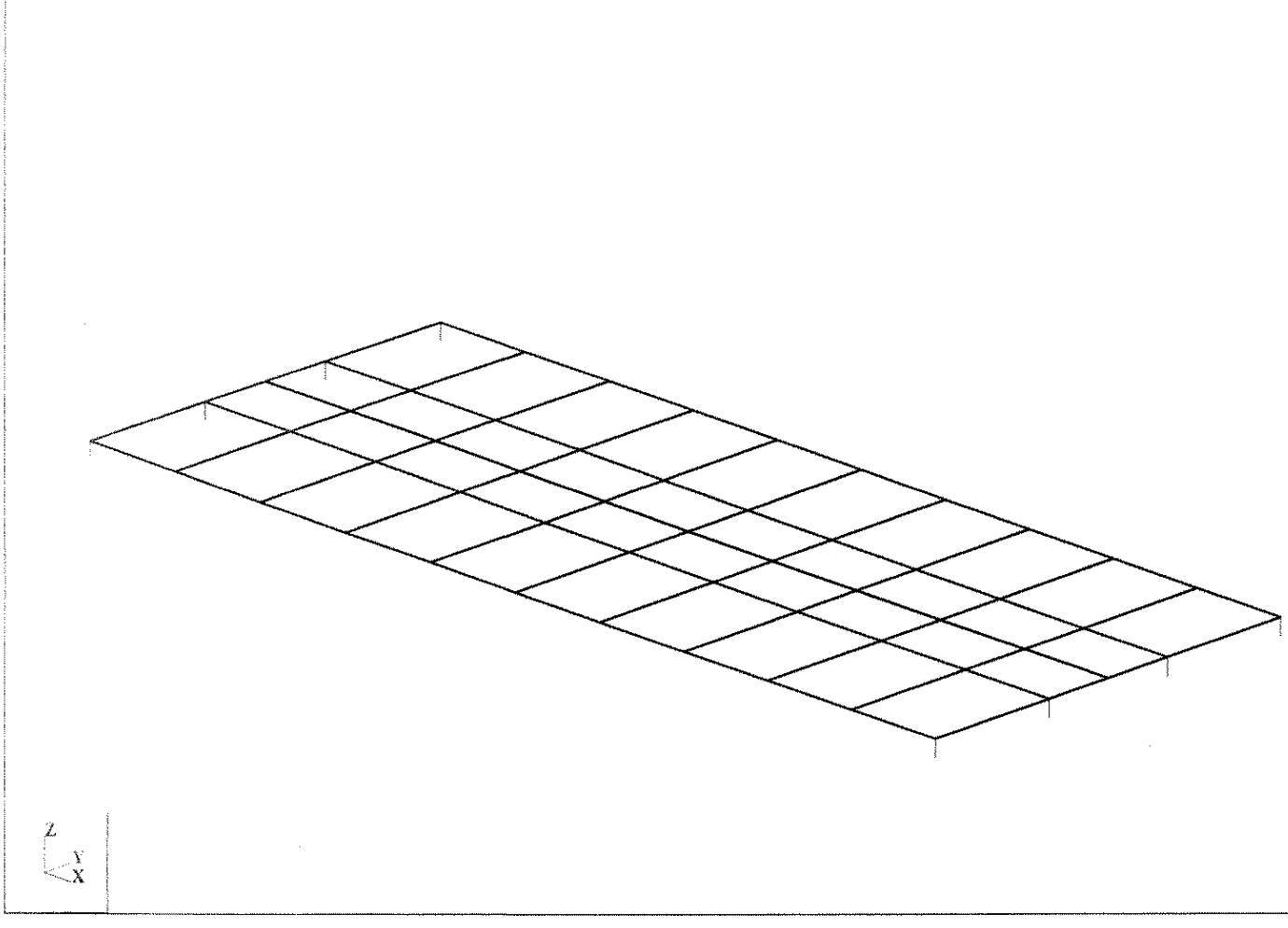
Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
55	51	52	travessa1	*HA - 25*	2.30	0.0	Barra
56	52	53	travessa1	*HA - 25*	1.20	0.0	Barra
57	53	54	travessa1	*HA - 25*	1.20	0.0	Barra
58	54	55	travessa1	*HA - 25*	2.30	0.0	Barra
59	6	7	travessa2	*HA - 25*	2.30	0.0	Barra
60	7	8	travessa2	*HA - 25*	1.20	0.0	Barra
61	8	9	travessa2	*HA - 25*	1.20	0.0	Barra
62	9	10	travessa2	*HA - 25*	2.30	0.0	Barra
63	11	12	travessa2	*HA - 25*	2.30	0.0	Barra
64	12	13	travessa2	*HA - 25*	1.20	0.0	Barra
65	13	14	travessa2	*HA - 25*	1.20	0.0	Barra
66	14	15	travessa2	*HA - 25*	2.30	0.0	Barra
67	16	17	travessa2	*HA - 25*	2.30	0.0	Barra
68	17	18	travessa2	*HA - 25*	1.20	0.0	Barra
69	18	19	travessa2	*HA - 25*	1.20	0.0	Barra
70	19	20	travessa2	*HA - 25*	2.30	0.0	Barra
71	21	22	travessa2	*HA - 25*	2.30	0.0	Barra
72	22	23	travessa2	*HA - 25*	1.20	0.0	Barra
73	23	24	travessa2	*HA - 25*	1.20	0.0	Barra
74	24	25	travessa2	*HA - 25*	2.30	0.0	Barra
75	26	27	travessa2	*HA - 25*	2.30	0.0	Barra
76	27	28	travessa2	*HA - 25*	1.20	0.0	Barra
77	28	29	travessa2	*HA - 25*	1.20	0.0	Barra
78	29	30	travessa2	*HA - 25*	2.30	0.0	Barra
79	31	32	travessa2	*HA - 25*	2.30	0.0	Barra
80	32	33	travessa2	*HA - 25*	1.20	0.0	Barra
81	33	34	travessa2	*HA - 25*	1.20	0.0	Barra
82	34	35	travessa2	*HA - 25*	2.30	0.0	Barra
83	36	37	travessa2	*HA - 25*	2.30	0.0	Barra
84	37	38	travessa2	*HA - 25*	1.20	0.0	Barra
85	38	39	travessa2	*HA - 25*	1.20	0.0	Barra
86	39	40	travessa2	*HA - 25*	2.30	0.0	Barra

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
87	41	42	travessa2	*HA - 25*	2.30	0.0	Barra
88	42	43	travessa2	*HA - 25*	1.20	0.0	Barra
89	43	44	travessa2	*HA - 25*	1.20	0.0	Barra
90	44	45	travessa2	*HA - 25*	2.30	0.0	Barra
91	46	47	travessa2	*HA - 25*	2.30	0.0	Barra
92	47	48	travessa2	*HA - 25*	1.20	0.0	Barra
93	48	49	travessa2	*HA - 25*	1.20	0.0	Barra
94	49	50	travessa2	*HA - 25*	2.30	0.0	Barra

Características: Barras: 1

	Nombre de la sección	Lista de barras	SX (cm^2)	SY (cm^2)	SZ (cm^2)	IX (cm^4)	IY (cm^4)	IZ (cm^4)
	biga1	1A40	1.000	0.0	0.0	56857033.6	13054958.3	0.0
	biga2	41A50	1.000	0.0	0.0	213333.330	26666.670	0.0
	travessa1	51A58	1.000	0.0	0.0	1023541.67	13810.080	0.0
	travessa2	59A94	1.000	0.0	0.0	8188333.33	27620.160	0.0

Apoyos



Apoyos: Valores: 1

	Nombre del apoyo	Lista de nudos	Condiciones de apoyo
	Rotula	1 2 4 5 51 52 54 55	UZ

4. Casos de carga y combinaciones

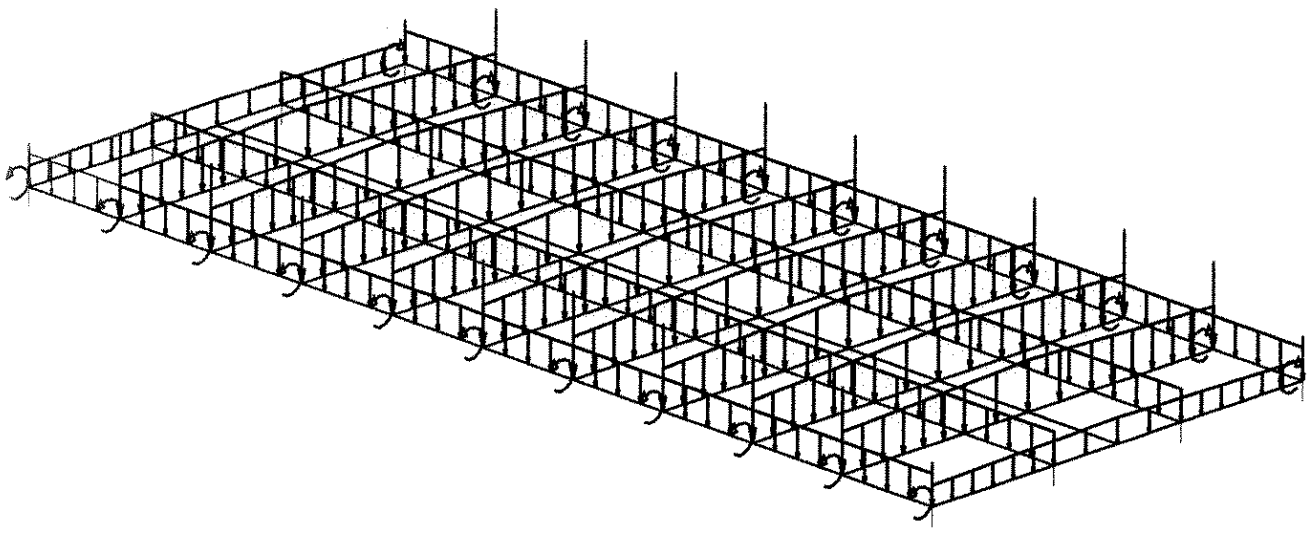
Cargas - Caso: 4 (SC+Carro descentrado en apoyos): Valores: 1

Caso	Nombre del caso	Naturaleza	tipo de análisis
1	PP+CM	permanente	Estático lineal
2	SC+Carro centrado en centro luz	explotación	Estático lineal
3	SC+Carro descentrado en centro luz	explotación	Estático lineal
4	SC+Carro descentrado en apoyos	explotación	Estático lineal
5	ELU		Ponderación
6	ELU+		Ponderación
7	ELU-		Ponderación
8	ELS		Ponderación
9	ELS+		Ponderación
10	ELS-		Ponderación

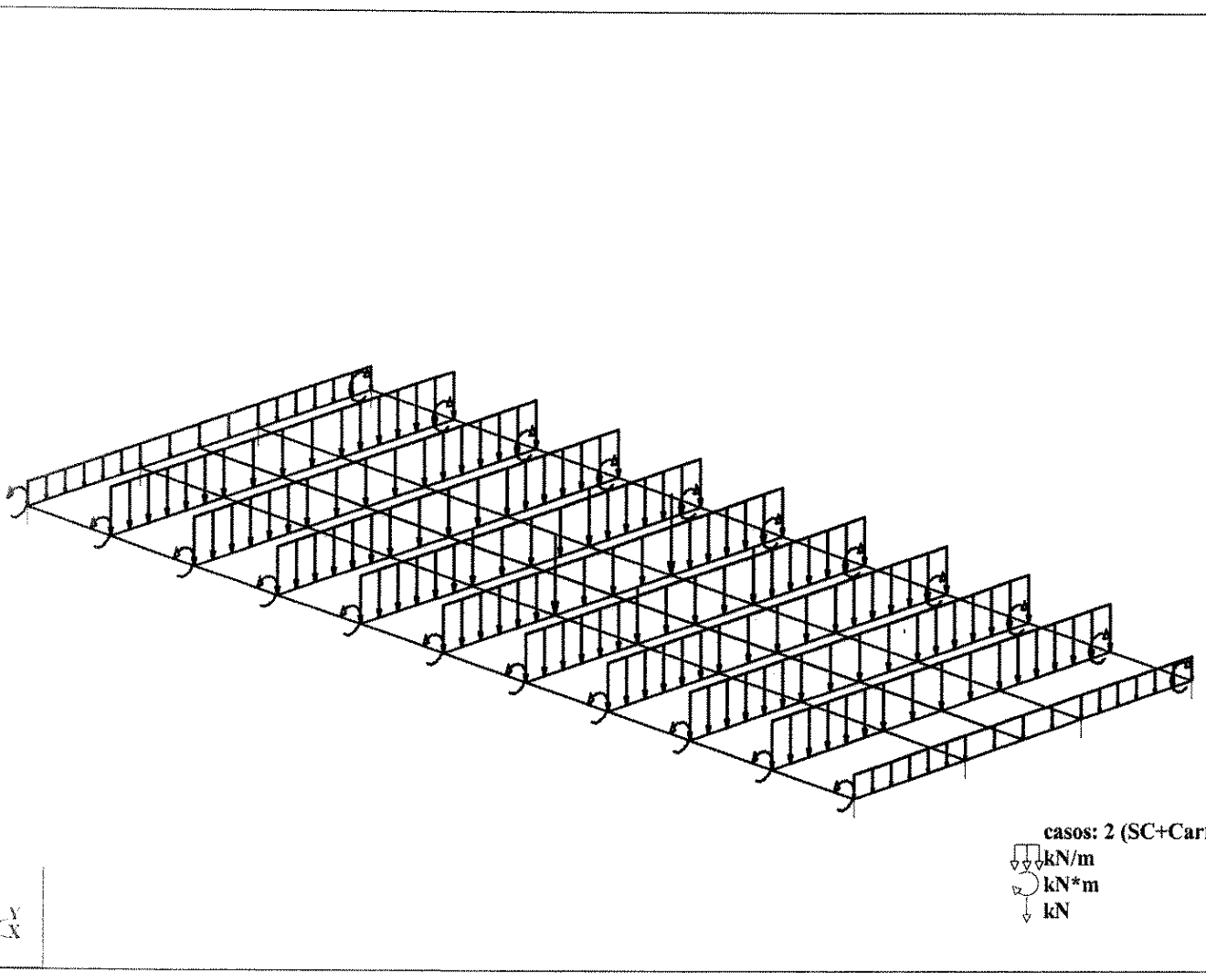
	Caso	Tipo de carga	Lista	Valores de carga
	1	carga trapezoidal	61A93CA4	PZ2=-14.21(kN/m) PZ1=-15.15(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	60A92CA4	PZ2=-15.15(kN/m) PZ1=-14.21(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	53 57	PZ2=-7.11(kN/m) PZ1=-7.57(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	52 56	PZ2=-7.57(kN/m) PZ1=-7.11(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	62A94CA4	PZ2=-12.41(kN/m) PZ1=-14.21(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	59A91CA4	PZ2=-14.21(kN/m) PZ1=-12.41(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	54 58	PZ2=-6.21(kN/m) PZ1=-7.11(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	51 55	PZ2=-7.11(kN/m) PZ1=-6.21(kN/m) X2=1.00 X1=0.0 global no pr
	1	fuerza nodal	10A50CA5	FZ=-18.70(kN) CX=-10.37(kNm)
	1	fuerza nodal	6A46CA5	FZ=-18.70(kN) CX=10.37(kNm)
	1	fuerza nodal	5 55	FZ=-9.35(kN) CX=-5.19(kNm)
	1	fuerza nodal	1 51	FZ=-9.35(kN) CX=5.19(kNm)
	1	sobrecarga uniforme	1A40	PZ=-9.66(kN/m)
	2	fuerza nodal	22 24 32 34	FZ=-73.53(kN)
	2	fuerza nodal	23 33	FZ=-29.41(kN)
	2	fuerza nodal	27 29	FZ=-102.94(kN)
	2	fuerza nodal	28	FZ=-41.18(kN)

	Caso	Tipo de carga	Lista	Valores de carga
	2	sobrecarga uniforme	59A94	PZ=-6.80(kN/m)
	2	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	2	fuerza nodal	10A50CA5	FZ=-8.16(kN) CX=-4.90(kNm)
	2	fuerza nodal	6A46CA5	FZ=-8.16(kN) CX=4.90(kNm)
	2	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	2	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)
	3	fuerza nodal	28	FZ=-20.58(kN)
	3	fuerza nodal	23 33	FZ=-14.71(kN)
	3	fuerza nodal	29	FZ=-129.80(kN)
	3	fuerza nodal	24 34	FZ=-92.71(kN)
	3	fuerza nodal	30	FZ=-96.68(kN)
	3	fuerza nodal	25 35	FZ=-69.05(kN)
	3	sobrecarga uniforme	59A94	PZ=-6.80(kN/m)
	3	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	3	fuerza nodal	10A50CA5	FZ=-8.16(kN) CX=-4.90(kNm)
	3	fuerza nodal	6A46CA5	FZ=-8.16(kN) CX=4.90(kNm)
	3	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	3	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)
	4	fuerza nodal	43	FZ=-12.74(kN)
	4	fuerza nodal	44	FZ=-80.35(kN)
	4	fuerza nodal	45	FZ=-59.85(kN)
	4	fuerza nodal	48 53	FZ=-18.63(kN)
	4	fuerza nodal	49 54	FZ=-117.43(kN)
	4	fuerza nodal	50 55	FZ=-87.47(kN)
	4	sobrecarga uniforme	59A94	PZ=-6.80(kN/m)
	4	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	4	fuerza nodal	10A50CA5	FZ=-8.16(kN) CX=-4.90(kNm)
	4	fuerza nodal	6A46CA5	FZ=-8.16(kN) CX=4.90(kNm)
	4	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	4	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)

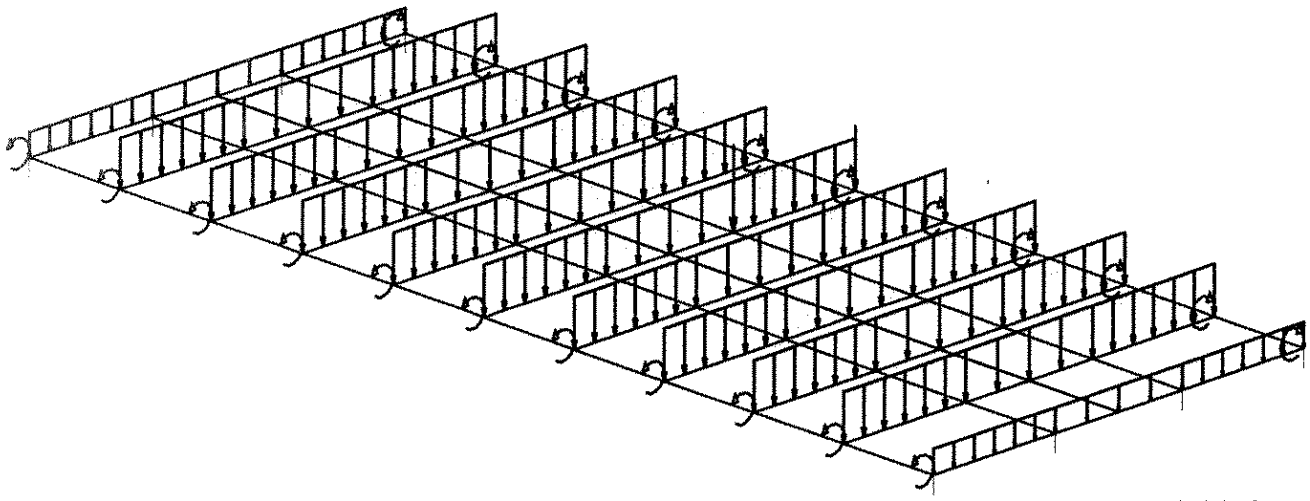
Vista - casos: 1 (PP+CM) 1



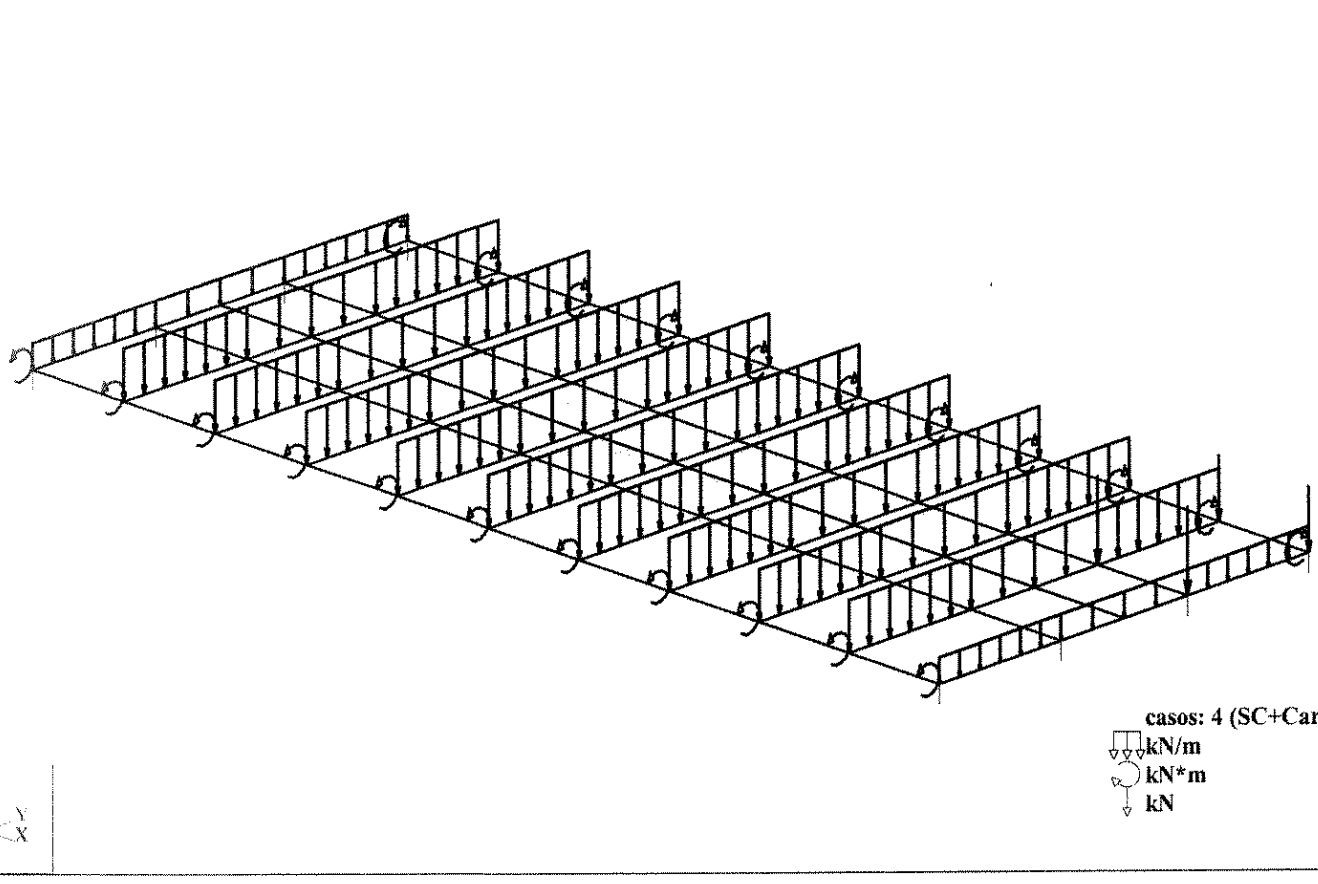
Vista - casos: 2 (SC+Carro centrado en centro luz)



Vista - casos: 3 (SC+Carro descentrado en centro luz)

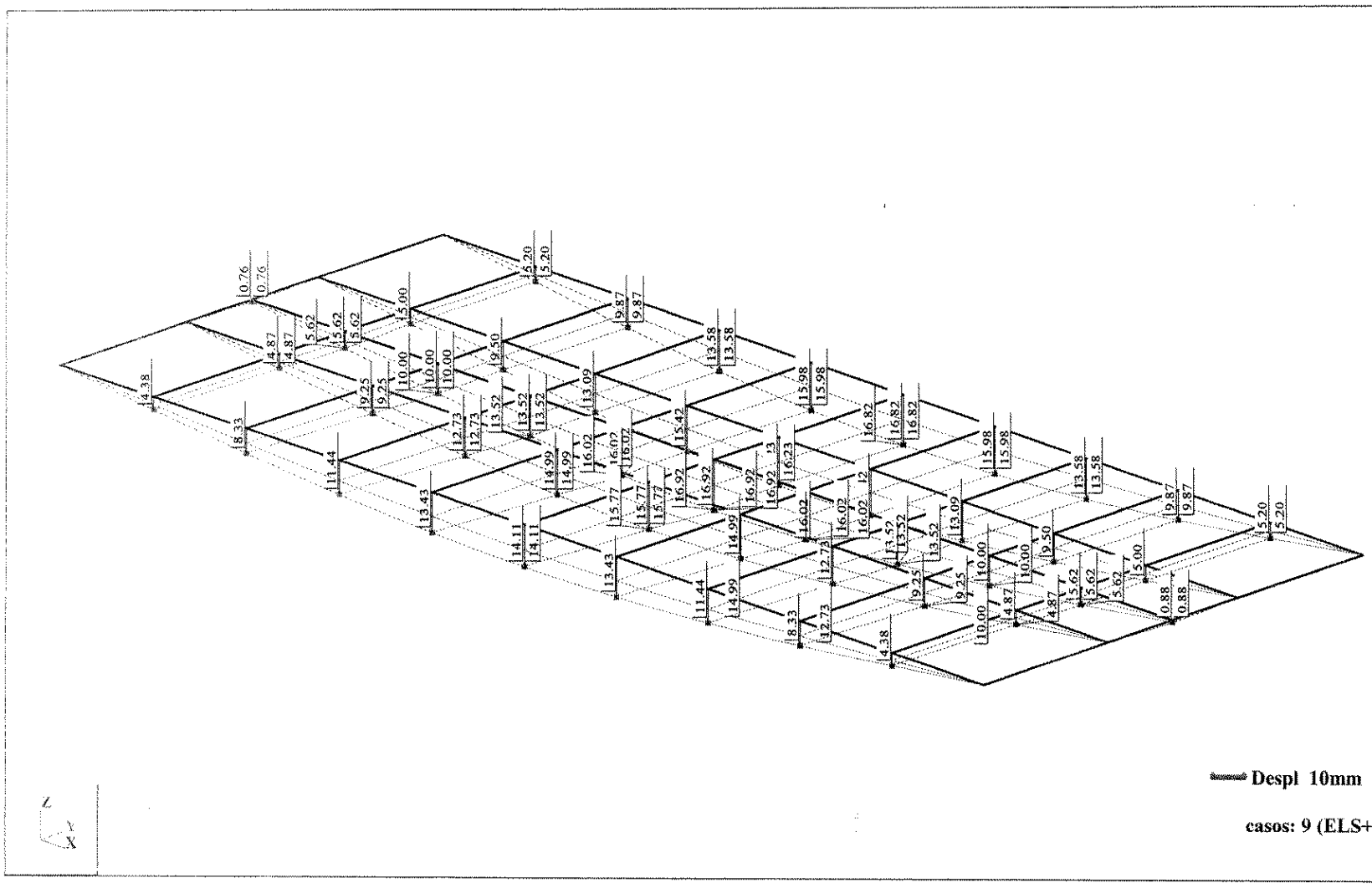


Vista - casos: 4 (SC+Carro descentrado en apoyos)

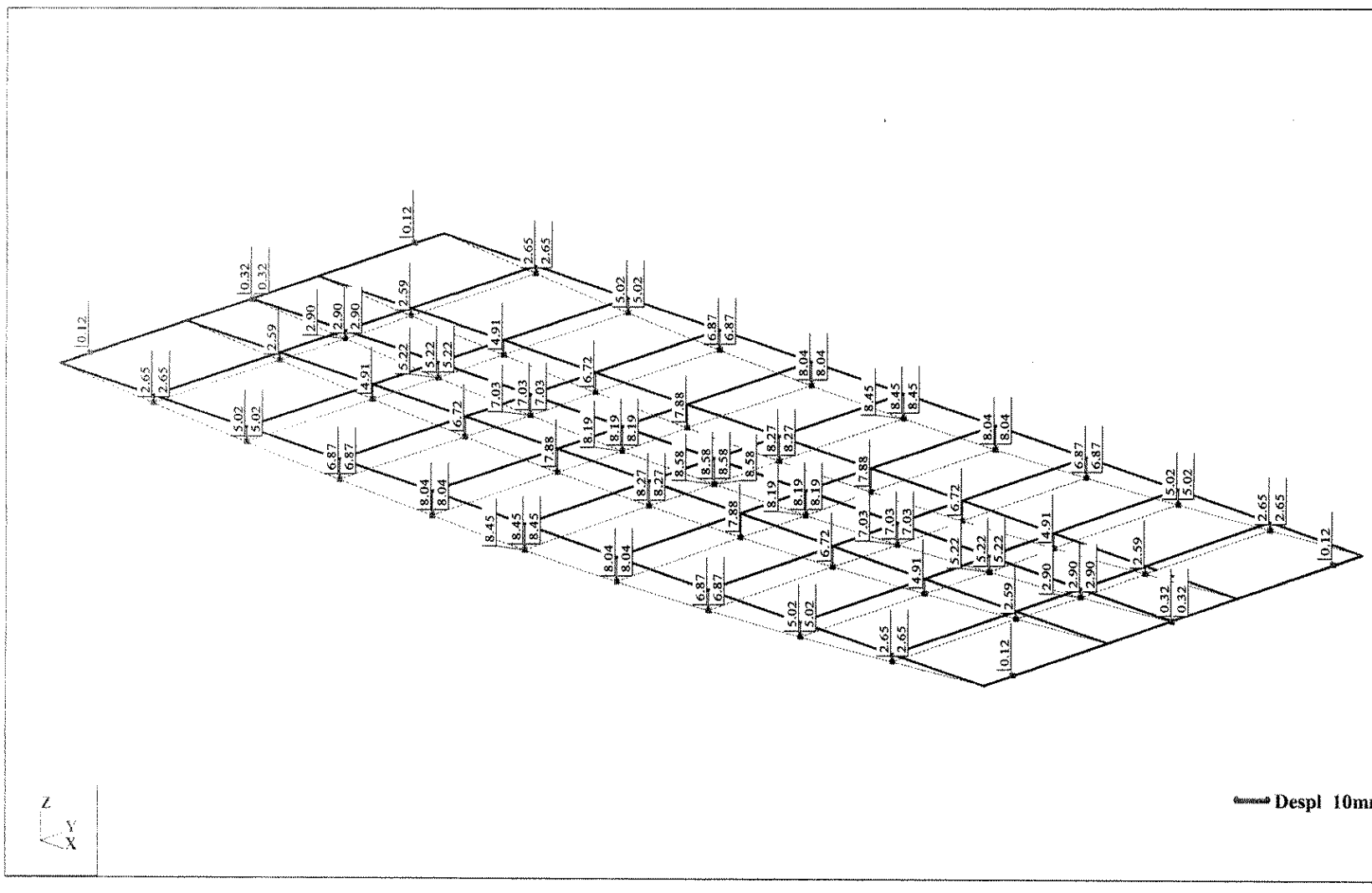


5. Resultados. Desplazamientos

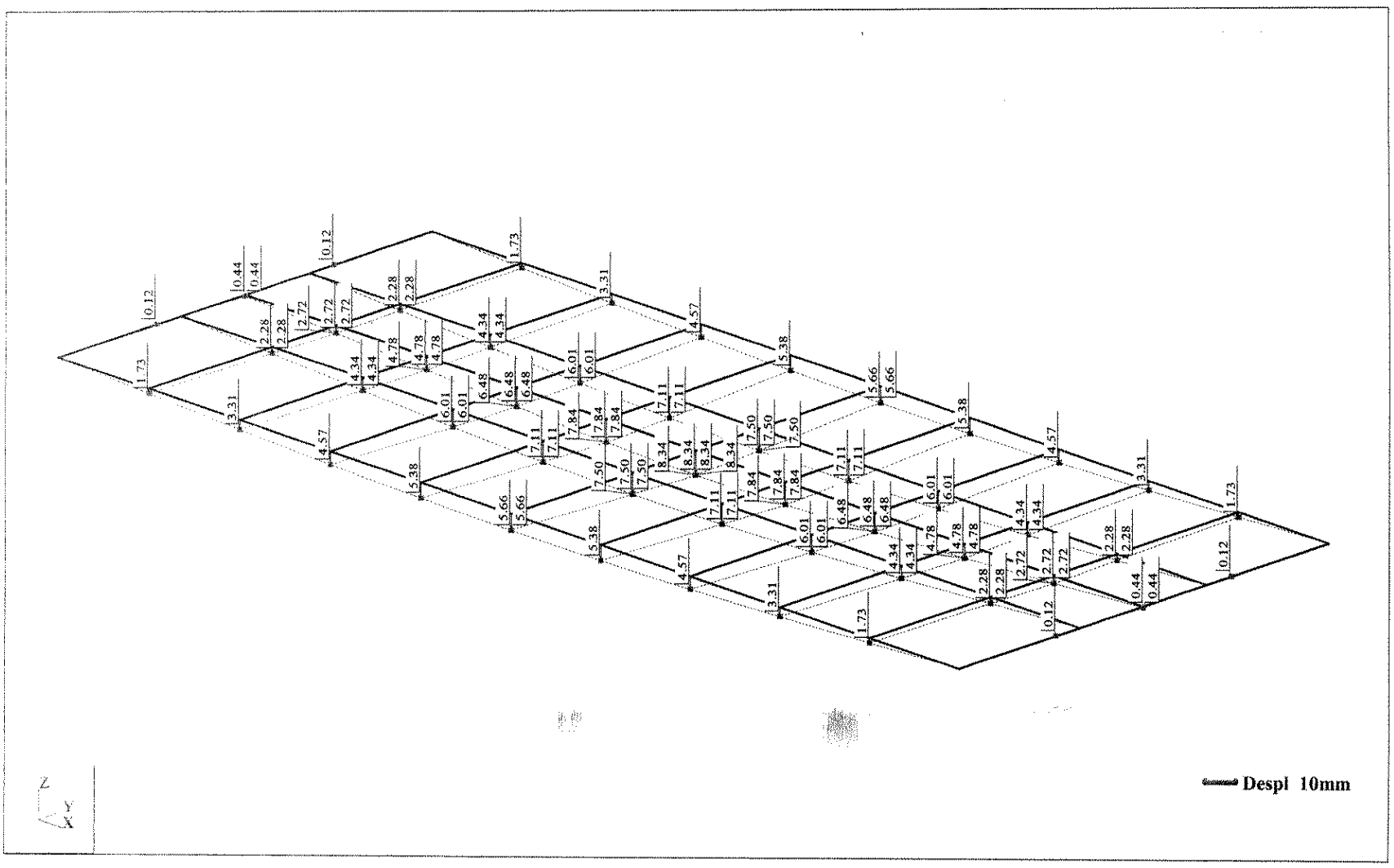
Vista - Def. exacta; casos: 9 (ELS+) 1



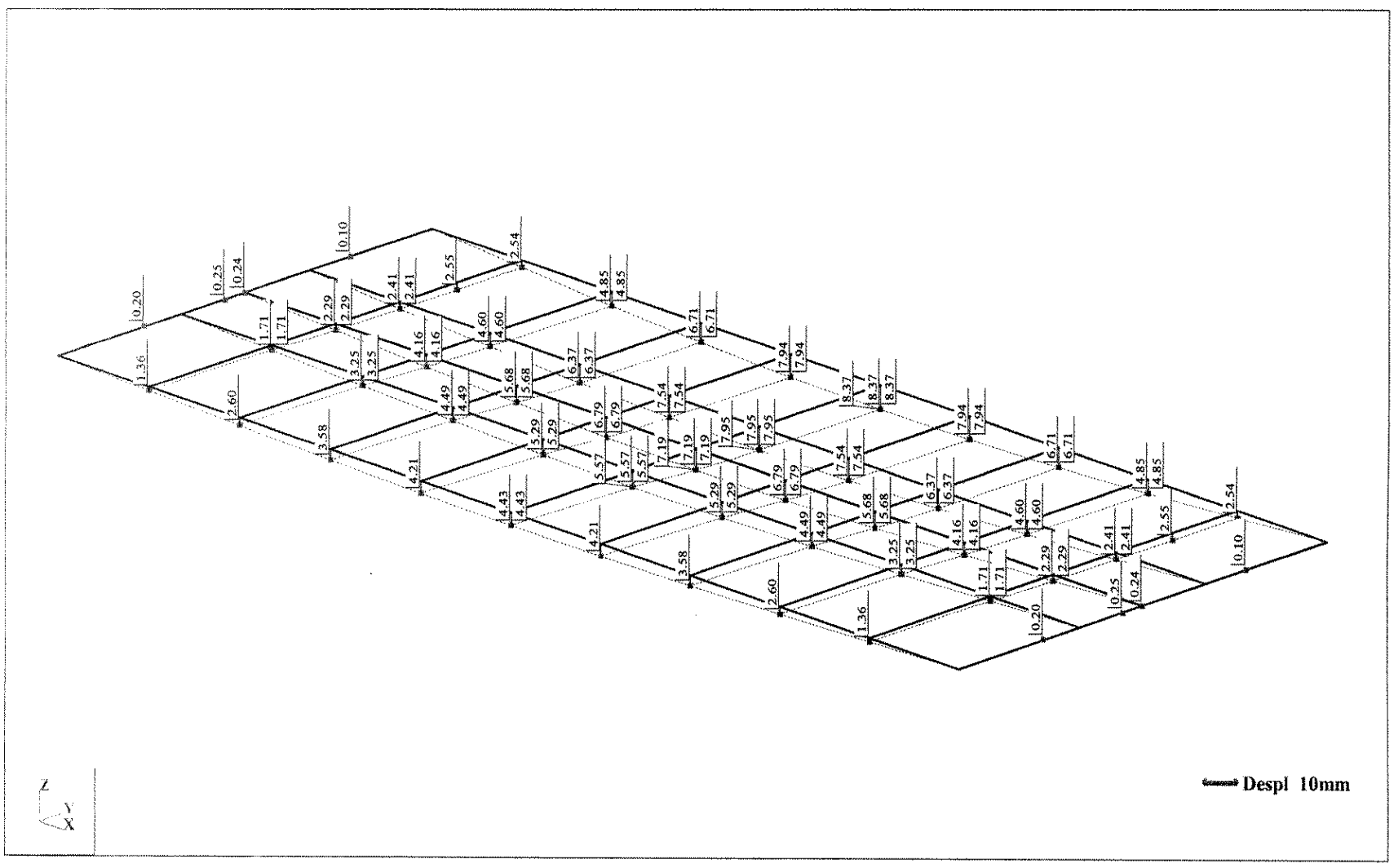
Vista - Def. exacta; casos: 1 (PP+CM) 1



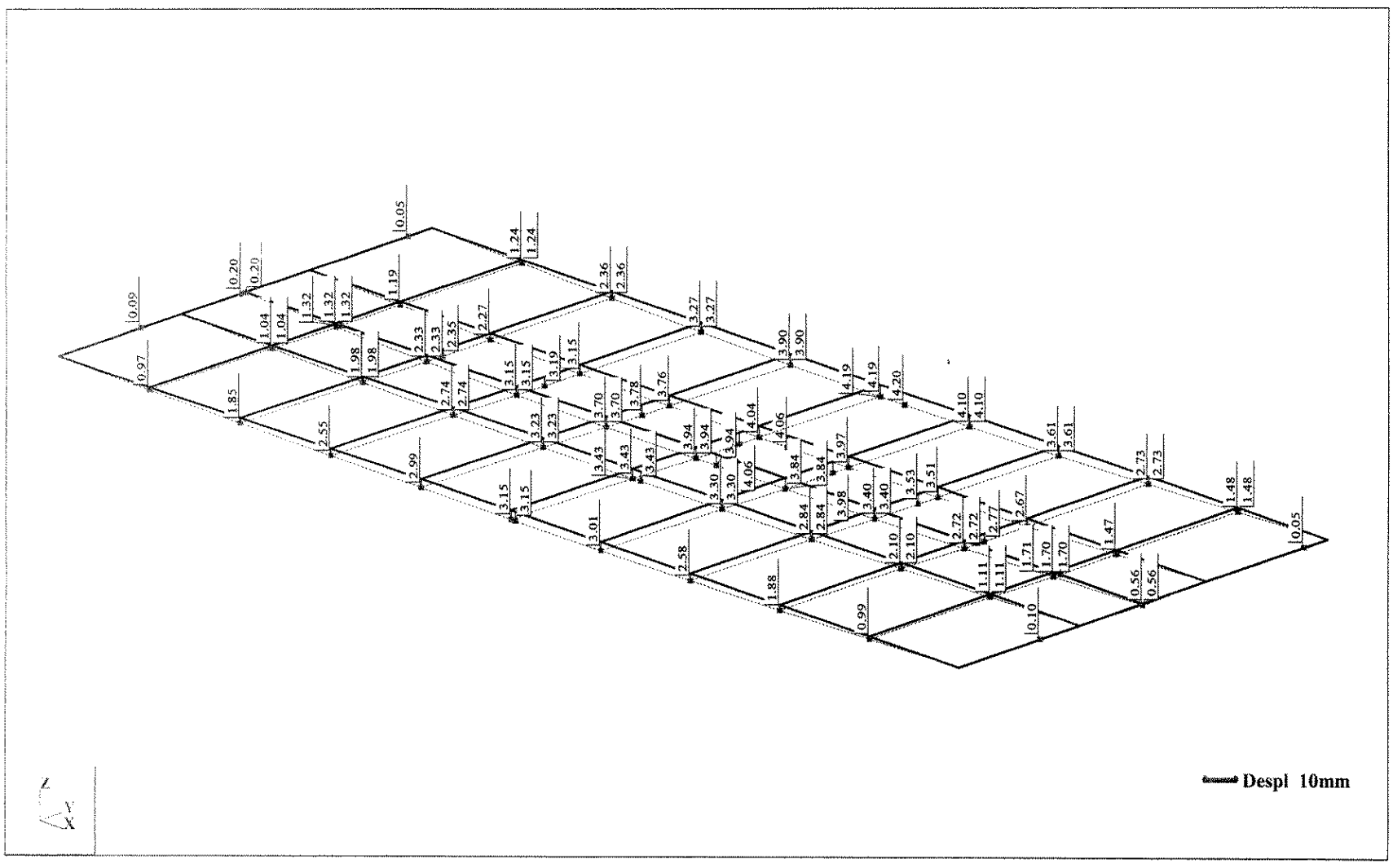
Vista - Def. exacta; casos: 2 (SC+Carro centrado en centro luz)



Vista - Def. exacta; casos: 3 (SC+Carro descentrado en centro luz)



Vista - Def. exacta; casos: 4 (SC+Carro descentrado en apoyos)



Desplazamientos - Caso: 8 (ELS): Valores: 1

- Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A55	1A10
Selección	1A55	8
Número total	55	10
Número seleccionado	55	1

- Caso: 8 (ELS)

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
1/ ELS/ 1	0.0	0.001	0.002	1*1.00
1/ ELS/ 2	0.0	0.000	0.003	1*1.00 + 2*1.00
1/ ELS/ 3	0.0	0.001	0.002	1*1.00 + 3*1.00
1/ ELS/ 4	0.0	0.001	0.002	1*1.00 + 4*1.00
1/ ELS/ 5	0.0	0.000	0.002	1*1.00 + 2*0.80
1/ ELS/ 6	0.0	0.001	0.002	1*1.00 + 3*0.80
1/ ELS/ 7	0.0	0.001	0.002	1*1.00 + 4*0.80
1/ ELS/ 8	0.0	0.000	0.002	1*1.00 + 2*0.50
1/ ELS/ 9	0.0	0.001	0.002	1*1.00 + 3*0.50
1/ ELS/ 10	0.0	0.001	0.002	1*1.00 + 4*0.50
2/ ELS/ 1	0.0	-0.000	0.002	1*1.00
2/ ELS/ 2	0.0	-0.001	0.003	1*1.00 + 2*1.00
2/ ELS/ 3	0.0	-0.001	0.003	1*1.00 + 3*1.00
2/ ELS/ 4	0.0	-0.001	0.002	1*1.00 + 4*1.00
2/ ELS/ 5	0.0	-0.001	0.003	1*1.00 + 2*0.80
2/ ELS/ 6	0.0	-0.001	0.002	1*1.00 + 3*0.80
2/ ELS/ 7	0.0	-0.000	0.002	1*1.00 + 4*0.80
2/ ELS/ 8	0.0	-0.000	0.002	1*1.00 + 2*0.50
2/ ELS/ 9	0.0	-0.001	0.002	1*1.00 + 3*0.50
2/ ELS/ 10	0.0	-0.000	0.002	1*1.00 + 4*0.50
3/ ELS/ 1	-0.32	-0.000	0.002	1*1.00
3/ ELS/ 2	-0.76	-0.000	0.003	1*1.00 + 2*1.00
3/ ELS/ 3	-0.55	0.000	0.003	1*1.00 + 3*1.00
3/ ELS/ 4	-0.52	0.000	0.002	1*1.00 + 4*1.00
3/ ELS/ 5	-0.67	-0.000	0.003	1*1.00 + 2*0.80
3/ ELS/ 6	-0.50	0.000	0.003	1*1.00 + 3*0.80
3/ ELS/ 7	-0.48	0.000	0.002	1*1.00 + 4*0.80
3/ ELS/ 8	-0.54	-0.000	0.002	1*1.00 + 2*0.50
3/ ELS/ 9	-0.43	0.000	0.002	1*1.00 + 3*0.50
3/ ELS/ 10	-0.42	0.000	0.002	1*1.00 + 4*0.50
4/ ELS/ 1	0.0	0.000	0.002	1*1.00
4/ ELS/ 2	0.0	0.001	0.003	1*1.00 + 2*1.00
4/ ELS/ 3	0.0	-0.000	0.003	1*1.00 + 3*1.00
4/ ELS/ 4	0.0	0.000	0.002	1*1.00 + 4*1.00
4/ ELS/ 5	0.0	0.001	0.003	1*1.00 + 2*0.80
4/ ELS/ 6	0.0	0.000	0.003	1*1.00 + 3*0.80
4/ ELS/ 7	0.0	0.000	0.002	1*1.00 + 4*0.80
4/ ELS/ 8	0.0	0.000	0.002	1*1.00 + 2*0.50
4/ ELS/ 9	0.0	0.000	0.002	1*1.00 + 3*0.50
4/ ELS/ 10	0.0	0.000	0.002	1*1.00 + 4*0.50
5/ ELS/ 1	0.0	-0.001	0.002	1*1.00
5/ ELS/ 2	0.0	-0.000	0.003	1*1.00 + 2*1.00
5/ ELS/ 3	0.0	-0.001	0.003	1*1.00 + 3*1.00
5/ ELS/ 4	0.0	-0.001	0.002	1*1.00 + 4*1.00
5/ ELS/ 5	0.0	-0.000	0.002	1*1.00 + 2*0.80
5/ ELS/ 6	0.0	-0.001	0.003	1*1.00 + 3*0.80
5/ ELS/ 7	0.0	-0.001	0.002	1*1.00 + 4*0.80
5/ ELS/ 8	0.0	-0.000	0.002	1*1.00 + 2*0.50
5/ ELS/ 9	0.0	-0.001	0.002	1*1.00 + 3*0.50
5/ ELS/ 10	0.0	-0.001	0.002	1*1.00 + 4*0.50
6/ ELS/ 1	-2.65	0.001	0.002	1*1.00
6/ ELS/ 2	-4.38	0.000	0.002	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
6/ ELS/ 3	-4.02	0.001	0.002	1*1.00 + 3*1.00
6/ ELS/ 4	-3.63	0.001	0.002	1*1.00 + 4*1.00
6/ ELS/ 5	-4.04	0.000	0.002	1*1.00 + 2*0.80
6/ ELS/ 6	-3.74	0.001	0.002	1*1.00 + 3*0.80
6/ ELS/ 7	-3.43	0.001	0.002	1*1.00 + 4*0.80
6/ ELS/ 8	-3.52	0.000	0.002	1*1.00 + 2*0.50
6/ ELS/ 9	-3.33	0.001	0.002	1*1.00 + 3*0.50
6/ ELS/ 10	-3.14	0.001	0.002	1*1.00 + 4*0.50
7/ ELS/ 1	-2.59	-0.000	0.001	1*1.00
7/ ELS/ 2	-4.87	-0.001	0.003	1*1.00 + 2*1.00
7/ ELS/ 3	-4.30	-0.001	0.002	1*1.00 + 3*1.00
7/ ELS/ 4	-3.63	-0.001	0.002	1*1.00 + 4*1.00
7/ ELS/ 5	-4.42	-0.001	0.003	1*1.00 + 2*0.80
7/ ELS/ 6	-3.96	-0.001	0.002	1*1.00 + 3*0.80
7/ ELS/ 7	-3.43	-0.000	0.002	1*1.00 + 4*0.80
7/ ELS/ 8	-3.73	-0.000	0.002	1*1.00 + 2*0.50
7/ ELS/ 9	-3.45	-0.001	0.002	1*1.00 + 3*0.50
7/ ELS/ 10	-3.11	-0.000	0.002	1*1.00 + 4*0.50
8/ ELS/ 1	-2.90	-0.000	0.001	1*1.00
8/ ELS/ 2	-5.62	-0.000	0.003	1*1.00 + 2*1.00
8/ ELS/ 3	-5.19	-0.000	0.003	1*1.00 + 3*1.00
8/ ELS/ 4	-4.22	-0.000	0.002	1*1.00 + 4*1.00
8/ ELS/ 5	-5.08	-0.000	0.003	1*1.00 + 2*0.80
8/ ELS/ 6	-4.73	-0.000	0.002	1*1.00 + 3*0.80
8/ ELS/ 7	-3.96	-0.000	0.002	1*1.00 + 4*0.80
8/ ELS/ 8	-4.26	-0.000	0.002	1*1.00 + 2*0.50
8/ ELS/ 9	-4.05	-0.000	0.002	1*1.00 + 3*0.50
8/ ELS/ 10	-3.56	-0.000	0.002	1*1.00 + 4*0.50
9/ ELS/ 1	-2.59	0.000	0.001	1*1.00
9/ ELS/ 2	-4.87	0.001	0.003	1*1.00 + 2*1.00
9/ ELS/ 3	-5.00	-0.000	0.003	1*1.00 + 3*1.00
9/ ELS/ 4	-3.78	0.000	0.002	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
9/ ELS/ 5	-4.42	0.001	0.003	1*1.00 + 2*0.80
9/ ELS/ 6	-4.52	0.000	0.003	1*1.00 + 3*0.80
9/ ELS/ 7	-3.55	0.000	0.002	1*1.00 + 4*0.80
9/ ELS/ 8	-3.73	0.000	0.002	1*1.00 + 2*0.50
9/ ELS/ 9	-3.80	0.000	0.002	1*1.00 + 3*0.50
9/ ELS/ 10	-3.19	0.000	0.002	1*1.00 + 4*0.50
10/ ELS/ 1	-2.65	-0.001	0.002	1*1.00
10/ ELS/ 2	-4.38	-0.000	0.002	1*1.00 + 2*1.00
10/ ELS/ 3	-5.20	-0.001	0.003	1*1.00 + 3*1.00
10/ ELS/ 4	-3.89	-0.001	0.002	1*1.00 + 4*1.00
10/ ELS/ 5	-4.04	-0.000	0.002	1*1.00 + 2*0.80
10/ ELS/ 6	-4.69	-0.001	0.003	1*1.00 + 3*0.80
10/ ELS/ 7	-3.64	-0.001	0.002	1*1.00 + 4*0.80
10/ ELS/ 8	-3.52	-0.000	0.002	1*1.00 + 2*0.50
10/ ELS/ 9	-3.92	-0.001	0.002	1*1.00 + 3*0.50
10/ ELS/ 10	-3.27	-0.001	0.002	1*1.00 + 4*0.50
11/ ELS/ 1	-5.02	0.001	0.001	1*1.00
11/ ELS/ 2	-8.33	0.000	0.002	1*1.00 + 2*1.00
11/ ELS/ 3	-7.62	0.001	0.002	1*1.00 + 3*1.00
11/ ELS/ 4	-6.87	0.001	0.002	1*1.00 + 4*1.00
11/ ELS/ 5	-7.66	0.000	0.002	1*1.00 + 2*0.80
11/ ELS/ 6	-7.10	0.001	0.002	1*1.00 + 3*0.80
11/ ELS/ 7	-6.50	0.001	0.002	1*1.00 + 4*0.80
11/ ELS/ 8	-6.67	0.000	0.002	1*1.00 + 2*0.50
11/ ELS/ 9	-6.32	0.001	0.002	1*1.00 + 3*0.50
11/ ELS/ 10	-5.94	0.001	0.001	1*1.00 + 4*0.50
12/ ELS/ 1	-4.91	-0.000	0.001	1*1.00
12/ ELS/ 2	-9.25	-0.001	0.002	1*1.00 + 2*1.00
12/ ELS/ 3	-8.16	-0.001	0.002	1*1.00 + 3*1.00
12/ ELS/ 4	-6.89	-0.001	0.002	1*1.00 + 4*1.00
12/ ELS/ 5	-8.38	-0.001	0.002	1*1.00 + 2*0.80
12/ ELS/ 6	-7.51	-0.001	0.002	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
12/ ELS/ 7	-6.50	-0.000	0.002	1*1.00 + 4*0.80
12/ ELS/ 8	-7.08	-0.000	0.002	1*1.00 + 2*0.50
12/ ELS/ 9	-6.54	-0.001	0.002	1*1.00 + 3*0.50
12/ ELS/ 10	-5.90	-0.000	0.001	1*1.00 + 4*0.50
13/ ELS/ 1	-5.22	-0.000	0.001	1*1.00
13/ ELS/ 2	-10.00	-0.000	0.002	1*1.00 + 2*1.00
13/ ELS/ 3	-9.38	-0.001	0.002	1*1.00 + 3*1.00
13/ ELS/ 4	-7.55	-0.000	0.002	1*1.00 + 4*1.00
13/ ELS/ 5	-9.04	-0.000	0.002	1*1.00 + 2*0.80
13/ ELS/ 6	-8.54	-0.000	0.002	1*1.00 + 3*0.80
13/ ELS/ 7	-7.08	-0.000	0.002	1*1.00 + 4*0.80
13/ ELS/ 8	-7.61	-0.000	0.002	1*1.00 + 2*0.50
13/ ELS/ 9	-7.30	-0.000	0.002	1*1.00 + 3*0.50
13/ ELS/ 10	-6.38	-0.000	0.002	1*1.00 + 4*0.50
14/ ELS/ 1	-4.91	0.000	0.001	1*1.00
14/ ELS/ 2	-9.25	0.001	0.002	1*1.00 + 2*1.00
14/ ELS/ 3	-9.50	-0.000	0.002	1*1.00 + 3*1.00
14/ ELS/ 4	-7.18	0.000	0.002	1*1.00 + 4*1.00
14/ ELS/ 5	-8.38	0.001	0.002	1*1.00 + 2*0.80
14/ ELS/ 6	-8.59	0.000	0.002	1*1.00 + 3*0.80
14/ ELS/ 7	-6.73	0.000	0.002	1*1.00 + 4*0.80
14/ ELS/ 8	-7.08	0.000	0.002	1*1.00 + 2*0.50
14/ ELS/ 9	-7.21	0.000	0.002	1*1.00 + 3*0.50
14/ ELS/ 10	-6.05	0.000	0.002	1*1.00 + 4*0.50
15/ ELS/ 1	-5.02	-0.001	0.001	1*1.00
15/ ELS/ 2	-8.33	-0.000	0.002	1*1.00 + 2*1.00
15/ ELS/ 3	-9.87	-0.001	0.003	1*1.00 + 3*1.00
15/ ELS/ 4	-7.38	-0.001	0.002	1*1.00 + 4*1.00
15/ ELS/ 5	-7.66	-0.000	0.002	1*1.00 + 2*0.80
15/ ELS/ 6	-8.90	-0.001	0.002	1*1.00 + 3*0.80
15/ ELS/ 7	-6.91	-0.001	0.002	1*1.00 + 4*0.80
15/ ELS/ 8	-6.67	-0.000	0.002	1*1.00 + 2*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
15/ ELS/ 9	-7.44	-0.001	0.002	1*1.00 + 3*0.50
15/ ELS/ 10	-6.20	-0.001	0.002	1*1.00 + 4*0.50
16/ ELS/ 1	-6.87	0.001	0.001	1*1.00
16/ ELS/ 2	-11.44	0.000	0.002	1*1.00 + 2*1.00
16/ ELS/ 3	-10.45	0.001	0.001	1*1.00 + 3*1.00
16/ ELS/ 4	-9.41	0.001	0.001	1*1.00 + 4*1.00
16/ ELS/ 5	-10.52	0.000	0.001	1*1.00 + 2*0.80
16/ ELS/ 6	-9.74	0.001	0.001	1*1.00 + 3*0.80
16/ ELS/ 7	-8.91	0.001	0.001	1*1.00 + 4*0.80
16/ ELS/ 8	-9.15	0.000	0.001	1*1.00 + 2*0.50
16/ ELS/ 9	-8.66	0.001	0.001	1*1.00 + 3*0.50
16/ ELS/ 10	-8.14	0.001	0.001	1*1.00 + 4*0.50
17/ ELS/ 1	-6.72	-0.000	0.001	1*1.00
17/ ELS/ 2	-12.73	-0.001	0.002	1*1.00 + 2*1.00
17/ ELS/ 3	-11.22	-0.001	0.001	1*1.00 + 3*1.00
17/ ELS/ 4	-9.46	-0.001	0.001	1*1.00 + 4*1.00
17/ ELS/ 5	-11.53	-0.001	0.002	1*1.00 + 2*0.80
17/ ELS/ 6	-10.32	-0.001	0.001	1*1.00 + 3*0.80
17/ ELS/ 7	-8.91	-0.000	0.001	1*1.00 + 4*0.80
17/ ELS/ 8	-9.73	-0.000	0.001	1*1.00 + 2*0.50
17/ ELS/ 9	-8.97	-0.001	0.001	1*1.00 + 3*0.50
17/ ELS/ 10	-8.09	-0.000	0.001	1*1.00 + 4*0.50
18/ ELS/ 1	-7.03	-0.000	0.001	1*1.00
18/ ELS/ 2	-13.52	-0.000	0.002	1*1.00 + 2*1.00
18/ ELS/ 3	-12.71	-0.001	0.002	1*1.00 + 3*1.00
18/ ELS/ 4	-10.18	-0.000	0.001	1*1.00 + 4*1.00
18/ ELS/ 5	-12.22	-0.000	0.002	1*1.00 + 2*0.80
18/ ELS/ 6	-11.58	-0.001	0.001	1*1.00 + 3*0.80
18/ ELS/ 7	-9.55	-0.000	0.001	1*1.00 + 4*0.80
18/ ELS/ 8	-10.28	-0.000	0.001	1*1.00 + 2*0.50
18/ ELS/ 9	-9.87	-0.000	0.001	1*1.00 + 3*0.50
18/ ELS/ 10	-8.61	-0.000	0.001	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
19/ ELS/ 1	-6.72	0.000	0.001	1*1.00
19/ ELS/ 2	-12.73	0.001	0.002	1*1.00 + 2*1.00
19/ ELS/ 3	-13.09	-0.000	0.002	1*1.00 + 3*1.00
19/ ELS/ 4	-9.88	0.000	0.001	1*1.00 + 4*1.00
19/ ELS/ 5	-11.53	0.001	0.002	1*1.00 + 2*0.80
19/ ELS/ 6	-11.82	0.000	0.002	1*1.00 + 3*0.80
19/ ELS/ 7	-9.25	0.000	0.001	1*1.00 + 4*0.80
19/ ELS/ 8	-9.73	0.000	0.001	1*1.00 + 2*0.50
19/ ELS/ 9	-9.91	0.000	0.001	1*1.00 + 3*0.50
19/ ELS/ 10	-8.30	0.000	0.001	1*1.00 + 4*0.50
20/ ELS/ 1	-6.87	-0.001	0.001	1*1.00
20/ ELS/ 2	-11.44	-0.000	0.002	1*1.00 + 2*1.00
20/ ELS/ 3	-13.58	-0.001	0.002	1*1.00 + 3*1.00
20/ ELS/ 4	-10.14	-0.001	0.001	1*1.00 + 4*1.00
20/ ELS/ 5	-10.52	-0.000	0.001	1*1.00 + 2*0.80
20/ ELS/ 6	-12.24	-0.001	0.002	1*1.00 + 3*0.80
20/ ELS/ 7	-9.49	-0.001	0.001	1*1.00 + 4*0.80
20/ ELS/ 8	-9.15	-0.000	0.001	1*1.00 + 2*0.50
20/ ELS/ 9	-10.23	-0.001	0.001	1*1.00 + 3*0.50
20/ ELS/ 10	-8.51	-0.001	0.001	1*1.00 + 4*0.50
21/ ELS/ 1	-8.04	0.001	0.000	1*1.00
21/ ELS/ 2	-13.43	0.000	0.001	1*1.00 + 2*1.00
21/ ELS/ 3	-12.26	0.001	0.001	1*1.00 + 3*1.00
21/ ELS/ 4	-11.04	0.001	0.001	1*1.00 + 4*1.00
21/ ELS/ 5	-12.35	0.000	0.001	1*1.00 + 2*0.80
21/ ELS/ 6	-11.42	0.001	0.001	1*1.00 + 3*0.80
21/ ELS/ 7	-10.44	0.001	0.001	1*1.00 + 4*0.80
21/ ELS/ 8	-10.74	0.000	0.001	1*1.00 + 2*0.50
21/ ELS/ 9	-10.15	0.001	0.001	1*1.00 + 3*0.50
21/ ELS/ 10	-9.54	0.001	0.001	1*1.00 + 4*0.50
22/ ELS/ 1	-7.88	-0.000	0.000	1*1.00
22/ ELS/ 2	-14.99	-0.001	0.001	1*1.00 + 2*1.00
22/ ELS/ 3	-13.17	-0.001	0.001	1*1.00 + 3*1.00
22/ ELS/ 4	-11.11	-0.001	0.001	1*1.00 + 4*1.00
22/ ELS/ 5	-13.57	-0.001	0.001	1*1.00 + 2*0.80
22/ ELS/ 6	-12.11	-0.001	0.001	1*1.00 + 3*0.80
22/ ELS/ 7	-10.46	-0.000	0.001	1*1.00 + 4*0.80
22/ ELS/ 8	-11.43	-0.001	0.001	1*1.00 + 2*0.50
22/ ELS/ 9	-10.52	-0.001	0.001	1*1.00 + 3*0.50
22/ ELS/ 10	-9.49	-0.000	0.001	1*1.00 + 4*0.50
23/ ELS/ 1	-8.19	-0.000	0.000	1*1.00
23/ ELS/ 2	-16.02	-0.000	0.001	1*1.00 + 2*1.00
23/ ELS/ 3	-14.98	-0.001	0.001	1*1.00 + 3*1.00
23/ ELS/ 4	-11.88	-0.000	0.001	1*1.00 + 4*1.00
23/ ELS/ 5	-14.46	-0.000	0.001	1*1.00 + 2*0.80
23/ ELS/ 6	-13.62	-0.001	0.001	1*1.00 + 3*0.80
23/ ELS/ 7	-11.15	-0.000	0.001	1*1.00 + 4*0.80
23/ ELS/ 8	-12.11	-0.000	0.001	1*1.00 + 2*0.50
23/ ELS/ 9	-11.58	-0.001	0.001	1*1.00 + 3*0.50
23/ ELS/ 10	-10.04	-0.000	0.001	1*1.00 + 4*0.50
24/ ELS/ 1	-7.88	0.000	0.000	1*1.00
24/ ELS/ 2	-14.99	0.001	0.001	1*1.00 + 2*1.00
24/ ELS/ 3	-15.42	-0.000	0.001	1*1.00 + 3*1.00
24/ ELS/ 4	-11.64	0.000	0.001	1*1.00 + 4*1.00
24/ ELS/ 5	-13.57	0.001	0.001	1*1.00 + 2*0.80
24/ ELS/ 6	-13.91	0.000	0.001	1*1.00 + 3*0.80
24/ ELS/ 7	-10.89	0.000	0.001	1*1.00 + 4*0.80
24/ ELS/ 8	-11.43	0.001	0.001	1*1.00 + 2*0.50
24/ ELS/ 9	-11.65	0.000	0.001	1*1.00 + 3*0.50
24/ ELS/ 10	-9.76	0.000	0.001	1*1.00 + 4*0.50
25/ ELS/ 1	-8.04	-0.001	0.000	1*1.00
25/ ELS/ 2	-13.43	-0.000	0.001	1*1.00 + 2*1.00
25/ ELS/ 3	-15.98	-0.001	0.001	1*1.00 + 3*1.00
25/ ELS/ 4	-11.95	-0.001	0.001	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
25/ ELS/ 5	-12.35	-0.000	0.001	1*1.00 + 2*0.80
25/ ELS/ 6	-14.40	-0.001	0.001	1*1.00 + 3*0.80
25/ ELS/ 7	-11.17	-0.001	0.001	1*1.00 + 4*0.80
25/ ELS/ 8	-10.74	-0.000	0.001	1*1.00 + 2*0.50
25/ ELS/ 9	-12.01	-0.001	0.001	1*1.00 + 3*0.50
25/ ELS/ 10	-10.00	-0.001	0.001	1*1.00 + 4*0.50
26/ ELS/ 1	-8.45	0.001	-0.000	1*1.00
26/ ELS/ 2	-14.11	0.000	-0.000	1*1.00 + 2*1.00
26/ ELS/ 3	-12.88	0.001	-0.000	1*1.00 + 3*1.00
26/ ELS/ 4	-11.60	0.001	0.000	1*1.00 + 4*1.00
26/ ELS/ 5	-12.98	0.000	-0.000	1*1.00 + 2*0.80
26/ ELS/ 6	-11.99	0.001	-0.000	1*1.00 + 3*0.80
26/ ELS/ 7	-10.97	0.001	0.000	1*1.00 + 4*0.80
26/ ELS/ 8	-11.28	0.000	-0.000	1*1.00 + 2*0.50
26/ ELS/ 9	-10.66	0.001	-0.000	1*1.00 + 3*0.50
26/ ELS/ 10	-10.02	0.001	0.000	1*1.00 + 4*0.50
27/ ELS/ 1	-8.27	-0.000	0.000	1*1.00
27/ ELS/ 2	-15.77	-0.001	0.000	1*1.00 + 2*1.00
27/ ELS/ 3	-13.84	-0.001	0.000	1*1.00 + 3*1.00
27/ ELS/ 4	-11.70	-0.001	0.000	1*1.00 + 4*1.00
27/ ELS/ 5	-14.27	-0.001	0.000	1*1.00 + 2*0.80
27/ ELS/ 6	-12.73	-0.001	0.000	1*1.00 + 3*0.80
27/ ELS/ 7	-11.01	-0.000	0.000	1*1.00 + 4*0.80
27/ ELS/ 8	-12.02	-0.001	0.000	1*1.00 + 2*0.50
27/ ELS/ 9	-11.06	-0.001	0.000	1*1.00 + 3*0.50
27/ ELS/ 10	-9.99	-0.000	0.000	1*1.00 + 4*0.50
28/ ELS/ 1	-8.58	-0.000	0.000	1*1.00
28/ ELS/ 2	-16.92	-0.000	0.000	1*1.00 + 2*1.00
28/ ELS/ 3	-15.77	-0.001	0.000	1*1.00 + 3*1.00
28/ ELS/ 4	-12.52	-0.000	0.000	1*1.00 + 4*1.00
28/ ELS/ 5	-15.25	-0.000	0.000	1*1.00 + 2*0.80
28/ ELS/ 6	-14.34	-0.001	0.000	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
28/ ELS/ 7	-11.73	-0.000	0.000	1*1.00 + 4*0.80
28/ ELS/ 8	-12.75	-0.000	0.000	1*1.00 + 2*0.50
28/ ELS/ 9	-12.18	-0.001	0.000	1*1.00 + 3*0.50
28/ ELS/ 10	-10.55	-0.000	0.000	1*1.00 + 4*0.50
29/ ELS/ 1	-8.27	0.000	0.000	1*1.00
29/ ELS/ 2	-15.77	0.001	0.000	1*1.00 + 2*1.00
29/ ELS/ 3	-16.23	-0.000	0.000	1*1.00 + 3*1.00
29/ ELS/ 4	-12.32	0.000	0.000	1*1.00 + 4*1.00
29/ ELS/ 5	-14.27	0.001	0.000	1*1.00 + 2*0.80
29/ ELS/ 6	-14.64	0.000	0.000	1*1.00 + 3*0.80
29/ ELS/ 7	-11.51	0.000	0.000	1*1.00 + 4*0.80
29/ ELS/ 8	-12.02	0.001	0.000	1*1.00 + 2*0.50
29/ ELS/ 9	-12.25	0.000	0.000	1*1.00 + 3*0.50
29/ ELS/ 10	-10.29	0.000	0.000	1*1.00 + 4*0.50
30/ ELS/ 1	-8.45	-0.001	-0.000	1*1.00
30/ ELS/ 2	-14.11	-0.000	-0.000	1*1.00 + 2*1.00
30/ ELS/ 3	-16.82	-0.001	-0.000	1*1.00 + 3*1.00
30/ ELS/ 4	-12.64	-0.001	0.000	1*1.00 + 4*1.00
30/ ELS/ 5	-12.98	-0.000	-0.000	1*1.00 + 2*0.80
30/ ELS/ 6	-15.14	-0.001	-0.000	1*1.00 + 3*0.80
30/ ELS/ 7	-11.80	-0.001	0.000	1*1.00 + 4*0.80
30/ ELS/ 8	-11.28	-0.000	-0.000	1*1.00 + 2*0.50
30/ ELS/ 9	-12.63	-0.001	-0.000	1*1.00 + 3*0.50
30/ ELS/ 10	-10.54	-0.001	0.000	1*1.00 + 4*0.50
31/ ELS/ 1	-8.04	0.001	-0.000	1*1.00
31/ ELS/ 2	-13.43	0.000	-0.001	1*1.00 + 2*1.00
31/ ELS/ 3	-12.26	0.001	-0.001	1*1.00 + 3*1.00
31/ ELS/ 4	-11.06	0.001	-0.001	1*1.00 + 4*1.00
31/ ELS/ 5	-12.35	0.000	-0.001	1*1.00 + 2*0.80
31/ ELS/ 6	-11.42	0.001	-0.001	1*1.00 + 3*0.80
31/ ELS/ 7	-10.45	0.001	-0.001	1*1.00 + 4*0.80
31/ ELS/ 8	-10.74	0.000	-0.001	1*1.00 + 2*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
31/ ELS/ 9	-10.15	0.001	-0.001	1*1.00 + 3*0.50
31/ ELS/ 10	-9.55	0.001	-0.001	1*1.00 + 4*0.50
32/ ELS/ 1	-7.88	-0.000	-0.000	1*1.00
32/ ELS/ 2	-14.99	-0.001	-0.001	1*1.00 + 2*1.00
32/ ELS/ 3	-13.17	-0.001	-0.001	1*1.00 + 3*1.00
32/ ELS/ 4	-11.17	-0.001	-0.001	1*1.00 + 4*1.00
32/ ELS/ 5	-13.57	-0.001	-0.001	1*1.00 + 2*0.80
32/ ELS/ 6	-12.11	-0.001	-0.001	1*1.00 + 3*0.80
32/ ELS/ 7	-10.51	-0.000	-0.001	1*1.00 + 4*0.80
32/ ELS/ 8	-11.43	-0.001	-0.001	1*1.00 + 2*0.50
32/ ELS/ 9	-10.52	-0.001	-0.001	1*1.00 + 3*0.50
32/ ELS/ 10	-9.53	-0.000	-0.001	1*1.00 + 4*0.50
33/ ELS/ 1	-8.19	-0.000	-0.000	1*1.00
33/ ELS/ 2	-16.02	-0.000	-0.001	1*1.00 + 2*1.00
33/ ELS/ 3	-14.98	-0.001	-0.001	1*1.00 + 3*1.00
33/ ELS/ 4	-12.02	-0.000	-0.001	1*1.00 + 4*1.00
33/ ELS/ 5	-14.46	-0.000	-0.001	1*1.00 + 2*0.80
33/ ELS/ 6	-13.62	-0.001	-0.001	1*1.00 + 3*0.80
33/ ELS/ 7	-11.26	-0.000	-0.001	1*1.00 + 4*0.80
33/ ELS/ 8	-12.11	-0.000	-0.001	1*1.00 + 2*0.50
33/ ELS/ 9	-11.58	-0.001	-0.001	1*1.00 + 3*0.50
33/ ELS/ 10	-10.11	-0.000	-0.001	1*1.00 + 4*0.50
34/ ELS/ 1	-7.88	0.000	-0.000	1*1.00
34/ ELS/ 2	-14.99	0.001	-0.001	1*1.00 + 2*1.00
34/ ELS/ 3	-15.42	-0.000	-0.001	1*1.00 + 3*1.00
34/ ELS/ 4	-11.84	0.000	-0.001	1*1.00 + 4*1.00
34/ ELS/ 5	-13.57	0.001	-0.001	1*1.00 + 2*0.80
34/ ELS/ 6	-13.91	0.000	-0.001	1*1.00 + 3*0.80
34/ ELS/ 7	-11.05	0.000	-0.001	1*1.00 + 4*0.80
34/ ELS/ 8	-11.43	0.001	-0.001	1*1.00 + 2*0.50
34/ ELS/ 9	-11.65	0.000	-0.001	1*1.00 + 3*0.50
34/ ELS/ 10	-9.86	0.000	-0.001	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
35/ ELS/ 1	-8.04	-0.001	-0.000	1*1.00
35/ ELS/ 2	-13.43	-0.000	-0.001	1*1.00 + 2*1.00
35/ ELS/ 3	-15.98	-0.001	-0.001	1*1.00 + 3*1.00
35/ ELS/ 4	-12.14	-0.001	-0.001	1*1.00 + 4*1.00
35/ ELS/ 5	-12.35	-0.000	-0.001	1*1.00 + 2*0.80
35/ ELS/ 6	-14.40	-0.001	-0.001	1*1.00 + 3*0.80
35/ ELS/ 7	-11.32	-0.001	-0.001	1*1.00 + 4*0.80
35/ ELS/ 8	-10.74	-0.000	-0.001	1*1.00 + 2*0.50
35/ ELS/ 9	-12.01	-0.001	-0.001	1*1.00 + 3*0.50
35/ ELS/ 10	-10.09	-0.001	-0.001	1*1.00 + 4*0.50
36/ ELS/ 1	-6.87	0.001	-0.001	1*1.00
36/ ELS/ 2	-11.44	0.000	-0.002	1*1.00 + 2*1.00
36/ ELS/ 3	-10.45	0.001	-0.001	1*1.00 + 3*1.00
36/ ELS/ 4	-9.45	0.001	-0.001	1*1.00 + 4*1.00
36/ ELS/ 5	-10.52	0.000	-0.001	1*1.00 + 2*0.80
36/ ELS/ 6	-9.74	0.001	-0.001	1*1.00 + 3*0.80
36/ ELS/ 7	-8.93	0.001	-0.001	1*1.00 + 4*0.80
36/ ELS/ 8	-9.15	0.000	-0.001	1*1.00 + 2*0.50
36/ ELS/ 9	-8.66	0.001	-0.001	1*1.00 + 3*0.50
36/ ELS/ 10	-8.16	0.001	-0.001	1*1.00 + 4*0.50
37/ ELS/ 1	-6.72	-0.000	-0.001	1*1.00
37/ ELS/ 2	-12.73	-0.001	-0.002	1*1.00 + 2*1.00
37/ ELS/ 3	-11.22	-0.001	-0.001	1*1.00 + 3*1.00
37/ ELS/ 4	-9.57	-0.001	-0.001	1*1.00 + 4*1.00
37/ ELS/ 5	-11.53	-0.001	-0.002	1*1.00 + 2*0.80
37/ ELS/ 6	-10.32	-0.001	-0.001	1*1.00 + 3*0.80
37/ ELS/ 7	-9.00	-0.000	-0.001	1*1.00 + 4*0.80
37/ ELS/ 8	-9.73	-0.000	-0.001	1*1.00 + 2*0.50
37/ ELS/ 9	-8.97	-0.001	-0.001	1*1.00 + 3*0.50
37/ ELS/ 10	-8.15	-0.000	-0.001	1*1.00 + 4*0.50
38/ ELS/ 1	-7.03	-0.000	-0.001	1*1.00
38/ ELS/ 2	-13.52	-0.000	-0.002	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
38/ ELS/ 3	-12.71	-0.001	-0.002	1*1.00 + 3*1.00
38/ ELS/ 4	-10.43	-0.000	-0.001	1*1.00 + 4*1.00
38/ ELS/ 5	-12.22	-0.000	-0.002	1*1.00 + 2*0.80
38/ ELS/ 6	-11.58	-0.001	-0.001	1*1.00 + 3*0.80
38/ ELS/ 7	-9.75	-0.000	-0.001	1*1.00 + 4*0.80
38/ ELS/ 8	-10.28	-0.000	-0.001	1*1.00 + 2*0.50
38/ ELS/ 9	-9.87	-0.000	-0.001	1*1.00 + 3*0.50
38/ ELS/ 10	-8.73	-0.000	-0.001	1*1.00 + 4*0.50
39/ ELS/ 1	-6.72	0.000	-0.001	1*1.00
39/ ELS/ 2	-12.73	0.001	-0.002	1*1.00 + 2*1.00
39/ ELS/ 3	-13.09	-0.000	-0.002	1*1.00 + 3*1.00
39/ ELS/ 4	-10.24	0.000	-0.001	1*1.00 + 4*1.00
39/ ELS/ 5	-11.53	0.001	-0.002	1*1.00 + 2*0.80
39/ ELS/ 6	-11.82	0.000	-0.002	1*1.00 + 3*0.80
39/ ELS/ 7	-9.53	0.000	-0.001	1*1.00 + 4*0.80
39/ ELS/ 8	-9.73	0.000	-0.001	1*1.00 + 2*0.50
39/ ELS/ 9	-9.91	0.000	-0.001	1*1.00 + 3*0.50
39/ ELS/ 10	-8.48	0.000	-0.001	1*1.00 + 4*0.50
40/ ELS/ 1	-6.87	-0.001	-0.001	1*1.00
40/ ELS/ 2	-11.44	-0.000	-0.002	1*1.00 + 2*1.00
40/ ELS/ 3	-13.58	-0.001	-0.002	1*1.00 + 3*1.00
40/ ELS/ 4	-10.48	-0.001	-0.001	1*1.00 + 4*1.00
40/ ELS/ 5	-10.52	-0.000	-0.001	1*1.00 + 2*0.80
40/ ELS/ 6	-12.24	-0.001	-0.002	1*1.00 + 3*0.80
40/ ELS/ 7	-9.76	-0.001	-0.001	1*1.00 + 4*0.80
40/ ELS/ 8	-9.15	-0.000	-0.001	1*1.00 + 2*0.50
40/ ELS/ 9	-10.23	-0.001	-0.001	1*1.00 + 3*0.50
40/ ELS/ 10	-8.67	-0.001	-0.001	1*1.00 + 4*0.50
41/ ELS/ 1	-5.02	0.001	-0.001	1*1.00
41/ ELS/ 2	-8.33	0.000	-0.002	1*1.00 + 2*1.00
41/ ELS/ 3	-7.62	0.001	-0.002	1*1.00 + 3*1.00
41/ ELS/ 4	-6.90	0.001	-0.002	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
41/ ELS/ 5	-7.66	0.000	-0.002	1*1.00 + 2*0.80
41/ ELS/ 6	-7.10	0.001	-0.002	1*1.00 + 3*0.80
41/ ELS/ 7	-6.52	0.001	-0.002	1*1.00 + 4*0.80
41/ ELS/ 8	-6.67	0.000	-0.002	1*1.00 + 2*0.50
41/ ELS/ 9	-6.32	0.001	-0.002	1*1.00 + 3*0.50
41/ ELS/ 10	-5.96	0.001	-0.001	1*1.00 + 4*0.50
42/ ELS/ 1	-4.91	-0.000	-0.001	1*1.00
42/ ELS/ 2	-9.25	-0.001	-0.002	1*1.00 + 2*1.00
42/ ELS/ 3	-8.16	-0.001	-0.002	1*1.00 + 3*1.00
42/ ELS/ 4	-7.00	-0.001	-0.002	1*1.00 + 4*1.00
42/ ELS/ 5	-8.38	-0.001	-0.002	1*1.00 + 2*0.80
42/ ELS/ 6	-7.51	-0.001	-0.002	1*1.00 + 3*0.80
42/ ELS/ 7	-6.58	-0.000	-0.002	1*1.00 + 4*0.80
42/ ELS/ 8	-7.08	-0.000	-0.002	1*1.00 + 2*0.50
42/ ELS/ 9	-6.54	-0.001	-0.002	1*1.00 + 3*0.50
42/ ELS/ 10	-5.96	-0.000	-0.001	1*1.00 + 4*0.50
43/ ELS/ 1	-5.22	-0.000	-0.001	1*1.00
43/ ELS/ 2	-10.00	-0.000	-0.002	1*1.00 + 2*1.00
43/ ELS/ 3	-9.38	-0.001	-0.002	1*1.00 + 3*1.00
43/ ELS/ 4	-7.94	-0.000	-0.002	1*1.00 + 4*1.00
43/ ELS/ 5	-9.04	-0.000	-0.002	1*1.00 + 2*0.80
43/ ELS/ 6	-8.54	-0.000	-0.002	1*1.00 + 3*0.80
43/ ELS/ 7	-7.39	-0.000	-0.002	1*1.00 + 4*0.80
43/ ELS/ 8	-7.61	-0.000	-0.002	1*1.00 + 2*0.50
43/ ELS/ 9	-7.30	-0.000	-0.002	1*1.00 + 3*0.50
43/ ELS/ 10	-6.58	-0.000	-0.002	1*1.00 + 4*0.50
44/ ELS/ 1	-4.91	0.000	-0.001	1*1.00
44/ ELS/ 2	-9.25	0.001	-0.002	1*1.00 + 2*1.00
44/ ELS/ 3	-9.50	-0.000	-0.002	1*1.00 + 3*1.00
44/ ELS/ 4	-7.58	0.000	-0.002	1*1.00 + 4*1.00
44/ ELS/ 5	-8.38	0.001	-0.002	1*1.00 + 2*0.80
44/ ELS/ 6	-8.59	0.000	-0.002	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
44/ ELS/ 7	-7.05	0.000	-0.002	1*1.00 + 4*0.80
44/ ELS/ 8	-7.08	0.000	-0.002	1*1.00 + 2*0.50
44/ ELS/ 9	-7.21	0.000	-0.002	1*1.00 + 3*0.50
44/ ELS/ 10	-6.25	0.000	-0.002	1*1.00 + 4*0.50
45/ ELS/ 1	-5.02	-0.001	-0.001	1*1.00
45/ ELS/ 2	-8.33	-0.000	-0.002	1*1.00 + 2*1.00
45/ ELS/ 3	-9.87	-0.001	-0.003	1*1.00 + 3*1.00
45/ ELS/ 4	-7.75	-0.001	-0.002	1*1.00 + 4*1.00
45/ ELS/ 5	-7.66	-0.000	-0.002	1*1.00 + 2*0.80
45/ ELS/ 6	-8.90	-0.001	-0.002	1*1.00 + 3*0.80
45/ ELS/ 7	-7.20	-0.001	-0.002	1*1.00 + 4*0.80
45/ ELS/ 8	-6.67	-0.000	-0.002	1*1.00 + 2*0.50
45/ ELS/ 9	-7.44	-0.001	-0.002	1*1.00 + 3*0.50
45/ ELS/ 10	-6.38	-0.001	-0.002	1*1.00 + 4*0.50
46/ ELS/ 1	-2.65	0.001	-0.002	1*1.00
46/ ELS/ 2	-4.38	0.000	-0.002	1*1.00 + 2*1.00
46/ ELS/ 3	-4.02	0.001	-0.002	1*1.00 + 3*1.00
46/ ELS/ 4	-3.65	0.001	-0.002	1*1.00 + 4*1.00
46/ ELS/ 5	-4.04	0.000	-0.002	1*1.00 + 2*0.80
46/ ELS/ 6	-3.74	0.001	-0.002	1*1.00 + 3*0.80
46/ ELS/ 7	-3.45	0.001	-0.002	1*1.00 + 4*0.80
46/ ELS/ 8	-3.52	0.000	-0.002	1*1.00 + 2*0.50
46/ ELS/ 9	-3.33	0.001	-0.002	1*1.00 + 3*0.50
46/ ELS/ 10	-3.15	0.001	-0.002	1*1.00 + 4*0.50
47/ ELS/ 1	-2.59	-0.000	-0.001	1*1.00
47/ ELS/ 2	-4.87	-0.001	-0.003	1*1.00 + 2*1.00
47/ ELS/ 3	-4.30	-0.001	-0.002	1*1.00 + 3*1.00
47/ ELS/ 4	-3.70	-0.001	-0.002	1*1.00 + 4*1.00
47/ ELS/ 5	-4.42	-0.001	-0.003	1*1.00 + 2*0.80
47/ ELS/ 6	-3.96	-0.001	-0.002	1*1.00 + 3*0.80
47/ ELS/ 7	-3.48	-0.000	-0.002	1*1.00 + 4*0.80
47/ ELS/ 8	-3.73	-0.000	-0.002	1*1.00 + 2*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
47/ ELS/ 9	-3.45	-0.001	-0.002	1*1.00 + 3*0.50
47/ ELS/ 10	-3.15	-0.000	-0.002	1*1.00 + 4*0.50
48/ ELS/ 1	-2.90	-0.000	-0.001	1*1.00
48/ ELS/ 2	-5.62	-0.000	-0.003	1*1.00 + 2*1.00
48/ ELS/ 3	-5.19	-0.000	-0.003	1*1.00 + 3*1.00
48/ ELS/ 4	-4.60	-0.000	-0.002	1*1.00 + 4*1.00
48/ ELS/ 5	-5.08	-0.000	-0.003	1*1.00 + 2*0.80
48/ ELS/ 6	-4.73	-0.000	-0.002	1*1.00 + 3*0.80
48/ ELS/ 7	-4.26	-0.000	-0.002	1*1.00 + 4*0.80
48/ ELS/ 8	-4.26	-0.000	-0.002	1*1.00 + 2*0.50
48/ ELS/ 9	-4.05	-0.000	-0.002	1*1.00 + 3*0.50
48/ ELS/ 10	-3.75	-0.000	-0.002	1*1.00 + 4*0.50
49/ ELS/ 1	-2.59	0.000	-0.001	1*1.00
49/ ELS/ 2	-4.87	0.001	-0.003	1*1.00 + 2*1.00
49/ ELS/ 3	-5.00	-0.000	-0.003	1*1.00 + 3*1.00
49/ ELS/ 4	-4.06	0.000	-0.002	1*1.00 + 4*1.00
49/ ELS/ 5	-4.42	0.001	-0.003	1*1.00 + 2*0.80
49/ ELS/ 6	-4.52	0.000	-0.003	1*1.00 + 3*0.80
49/ ELS/ 7	-3.76	0.000	-0.002	1*1.00 + 4*0.80
49/ ELS/ 8	-3.73	0.000	-0.002	1*1.00 + 2*0.50
49/ ELS/ 9	-3.80	0.000	-0.002	1*1.00 + 3*0.50
49/ ELS/ 10	-3.33	0.000	-0.002	1*1.00 + 4*0.50
50/ ELS/ 1	-2.65	-0.001	-0.002	1*1.00
50/ ELS/ 2	-4.38	-0.000	-0.002	1*1.00 + 2*1.00
50/ ELS/ 3	-5.20	-0.001	-0.003	1*1.00 + 3*1.00
50/ ELS/ 4	-4.13	-0.001	-0.002	1*1.00 + 4*1.00
50/ ELS/ 5	-4.04	-0.000	-0.002	1*1.00 + 2*0.80
50/ ELS/ 6	-4.69	-0.001	-0.003	1*1.00 + 3*0.80
50/ ELS/ 7	-3.84	-0.001	-0.002	1*1.00 + 4*0.80
50/ ELS/ 8	-3.52	-0.000	-0.002	1*1.00 + 2*0.50
50/ ELS/ 9	-3.92	-0.001	-0.002	1*1.00 + 3*0.50
50/ ELS/ 10	-3.39	-0.001	-0.002	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
51/ ELS/ 1	0.0	0.001	-0.002	1*1.00
51/ ELS/ 2	0.0	0.000	-0.003	1*1.00 + 2*1.00
51/ ELS/ 3	0.0	0.001	-0.002	1*1.00 + 3*1.00
51/ ELS/ 4	0.0	0.001	-0.002	1*1.00 + 4*1.00
51/ ELS/ 5	0.0	0.000	-0.002	1*1.00 + 2*0.80
51/ ELS/ 6	0.0	0.001	-0.002	1*1.00 + 3*0.80
51/ ELS/ 7	0.0	0.001	-0.002	1*1.00 + 4*0.80
51/ ELS/ 8	0.0	0.000	-0.002	1*1.00 + 2*0.50
51/ ELS/ 9	0.0	0.001	-0.002	1*1.00 + 3*0.50
51/ ELS/ 10	0.0	0.001	-0.002	1*1.00 + 4*0.50
52/ ELS/ 1	0.0	-0.000	-0.002	1*1.00
52/ ELS/ 2	0.0	-0.001	-0.003	1*1.00 + 2*1.00
52/ ELS/ 3	0.0	-0.001	-0.003	1*1.00 + 3*1.00
52/ ELS/ 4	0.0	-0.001	-0.002	1*1.00 + 4*1.00
52/ ELS/ 5	0.0	-0.001	-0.003	1*1.00 + 2*0.80
52/ ELS/ 6	0.0	-0.001	-0.002	1*1.00 + 3*0.80
52/ ELS/ 7	0.0	-0.000	-0.002	1*1.00 + 4*0.80
52/ ELS/ 8	0.0	-0.000	-0.002	1*1.00 + 2*0.50
52/ ELS/ 9	0.0	-0.001	-0.002	1*1.00 + 3*0.50
52/ ELS/ 10	0.0	-0.000	-0.002	1*1.00 + 4*0.50
53/ ELS/ 1	-0.32	-0.000	-0.002	1*1.00
53/ ELS/ 2	-0.76	-0.000	-0.003	1*1.00 + 2*1.00
53/ ELS/ 3	-0.55	0.000	-0.003	1*1.00 + 3*1.00
53/ ELS/ 4	-0.88	-0.000	-0.002	1*1.00 + 4*1.00
53/ ELS/ 5	-0.67	-0.000	-0.003	1*1.00 + 2*0.80
53/ ELS/ 6	-0.50	0.000	-0.003	1*1.00 + 3*0.80
53/ ELS/ 7	-0.76	-0.000	-0.002	1*1.00 + 4*0.80
53/ ELS/ 8	-0.54	-0.000	-0.002	1*1.00 + 2*0.50
53/ ELS/ 9	-0.43	0.000	-0.002	1*1.00 + 3*0.50
53/ ELS/ 10	-0.60	-0.000	-0.002	1*1.00 + 4*0.50
54/ ELS/ 1	0.0	0.000	-0.002	1*1.00
54/ ELS/ 2	0.0	0.001	-0.003	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
54/ ELS/ 3	0.0	-0.000	-0.003	1*1.00 + 3*1.00
54/ ELS/ 4	0.0	0.000	-0.002	1*1.00 + 4*1.00
54/ ELS/ 5	0.0	0.001	-0.003	1*1.00 + 2*0.80
54/ ELS/ 6	0.0	0.000	-0.003	1*1.00 + 3*0.80
54/ ELS/ 7	0.0	0.000	-0.002	1*1.00 + 4*0.80
54/ ELS/ 8	0.0	0.000	-0.002	1*1.00 + 2*0.50
54/ ELS/ 9	0.0	0.000	-0.002	1*1.00 + 3*0.50
54/ ELS/ 10	0.0	0.000	-0.002	1*1.00 + 4*0.50
55/ ELS/ 1	0.0	-0.001	-0.002	1*1.00
55/ ELS/ 2	0.0	-0.000	-0.003	1*1.00 + 2*1.00
55/ ELS/ 3	0.0	-0.001	-0.003	1*1.00 + 3*1.00
55/ ELS/ 4	0.0	-0.001	-0.002	1*1.00 + 4*1.00
55/ ELS/ 5	0.0	-0.000	-0.002	1*1.00 + 2*0.80
55/ ELS/ 6	0.0	-0.001	-0.003	1*1.00 + 3*0.80
55/ ELS/ 7	0.0	-0.001	-0.002	1*1.00 + 4*0.80
55/ ELS/ 8	0.0	-0.000	-0.002	1*1.00 + 2*0.50
55/ ELS/ 9	0.0	-0.001	-0.002	1*1.00 + 3*0.50
55/ ELS/ 10	0.0	-0.001	-0.002	1*1.00 + 4*0.50

Desplazamientos - Casos: 9 10 : Envolvente: 1

- Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A55	1A10
Selección	1A55	8
Número total	55	10
Número seleccionado	55	1

- Casos: 9 10

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
1/	ELS/1	0.0>>	0.001	0.002	1*1.00
1/	ELS/1	0.0<<	0.001	0.002	1*1.00
1/	ELS/4	0.0	0.001>>	0.002	1*1.00 + 4*1.00
1/	ELS/2	0.0	0.000<<	0.003	1*1.00 + 2*1.00
1/	ELS/2	0.0	0.000	0.003>>	1*1.00 + 2*1.00
1/	ELS/1	0.0	0.001	0.002<<	1*1.00
2/	ELS/1	0.0>>	-0.000	0.002	1*1.00
2/	ELS/1	0.0<<	-0.000	0.002	1*1.00
2/	ELS/1	0.0	-0.000>>	0.002	1*1.00
2/	ELS/3	0.0	-0.001<<	0.003	1*1.00 + 3*1.00
2/	ELS/2	0.0	-0.001	0.003>>	1*1.00 + 2*1.00
2/	ELS/1	0.0	-0.000	0.002<<	1*1.00
3/	ELS/1	-0.32>>	-0.000	0.002	1*1.00
3/	ELS/2	-0.76<<	-0.000	0.003	1*1.00 + 2*1.00
3/	ELS/3	-0.55	0.000>>	0.003	1*1.00 + 3*1.00
3/	ELS/2	-0.76	-0.000<<	0.003	1*1.00 + 2*1.00
3/	ELS/2	-0.76	-0.000	0.003>>	1*1.00 + 2*1.00
3/	ELS/1	-0.32	-0.000	0.002<<	1*1.00
4/	ELS/1	0.0>>	0.000	0.002	1*1.00
4/	ELS/1	0.0<<	0.000	0.002	1*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
4/	ELS/2	0.0	0.001>>	0.003	1*1.00 + 2*1.00
4/	ELS/3	0.0	-0.000<<	0.003	1*1.00 + 3*1.00
4/	ELS/3	0.0	-0.000	0.003>>	1*1.00 + 3*1.00
4/	ELS/1	0.0	0.000	0.002<<	1*1.00
5/	ELS/1	0.0>>	-0.001	0.002	1*1.00
5/	ELS/1	0.0<<	-0.001	0.002	1*1.00
5/	ELS/2	0.0	-0.000>>	0.003	1*1.00 + 2*1.00
5/	ELS/4	0.0	-0.001<<	0.002	1*1.00 + 4*1.00
5/	ELS/3	0.0	-0.001	0.003>>	1*1.00 + 3*1.00
5/	ELS/1	0.0	-0.001	0.002<<	1*1.00
6/	ELS/1	-2.65>>	0.001	0.002	1*1.00
6/	ELS/2	-4.38<<	0.000	0.002	1*1.00 + 2*1.00
6/	ELS/4	-3.63	0.001>>	0.002	1*1.00 + 4*1.00
6/	ELS/2	-4.38	0.000<<	0.002	1*1.00 + 2*1.00
6/	ELS/2	-4.38	0.000	0.002>>	1*1.00 + 2*1.00
6/	ELS/1	-2.65	0.001	0.002<<	1*1.00
7/	ELS/1	-2.59>>	-0.000	0.001	1*1.00
7/	ELS/2	-4.87<<	-0.001	0.003	1*1.00 + 2*1.00
7/	ELS/1	-2.59	-0.000>>	0.001	1*1.00
7/	ELS/3	-4.30	-0.001<<	0.002	1*1.00 + 3*1.00
7/	ELS/2	-4.87	-0.001	0.003>>	1*1.00 + 2*1.00
7/	ELS/1	-2.59	-0.000	0.001<<	1*1.00
8/	ELS/1	-2.90>>	-0.000	0.001	1*1.00
8/	ELS/2	-5.62<<	-0.000	0.003	1*1.00 + 2*1.00
8/	ELS/1	-2.90	-0.000>>	0.001	1*1.00
8/	ELS/3	-5.19	-0.000<<	0.003	1*1.00 + 3*1.00
8/	ELS/2	-5.62	-0.000	0.003>>	1*1.00 + 2*1.00
8/	ELS/1	-2.90	-0.000	0.001<<	1*1.00
9/	ELS/1	-2.59>>	0.000	0.001	1*1.00
9/	ELS/3	-5.00<<	-0.000	0.003	1*1.00 + 3*1.00
9/	ELS/2	-4.87	0.001>>	0.003	1*1.00 + 2*1.00
9/	ELS/3	-5.00	-0.000<<	0.003	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
9/	ELS/3	-5.00	-0.000	0.003>>	1*1.00 + 3*1.00
9/	ELS/1	-2.59	0.000	0.001<<	1*1.00
10/	ELS/1	-2.65>>	-0.001	0.002	1*1.00
10/	ELS/3	-5.20<<	-0.001	0.003	1*1.00 + 3*1.00
10/	ELS/2	-4.38	-0.000>>	0.002	1*1.00 + 2*1.00
10/	ELS/4	-3.89	-0.001<<	0.002	1*1.00 + 4*1.00
10/	ELS/3	-5.20	-0.001	0.003>>	1*1.00 + 3*1.00
10/	ELS/1	-2.65	-0.001	0.002<<	1*1.00
11/	ELS/1	-5.02>>	0.001	0.001	1*1.00
11/	ELS/2	-8.33<<	0.000	0.002	1*1.00 + 2*1.00
11/	ELS/4	-6.87	0.001>>	0.002	1*1.00 + 4*1.00
11/	ELS/2	-8.33	0.000<<	0.002	1*1.00 + 2*1.00
11/	ELS/2	-8.33	0.000	0.002>>	1*1.00 + 2*1.00
11/	ELS/1	-5.02	0.001	0.001<<	1*1.00
12/	ELS/1	-4.91>>	-0.000	0.001	1*1.00
12/	ELS/2	-9.25<<	-0.001	0.002	1*1.00 + 2*1.00
12/	ELS/1	-4.91	-0.000>>	0.001	1*1.00
12/	ELS/3	-8.16	-0.001<<	0.002	1*1.00 + 3*1.00
12/	ELS/2	-9.25	-0.001	0.002>>	1*1.00 + 2*1.00
12/	ELS/1	-4.91	-0.000	0.001<<	1*1.00
13/	ELS/1	-5.22>>	-0.000	0.001	1*1.00
13/	ELS/2	-10.00<<	-0.000	0.002	1*1.00 + 2*1.00
13/	ELS/1	-5.22	-0.000>>	0.001	1*1.00
13/	ELS/3	-9.38	-0.001<<	0.002	1*1.00 + 3*1.00
13/	ELS/2	-10.00	-0.000	0.002>>	1*1.00 + 2*1.00
13/	ELS/1	-5.22	-0.000	0.001<<	1*1.00
14/	ELS/1	-4.91>>	0.000	0.001	1*1.00
14/	ELS/3	-9.50<<	-0.000	0.002	1*1.00 + 3*1.00
14/	ELS/2	-9.25	0.001>>	0.002	1*1.00 + 2*1.00
14/	ELS/3	-9.50	-0.000<<	0.002	1*1.00 + 3*1.00
14/	ELS/3	-9.50	-0.000	0.002>>	1*1.00 + 3*1.00
14/	ELS/1	-4.91	0.000	0.001<<	1*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
15/	ELS/1	-5.02>>	-0.001	0.001	1*1.00
15/	ELS/3	-9.87<<	-0.001	0.003	1*1.00 + 3*1.00
15/	ELS/2	-8.33	-0.000>>	0.002	1*1.00 + 2*1.00
15/	ELS/4	-7.38	-0.001<<	0.002	1*1.00 + 4*1.00
15/	ELS/3	-9.87	-0.001	0.003>>	1*1.00 + 3*1.00
15/	ELS/1	-5.02	-0.001	0.001<<	1*1.00
16/	ELS/1	-6.87>>	0.001	0.001	1*1.00
16/	ELS/2	-11.44<<	0.000	0.002	1*1.00 + 2*1.00
16/	ELS/4	-9.41	0.001>>	0.001	1*1.00 + 4*1.00
16/	ELS/2	-11.44	0.000<<	0.002	1*1.00 + 2*1.00
16/	ELS/2	-11.44	0.000	0.002>>	1*1.00 + 2*1.00
16/	ELS/1	-6.87	0.001	0.001<<	1*1.00
17/	ELS/1	-6.72>>	-0.000	0.001	1*1.00
17/	ELS/2	-12.73<<	-0.001	0.002	1*1.00 + 2*1.00
17/	ELS/1	-6.72	-0.000>>	0.001	1*1.00
17/	ELS/3	-11.22	-0.001<<	0.001	1*1.00 + 3*1.00
17/	ELS/2	-12.73	-0.001	0.002>>	1*1.00 + 2*1.00
17/	ELS/1	-6.72	-0.000	0.001<<	1*1.00
18/	ELS/1	-7.03>>	-0.000	0.001	1*1.00
18/	ELS/2	-13.52<<	-0.000	0.002	1*1.00 + 2*1.00
18/	ELS/1	-7.03	-0.000>>	0.001	1*1.00
18/	ELS/3	-12.71	-0.001<<	0.002	1*1.00 + 3*1.00
18/	ELS/2	-13.52	-0.000	0.002>>	1*1.00 + 2*1.00
18/	ELS/1	-7.03	-0.000	0.001<<	1*1.00
19/	ELS/1	-6.72>>	0.000	0.001	1*1.00
19/	ELS/3	-13.09<<	-0.000	0.002	1*1.00 + 3*1.00
19/	ELS/2	-12.73	0.001>>	0.002	1*1.00 + 2*1.00
19/	ELS/3	-13.09	-0.000<<	0.002	1*1.00 + 3*1.00
19/	ELS/3	-13.09	-0.000	0.002>>	1*1.00 + 3*1.00
19/	ELS/1	-6.72	0.000	0.001<<	1*1.00
20/	ELS/1	-6.87>>	-0.001	0.001	1*1.00
20/	ELS/3	-13.58<<	-0.001	0.002	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
20/	ELS/2	-11.44	-0.000>>	0.002	1*1.00 + 2*1.00
20/	ELS/4	-10.14	-0.001<<	0.001	1*1.00 + 4*1.00
20/	ELS/3	-13.58	-0.001	0.002>>	1*1.00 + 3*1.00
20/	ELS/1	-6.87	-0.001	0.001<<	1*1.00
21/	ELS/1	-8.04>>	0.001	0.000	1*1.00
21/	ELS/2	-13.43<<	0.000	0.001	1*1.00 + 2*1.00
21/	ELS/4	-11.04	0.001>>	0.001	1*1.00 + 4*1.00
21/	ELS/2	-13.43	0.000<<	0.001	1*1.00 + 2*1.00
21/	ELS/2	-13.43	0.000	0.001>>	1*1.00 + 2*1.00
21/	ELS/1	-8.04	0.001	0.000<<	1*1.00
22/	ELS/1	-7.88>>	-0.000	0.000	1*1.00
22/	ELS/2	-14.99<<	-0.001	0.001	1*1.00 + 2*1.00
22/	ELS/1	-7.88	-0.000>>	0.000	1*1.00
22/	ELS/3	-13.17	-0.001<<	0.001	1*1.00 + 3*1.00
22/	ELS/2	-14.99	-0.001	0.001>>	1*1.00 + 2*1.00
22/	ELS/1	-7.88	-0.000	0.000<<	1*1.00
23/	ELS/1	-8.19>>	-0.000	0.000	1*1.00
23/	ELS/2	-16.02<<	-0.000	0.001	1*1.00 + 2*1.00
23/	ELS/1	-8.19	-0.000>>	0.000	1*1.00
23/	ELS/3	-14.98	-0.001<<	0.001	1*1.00 + 3*1.00
23/	ELS/2	-16.02	-0.000	0.001>>	1*1.00 + 2*1.00
23/	ELS/1	-8.19	-0.000	0.000<<	1*1.00
24/	ELS/1	-7.88>>	0.000	0.000	1*1.00
24/	ELS/3	-15.42<<	-0.000	0.001	1*1.00 + 3*1.00
24/	ELS/2	-14.99	0.001>>	0.001	1*1.00 + 2*1.00
24/	ELS/3	-15.42	-0.000<<	0.001	1*1.00 + 3*1.00
24/	ELS/3	-15.42	-0.000	0.001>>	1*1.00 + 3*1.00
24/	ELS/1	-7.88	0.000	0.000<<	1*1.00
25/	ELS/1	-8.04>>	-0.001	0.000	1*1.00
25/	ELS/3	-15.98<<	-0.001	0.001	1*1.00 + 3*1.00
25/	ELS/2	-13.43	-0.000>>	0.001	1*1.00 + 2*1.00
25/	ELS/4	-11.95	-0.001<<	0.001	1*1.00 + 4*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
25/	ELS/3	-15.98	-0.001	0.001>>	1*1.00 + 3*1.00
25/	ELS/1	-8.04	-0.001	0.000<<	1*1.00
26/	ELS/1	-8.45>>	0.001	-0.000	1*1.00
26/	ELS/2	-14.11<<	0.000	-0.000	1*1.00 + 2*1.00
26/	ELS/4	-11.60	0.001>>	0.000	1*1.00 + 4*1.00
26/	ELS/2	-14.11	0.000<<	-0.000	1*1.00 + 2*1.00
26/	ELS/4	-11.60	0.001	0.000>>	1*1.00 + 4*1.00
26/	ELS/2	-14.11	0.000	-0.000<<	1*1.00 + 2*1.00
27/	ELS/1	-8.27>>	-0.000	0.000	1*1.00
27/	ELS/2	-15.77<<	-0.001	0.000	1*1.00 + 2*1.00
27/	ELS/1	-8.27	-0.000>>	0.000	1*1.00
27/	ELS/3	-13.84	-0.001<<	0.000	1*1.00 + 3*1.00
27/	ELS/4	-11.70	-0.001	0.000>>	1*1.00 + 4*1.00
27/	ELS/1	-8.27	-0.000	0.000<<	1*1.00
28/	ELS/1	-8.58>>	-0.000	0.000	1*1.00
28/	ELS/2	-16.92<<	-0.000	0.000	1*1.00 + 2*1.00
28/	ELS/1	-8.58	-0.000>>	0.000	1*1.00
28/	ELS/3	-15.77	-0.001<<	0.000	1*1.00 + 3*1.00
28/	ELS/4	-12.52	-0.000	0.000>>	1*1.00 + 4*1.00
28/	ELS/1	-8.58	-0.000	0.000<<	1*1.00
29/	ELS/1	-8.27>>	0.000	0.000	1*1.00
29/	ELS/3	-16.23<<	-0.000	0.000	1*1.00 + 3*1.00
29/	ELS/2	-15.77	0.001>>	0.000	1*1.00 + 2*1.00
29/	ELS/3	-16.23	-0.000<<	0.000	1*1.00 + 3*1.00
29/	ELS/4	-12.32	0.000	0.000>>	1*1.00 + 4*1.00
29/	ELS/1	-8.27	0.000	0.000<<	1*1.00
30/	ELS/1	-8.45>>	-0.001	-0.000	1*1.00
30/	ELS/3	-16.82<<	-0.001	-0.000	1*1.00 + 3*1.00
30/	ELS/2	-14.11	-0.000>>	-0.000	1*1.00 + 2*1.00
30/	ELS/4	-12.64	-0.001<<	0.000	1*1.00 + 4*1.00
30/	ELS/4	-12.64	-0.001	0.000>>	1*1.00 + 4*1.00
30/	ELS/3	-16.82	-0.001	-0.000<<	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
31/	ELS/1	-8.04>>	0.001	-0.000	1*1.00
31/	ELS/2	-13.43<<	0.000	-0.001	1*1.00 + 2*1.00
31/	ELS/4	-11.06	0.001>>	-0.001	1*1.00 + 4*1.00
31/	ELS/2	-13.43	0.000<<	-0.001	1*1.00 + 2*1.00
31/	ELS/1	-8.04	0.001	-0.000>>	1*1.00
31/	ELS/2	-13.43	0.000	-0.001<<	1*1.00 + 2*1.00
32/	ELS/1	-7.88>>	-0.000	-0.000	1*1.00
32/	ELS/2	-14.99<<	-0.001	-0.001	1*1.00 + 2*1.00
32/	ELS/1	-7.88	-0.000>>	-0.000	1*1.00
32/	ELS/3	-13.17	-0.001<<	-0.001	1*1.00 + 3*1.00
32/	ELS/1	-7.88	-0.000	-0.000>>	1*1.00
32/	ELS/2	-14.99	-0.001	-0.001<<	1*1.00 + 2*1.00
33/	ELS/1	-8.19>>	-0.000	-0.000	1*1.00
33/	ELS/2	-16.02<<	-0.000	-0.001	1*1.00 + 2*1.00
33/	ELS/1	-8.19	-0.000>>	-0.000	1*1.00
33/	ELS/3	-14.98	-0.001<<	-0.001	1*1.00 + 3*1.00
33/	ELS/1	-8.19	-0.000	-0.000>>	1*1.00
33/	ELS/2	-16.02	-0.000	-0.001<<	1*1.00 + 2*1.00
34/	ELS/1	-7.88>>	0.000	-0.000	1*1.00
34/	ELS/3	-15.42<<	-0.000	-0.001	1*1.00 + 3*1.00
34/	ELS/2	-14.99	0.001>>	-0.001	1*1.00 + 2*1.00
34/	ELS/3	-15.42	-0.000<<	-0.001	1*1.00 + 3*1.00
34/	ELS/1	-7.88	0.000	-0.000>>	1*1.00
34/	ELS/3	-15.42	-0.000	-0.001<<	1*1.00 + 3*1.00
35/	ELS/1	-8.04>>	-0.001	-0.000	1*1.00
35/	ELS/3	-15.98<<	-0.001	-0.001	1*1.00 + 3*1.00
35/	ELS/2	-13.43	-0.000>>	-0.001	1*1.00 + 2*1.00
35/	ELS/4	-12.14	-0.001<<	-0.001	1*1.00 + 4*1.00
35/	ELS/1	-8.04	-0.001	-0.000>>	1*1.00
35/	ELS/3	-15.98	-0.001	-0.001<<	1*1.00 + 3*1.00
36/	ELS/1	-6.87>>	0.001	-0.001	1*1.00
36/	ELS/2	-11.44<<	0.000	-0.002	1*1.00 + 2*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
36/	ELS/4	-9.45	0.001>>	-0.001	1*1.00 + 4*1.00
36/	ELS/2	-11.44	0.000<<	-0.002	1*1.00 + 2*1.00
36/	ELS/1	-6.87	0.001	-0.001>>	1*1.00
36/	ELS/2	-11.44	0.000	-0.002<<	1*1.00 + 2*1.00
37/	ELS/1	-6.72>>	-0.000	-0.001	1*1.00
37/	ELS/2	-12.73<<	-0.001	-0.002	1*1.00 + 2*1.00
37/	ELS/1	-6.72	-0.000>>	-0.001	1*1.00
37/	ELS/3	-11.22	-0.001<<	-0.001	1*1.00 + 3*1.00
37/	ELS/1	-6.72	-0.000	-0.001>>	1*1.00
37/	ELS/2	-12.73	-0.001	-0.002<<	1*1.00 + 2*1.00
38/	ELS/1	-7.03>>	-0.000	-0.001	1*1.00
38/	ELS/2	-13.52<<	-0.000	-0.002	1*1.00 + 2*1.00
38/	ELS/1	-7.03	-0.000>>	-0.001	1*1.00
38/	ELS/3	-12.71	-0.001<<	-0.002	1*1.00 + 3*1.00
38/	ELS/1	-7.03	-0.000	-0.001>>	1*1.00
38/	ELS/2	-13.52	-0.000	-0.002<<	1*1.00 + 2*1.00
39/	ELS/1	-6.72>>	0.000	-0.001	1*1.00
39/	ELS/3	-13.09<<	-0.000	-0.002	1*1.00 + 3*1.00
39/	ELS/2	-12.73	0.001>>	-0.002	1*1.00 + 2*1.00
39/	ELS/3	-13.09	-0.000<<	-0.002	1*1.00 + 3*1.00
39/	ELS/1	-6.72	0.000	-0.001>>	1*1.00
39/	ELS/3	-13.09	-0.000	-0.002<<	1*1.00 + 3*1.00
40/	ELS/1	-6.87>>	-0.001	-0.001	1*1.00
40/	ELS/3	-13.58<<	-0.001	-0.002	1*1.00 + 3*1.00
40/	ELS/2	-11.44	-0.000>>	-0.002	1*1.00 + 2*1.00
40/	ELS/4	-10.48	-0.001<<	-0.001	1*1.00 + 4*1.00
40/	ELS/1	-6.87	-0.001	-0.001>>	1*1.00
40/	ELS/3	-13.58	-0.001	-0.002<<	1*1.00 + 3*1.00
41/	ELS/1	-5.02>>	0.001	-0.001	1*1.00
41/	ELS/2	-8.33<<	0.000	-0.002	1*1.00 + 2*1.00
41/	ELS/4	-6.90	0.001>>	-0.002	1*1.00 + 4*1.00
41/	ELS/2	-8.33	0.000<<	-0.002	1*1.00 + 2*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
41/	ELS/1	-5.02	0.001	-0.001>>	1*1.00
41/	ELS/2	-8.33	0.000	-0.002<<	1*1.00 + 2*1.00
42/	ELS/1	-4.91>>	-0.000	-0.001	1*1.00
42/	ELS/2	-9.25<<	-0.001	-0.002	1*1.00 + 2*1.00
42/	ELS/1	-4.91	-0.000>>	-0.001	1*1.00
42/	ELS/3	-8.16	-0.001<<	-0.002	1*1.00 + 3*1.00
42/	ELS/1	-4.91	-0.000	-0.001>>	1*1.00
42/	ELS/2	-9.25	-0.001	-0.002<<	1*1.00 + 2*1.00
43/	ELS/1	-5.22>>	-0.000	-0.001	1*1.00
43/	ELS/2	-10.00<<	-0.000	-0.002	1*1.00 + 2*1.00
43/	ELS/1	-5.22	-0.000>>	-0.001	1*1.00
43/	ELS/3	-9.38	-0.001<<	-0.002	1*1.00 + 3*1.00
43/	ELS/1	-5.22	-0.000	-0.001>>	1*1.00
43/	ELS/2	-10.00	-0.000	-0.002<<	1*1.00 + 2*1.00
44/	ELS/1	-4.91>>	0.000	-0.001	1*1.00
44/	ELS/3	-9.50<<	-0.000	-0.002	1*1.00 + 3*1.00
44/	ELS/2	-9.25	0.001>>	-0.002	1*1.00 + 2*1.00
44/	ELS/3	-9.50	-0.000<<	-0.002	1*1.00 + 3*1.00
44/	ELS/1	-4.91	0.000	-0.001>>	1*1.00
44/	ELS/3	-9.50	-0.000	-0.002<<	1*1.00 + 3*1.00
45/	ELS/1	-5.02>>	-0.001	-0.001	1*1.00
45/	ELS/3	-9.87<<	-0.001	-0.003	1*1.00 + 3*1.00
45/	ELS/2	-8.33	-0.000>>	-0.002	1*1.00 + 2*1.00
45/	ELS/4	-7.75	-0.001<<	-0.002	1*1.00 + 4*1.00
45/	ELS/1	-5.02	-0.001	-0.001>>	1*1.00
45/	ELS/3	-9.87	-0.001	-0.003<<	1*1.00 + 3*1.00
46/	ELS/1	-2.65>>	0.001	-0.002	1*1.00
46/	ELS/2	-4.38<<	0.000	-0.002	1*1.00 + 2*1.00
46/	ELS/4	-3.65	0.001>>	-0.002	1*1.00 + 4*1.00
46/	ELS/2	-4.38	0.000<<	-0.002	1*1.00 + 2*1.00
46/	ELS/1	-2.65	0.001	-0.002>>	1*1.00
46/	ELS/2	-4.38	0.000	-0.002<<	1*1.00 + 2*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
47/	ELS/1	**-2.59>>**	-0.000	-0.001	1*1.00
47/	ELS/2	**-4.87<<**	-0.001	-0.003	1*1.00 + 2*1.00
47/	ELS/1	-2.59	**-0.000>>**	-0.001	1*1.00
47/	ELS/3	-4.30	**-0.001<<**	-0.002	1*1.00 + 3*1.00
47/	ELS/1	-2.59	-0.000	**-0.001>>**	1*1.00
47/	ELS/2	-4.87	-0.001	**-0.003<<**	1*1.00 + 2*1.00
48/	ELS/1	**-2.90>>**	-0.000	-0.001	1*1.00
48/	ELS/2	**-5.62<<**	-0.000	-0.003	1*1.00 + 2*1.00
48/	ELS/1	-2.90	**-0.000>>**	-0.001	1*1.00
48/	ELS/3	-5.19	**-0.000<<**	-0.003	1*1.00 + 3*1.00
48/	ELS/1	-2.90	-0.000	**-0.001>>**	1*1.00
48/	ELS/2	-5.62	-0.000	**-0.003<<**	1*1.00 + 2*1.00
49/	ELS/1	**-2.59>>**	0.000	-0.001	1*1.00
49/	ELS/3	**-5.00<<**	-0.000	-0.003	1*1.00 + 3*1.00
49/	ELS/2	-4.87	**0.001>>**	-0.003	1*1.00 + 2*1.00
49/	ELS/3	-5.00	**-0.000<<**	-0.003	1*1.00 + 3*1.00
49/	ELS/1	-2.59	0.000	**-0.001>>**	1*1.00
49/	ELS/3	-5.00	-0.000	**-0.003<<**	1*1.00 + 3*1.00
50/	ELS/1	**-2.65>>**	-0.001	-0.002	1*1.00
50/	ELS/3	**-5.20<<**	-0.001	-0.003	1*1.00 + 3*1.00
50/	ELS/2	-4.38	**-0.000>>**	-0.002	1*1.00 + 2*1.00
50/	ELS/4	-4.13	**-0.001<<**	-0.002	1*1.00 + 4*1.00
50/	ELS/1	-2.65	-0.001	**-0.002>>**	1*1.00
50/	ELS/3	-5.20	-0.001	**-0.003<<**	1*1.00 + 3*1.00
51/	ELS/1	**0.0>>**	0.001	-0.002	1*1.00
51/	ELS/1	**0.0<<**	0.001	-0.002	1*1.00
51/	ELS/4	0.0	**0.001>>**	-0.002	1*1.00 + 4*1.00
51/	ELS/2	0.0	**0.000<<**	-0.003	1*1.00 + 2*1.00
51/	ELS/1	0.0	0.001	**-0.002>>**	1*1.00
51/	ELS/2	0.0	0.000	**-0.003<<**	1*1.00 + 2*1.00
52/	ELS/1	**0.0>>**	-0.000	-0.002	1*1.00
52/	ELS/1	**0.0<<**	-0.000	-0.002	1*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
52/	ELS/1	0.0	**-0.000>>**	-0.002	1*1.00
52/	ELS/3	0.0	**-0.001<<**	-0.003	1*1.00 + 3*1.00
52/	ELS/1	0.0	-0.000	**-0.002>>**	1*1.00
52/	ELS/2	0.0	-0.001	**-0.003<<**	1*1.00 + 2*1.00
53/	ELS/1	**-0.32>>**	-0.000	-0.002	1*1.00
53/	ELS/4	**-0.88<<**	-0.000	-0.002	1*1.00 + 4*1.00
53/	ELS/3	-0.55	**0.000>>**	-0.003	1*1.00 + 3*1.00
53/	ELS/4	-0.88	**-0.000<<**	-0.002	1*1.00 + 4*1.00
53/	ELS/1	-0.32	-0.000	**-0.002>>**	1*1.00
53/	ELS/2	-0.76	-0.000	**-0.003<<**	1*1.00 + 2*1.00
54/	ELS/1	**0.0>>**	0.000	-0.002	1*1.00
54/	ELS/1	**0.0<<**	0.000	-0.002	1*1.00
54/	ELS/2	0.0	**0.001>>**	-0.003	1*1.00 + 2*1.00
54/	ELS/3	0.0	**-0.000<<**	-0.003	1*1.00 + 3*1.00
54/	ELS/1	0.0	0.000	**-0.002>>**	1*1.00
54/	ELS/3	0.0	-0.000	**-0.003<<**	1*1.00 + 3*1.00
55/	ELS/1	**0.0>>**	-0.001	-0.002	1*1.00
55/	ELS/1	**0.0<<**	-0.001	-0.002	1*1.00
55/	ELS/2	0.0	**-0.000>>**	-0.003	1*1.00 + 2*1.00
55/	ELS/4	0.0	**-0.001<<**	-0.002	1*1.00 + 4*1.00
55/	ELS/1	0.0	-0.001	**-0.002>>**	1*1.00
55/	ELS/3	0.0	-0.001	**-0.003<<**	1*1.00 + 3*1.00

Desplazamientos - Casos: 9 10 : Extremos globales: 1

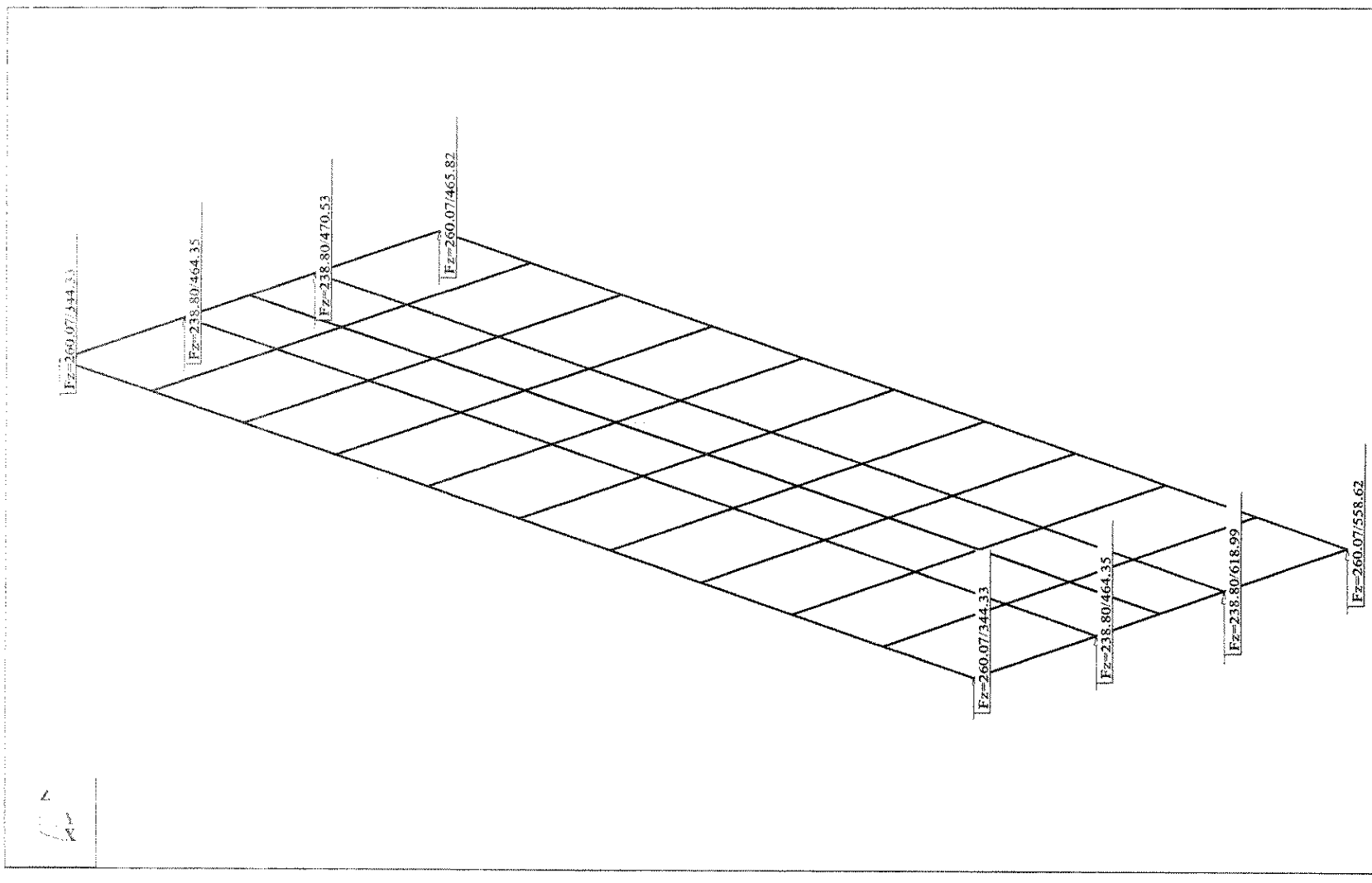
- Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A55	1A10
Selección	1A55	8
Número total	55	10
Número seleccionado	55	1

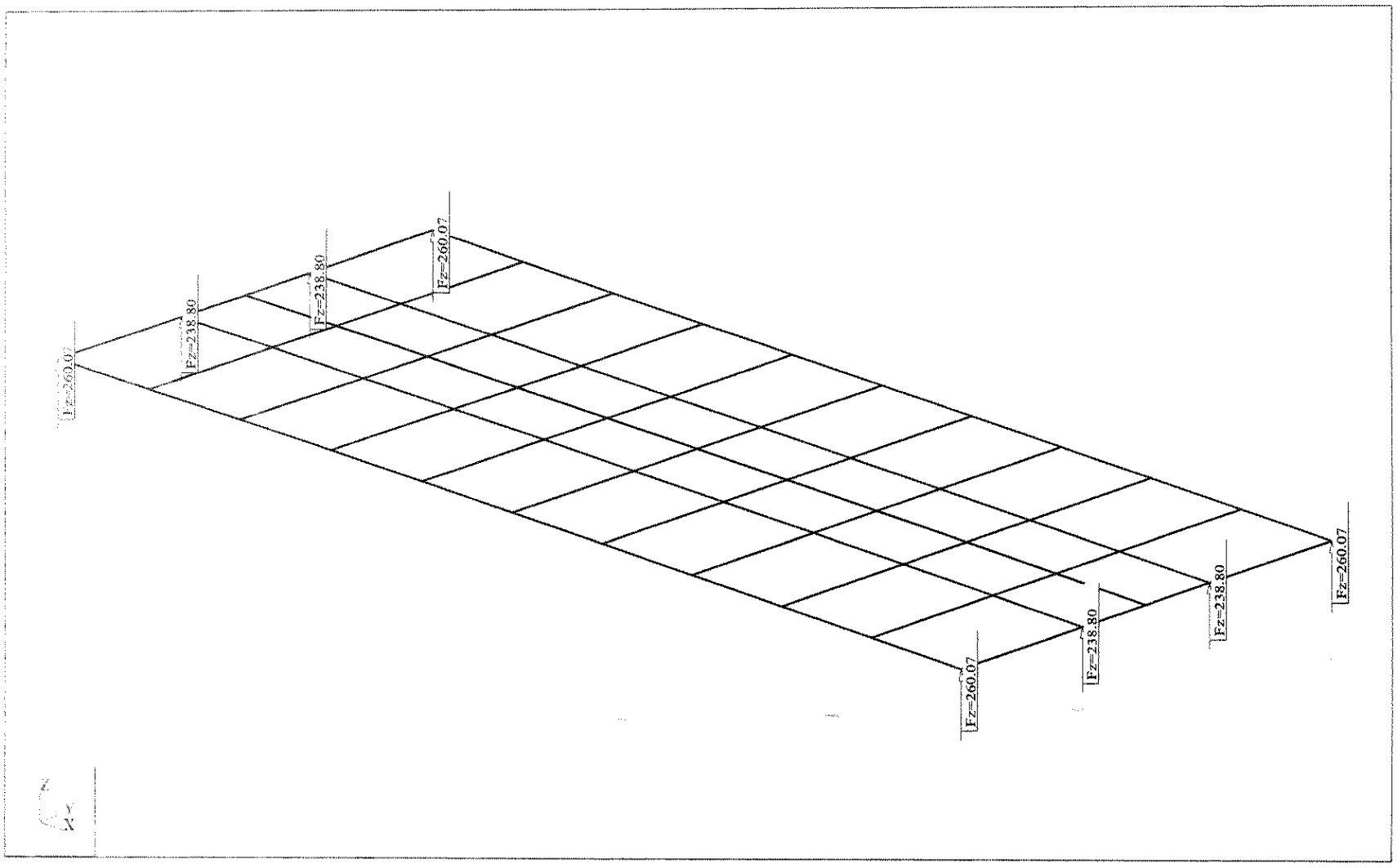
- Casos: 9 10

	UZ (mm)	RX (Rad)	RY (Rad)
MAX	0.0	0.001	0.003
Nudo	1	29	5
Caso	ELS/1	ELS/2	ELS/3
MIN	-16.92	-0.001	-0.003
Nudo	28	28	55
Caso	ELS/2	ELS/3	ELS/3

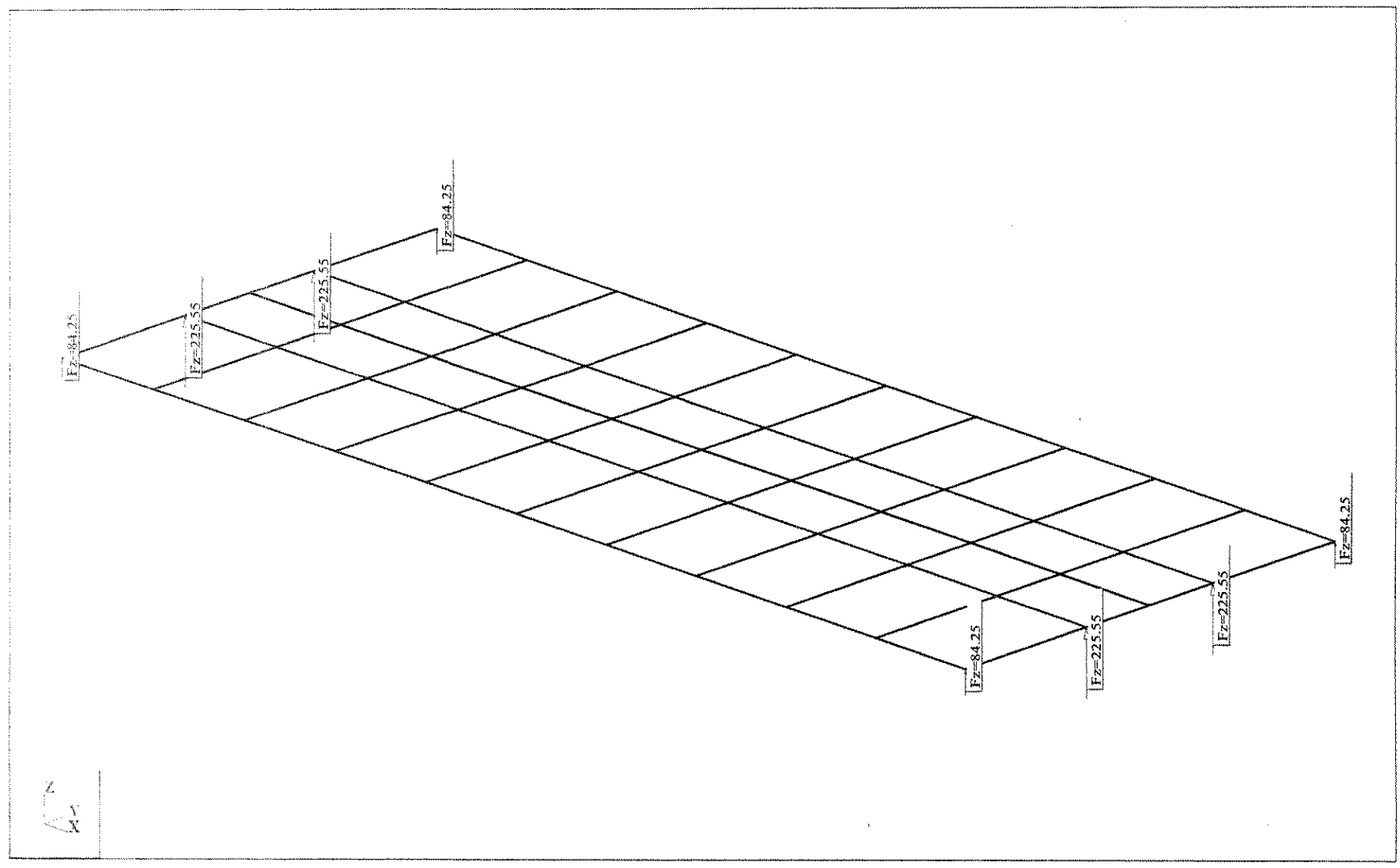
Vista - Fuerzas de reacción; casos: 9 (ELS+)



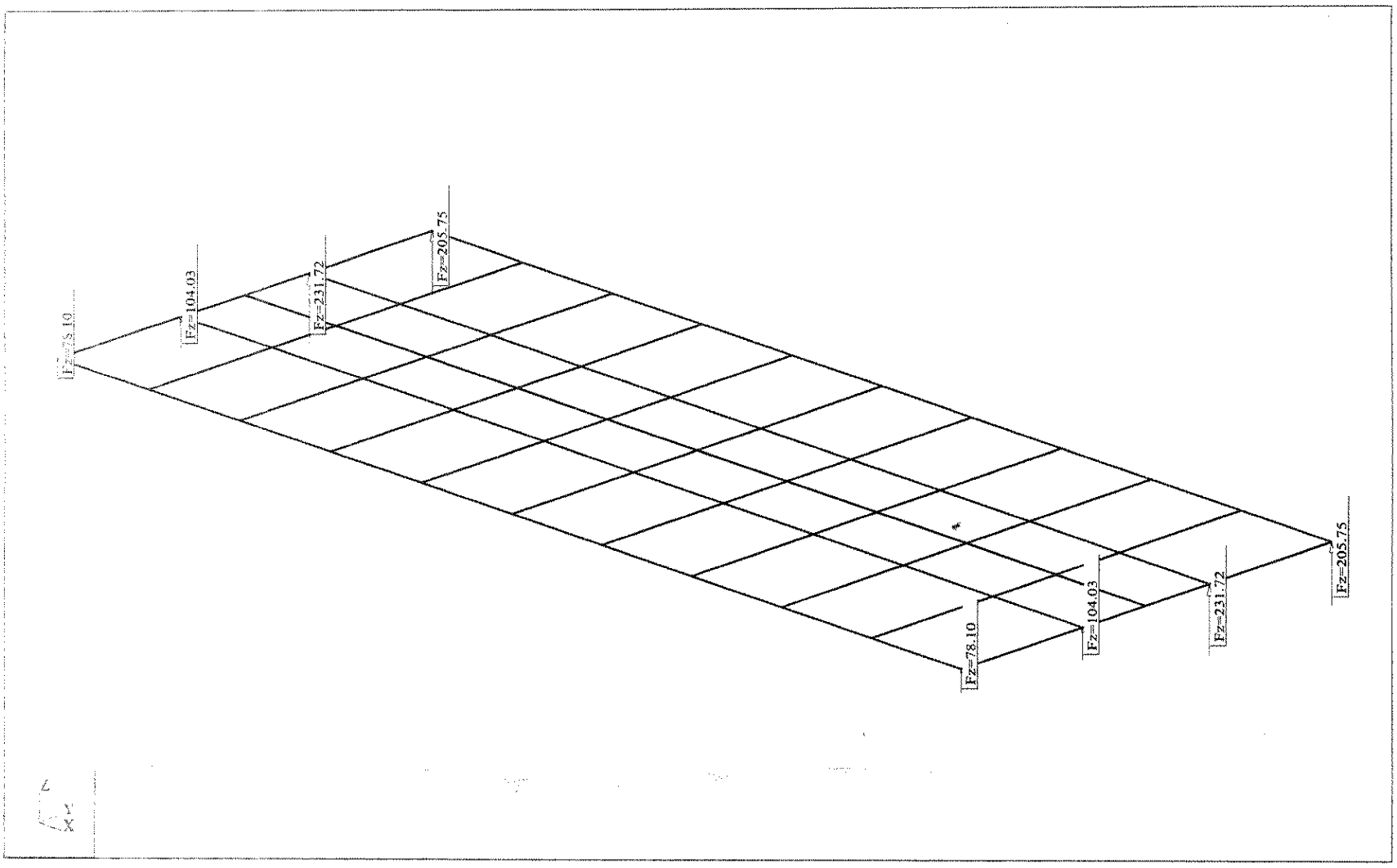
Vista - Fuerzas de reacción; casos: 1 (PP+CM) 1



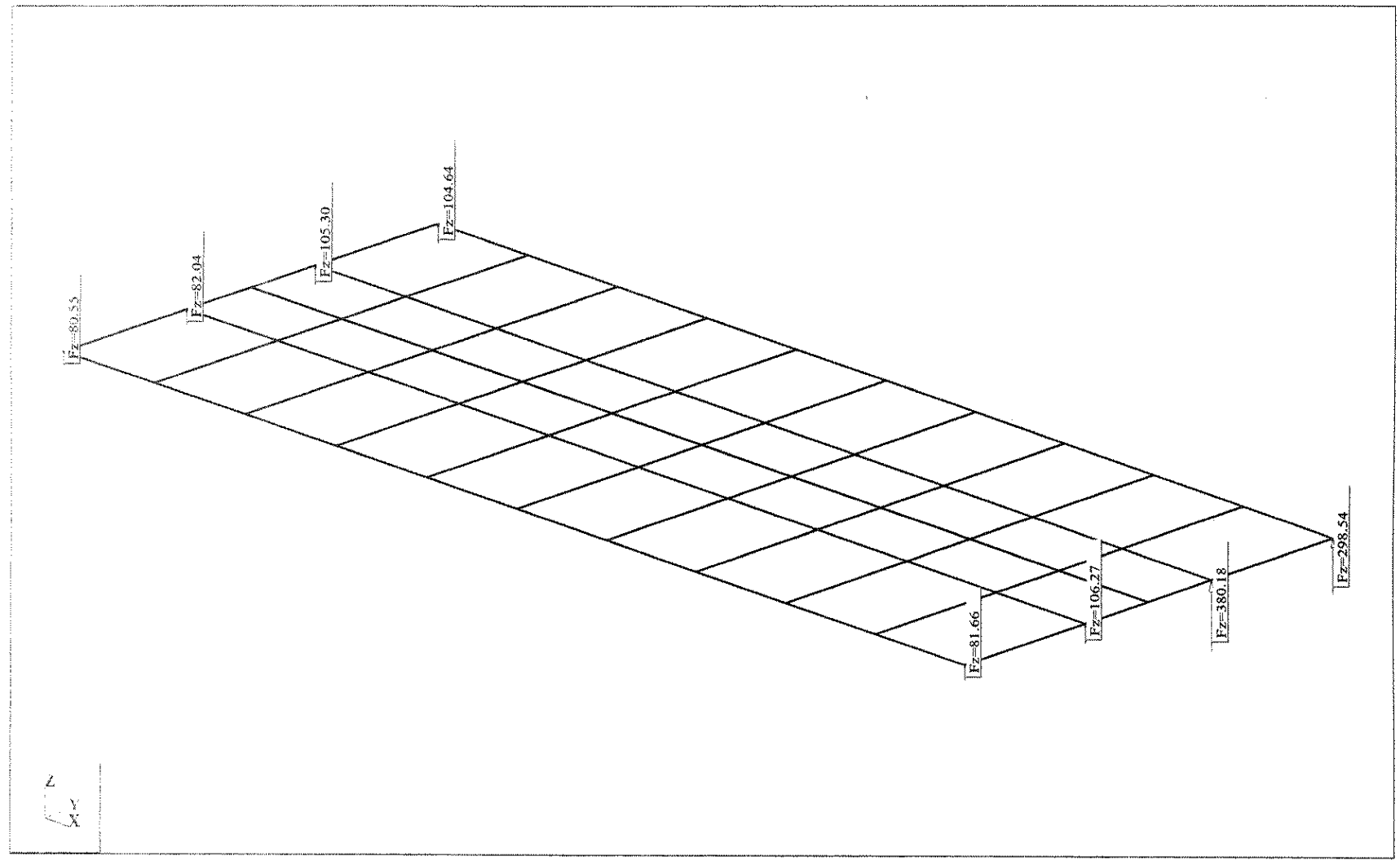
Vista - Fuerzas de reacción; casos: 2 (SC+Carro centrado en centro luz)



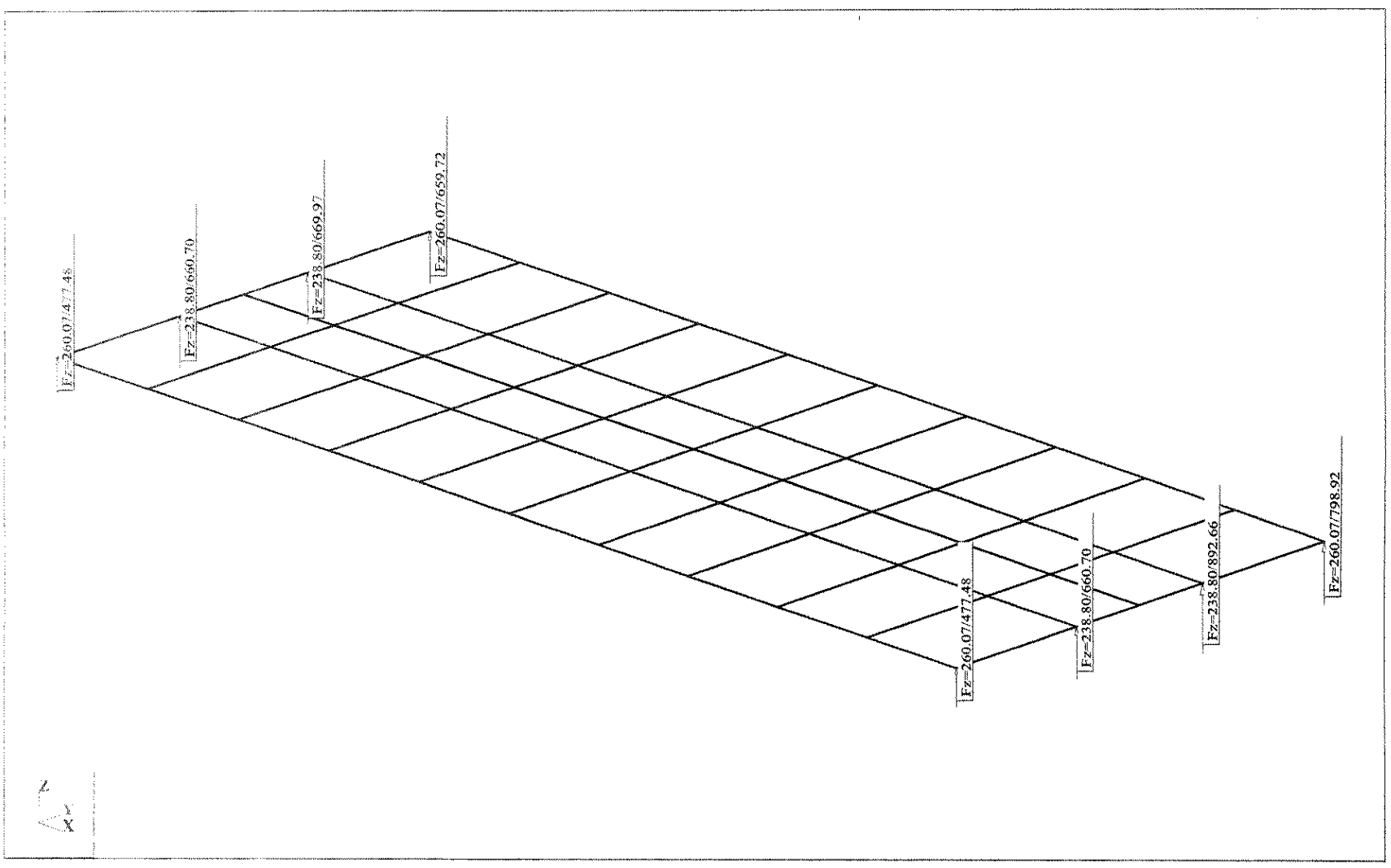
Vista - Fuerzas de reacción; casos: 3 (SC+Carro descentrado en centro luz)



Vista - Fuerzas de reacción; casos: 4 (SC+Carro descentrado en apoyos)



Vista - Fuerzas de reacción; casos: 6 (ELU+) 1



Reacciones sistema de coordenadas global - Casos: 1A4 6 7 9 10 : Valores: 1

sistema de coordenadas global - Casos: 1A4

Filtrar	Nudo	Caso
Lista completa	1A55	1A10
Selección	1 2 4 5 51 52 54	1A4 6 7 9 10
Número total	55	10
Número seleccion	8	8

sistema de coordenadas global - Casos: 1A4 6 7 9 10

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
1/	1	260.07	0.00	-0.00
1/	2	84.25	0.00	-0.00
1/	3	78.10	0.00	0.00
1/	4	80.55	0.00	0.00
1/	ELU+	477.48	0.00	-0.00
1/	ELU-	260.07	0.00	-0.00
1/	ELS+	344.33	0.00	-0.00
1/	ELS-	260.07	0.00	-0.00
2/	1	238.80	-0.00	-0.00
2/	2	225.55	0.00	-0.00
2/	3	104.03	0.00	-0.00
2/	4	82.04	-0.00	-0.00
2/	ELU+	660.70	0.00	-0.00
2/	ELU-	238.80	-0.00	-0.00
2/	ELS+	464.35	0.00	-0.00
2/	ELS-	238.80	-0.00	-0.00
4/	1	238.80	-0.00	0.00
4/	2	225.55	-0.00	-0.00
4/	3	231.72	-0.00	0.00
4/	4	105.30	-0.00	0.00

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
4/	ELU+	669.97	-0.00	0.00
4/	ELU-	238.80	-0.00	-0.00
4/	ELS+	470.53	-0.00	0.00
4/	ELS-	238.80	-0.00	0.00
5/	1	260.07	0.00	-0.00
5/	2	84.25	0.00	0.00
5/	3	205.75	0.00	-0.00
5/	4	104.64	0.00	-0.00
5/	ELU+	659.72	0.00	0.00
5/	ELU-	260.07	0.00	-0.00
5/	ELS+	465.82	0.00	0.00
5/	ELS-	260.07	0.00	-0.00
51/	1	260.07	0.00	-0.00
51/	2	84.25	0.00	0.00
51/	3	78.10	0.00	0.00
51/	4	81.66	-0.00	0.00
51/	ELU+	477.48	0.00	0.00
51/	ELU-	260.07	0.00	-0.00
51/	ELS+	344.33	0.00	0.00
51/	ELS-	260.07	0.00	-0.00
52/	1	238.80	0.00	0.00
52/	2	225.55	-0.00	0.00
52/	3	104.03	-0.00	0.00
52/	4	106.27	-0.00	0.00
52/	ELU+	660.70	0.00	0.00
52/	ELU-	238.80	-0.00	0.00
52/	ELS+	464.35	0.00	0.00
52/	ELS-	238.80	-0.00	0.00
54/	1	238.80	0.00	0.00
54/	2	225.55	-0.00	0.00
54/	3	231.72	0.00	0.00
54/	4	380.18	0.00	0.00

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
54/	ELU+	892.66	0.00	0.00
54/	ELU-	238.80	-0.00	0.00
54/	ELS+	618.99	0.00	0.00
54/	ELS-	238.80	-0.00	0.00
55/	1	260.07	-0.00	0.00
55/	2	84.25	-0.00	0.00
55/	3	205.75	0.00	0.00
55/	4	298.54	0.00	0.00
55/	ELU+	798.92	0.00	0.00
55/	ELU-	260.07	-0.00	0.00
55/	ELS+	558.62	0.00	0.00
55/	ELS-	260.07	-0.00	0.00
Caso 1		PP+CM		
Suma final		1995.51	0.00	0.00
Suma de reaccion		1995.51	8979.78	-16961.80
Suma de esfuerzo		-1995.51	-8979.78	16961.80
Verificación		-0.00	-0.00	0.00
Precisión:		3.59283e-013	3.50254e-026	
Caso 2		SC+Carro centrado en centro luz		
Suma final		1239.20	-0.00	0.00
Suma de reaccion		1239.20	5576.40	-10533.20
Suma de esfuerzo		-1239.20	-5576.40	10533.20
Verificación		-0.00	-0.00	0.00
Precisión:		1.04887e-012	6.18833e-026	
Caso 3		SC+Carro descentrado en centro luz		
Suma final		1239.20	0.00	0.00
Suma de reaccion		1239.20	6776.39	-10533.20
Suma de esfuerzo		-1239.20	-6776.39	10533.20
Verificación		-0.00	-0.00	0.00

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
Precisión:		1.27132e-011	5.50709e-026	
Caso 4		SC+Carro descentrado en apoyos		
Suma final		1239.20	0.00	0.00
Suma de reaccion		1239.20	6776.42	-14733.20
Suma de esfuerzo		-1239.20	-6776.42	14733.20
Verificación		-0.00	-0.00	0.00
Precisión:		4.16255e-013	1.95934e-026	
Caso ELU+		ELU+		
Suma final		5297.63	0.00	0.00
Suma de reaccion		3854.31	19144.40	-39061.61
Suma de esfuerzo		-3854.31	-19144.40	39061.61
Verificación		-0.00	-0.00	0.00
Precisión:		9.83666e-013	6.44155e-026	
Caso ELU-		ELU-		
Suma final		1995.51	-0.00	0.00
Suma de reaccion		3854.31	19144.40	-39061.61
Suma de esfuerzo		-3854.31	-19144.40	39061.61
Verificación		-0.00	-0.00	0.00
Precisión:		9.83666e-013	6.44155e-026	
Caso ELS+		ELS+		
Suma final		3731.30	0.00	0.00
Suma de reaccion		2615.11	12367.99	-24328.40
Suma de esfuerzo		-2615.11	-12367.99	24328.40
Verificación		-0.00	-0.00	0.00
Precisión:		5.67411e-013	4.48221e-026	
Caso ELS-		ELS-		
Suma final		1995.51	-0.00	0.00

Nudo/Caso	FZ (kN)	MX (kNm)	MY (kNm)
Suma de reaccion	2615.11	12367.99	-24328.40
Suma de esfuerzo	-2615.11	-12367.99	24328.40
Verificación	-0.00	-0.00	0.00
Precisión:	5.67411e-013	4.48221e-026	

Reacciones sistema de coordenadas global - Casos: 9 10 : Extremos globales: 1

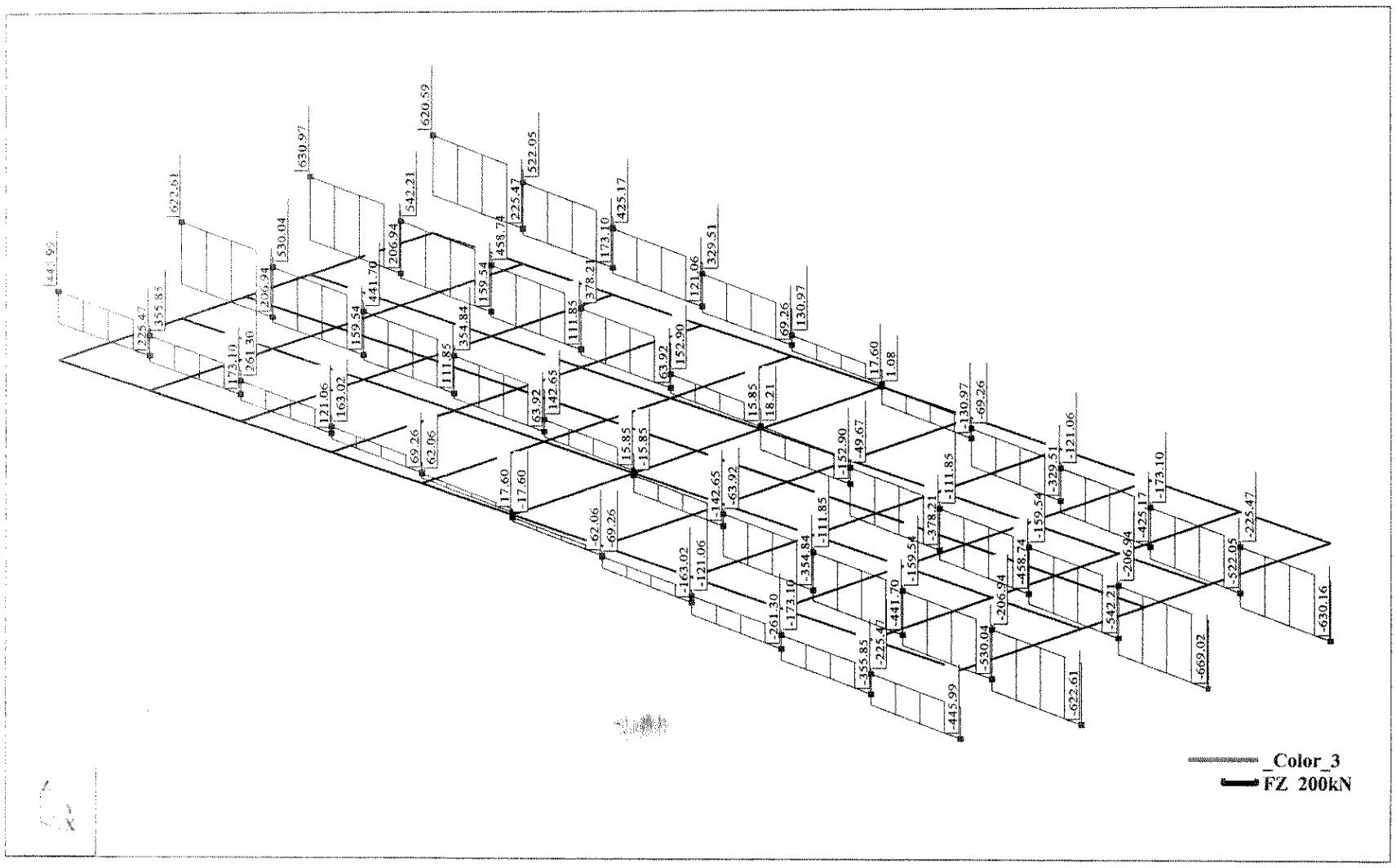
sistema de coordenadas global - Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A55	1A10
Selección	1 2 4 5 51 52 54	8
Número total	55	10
Número seleccionado	8	1

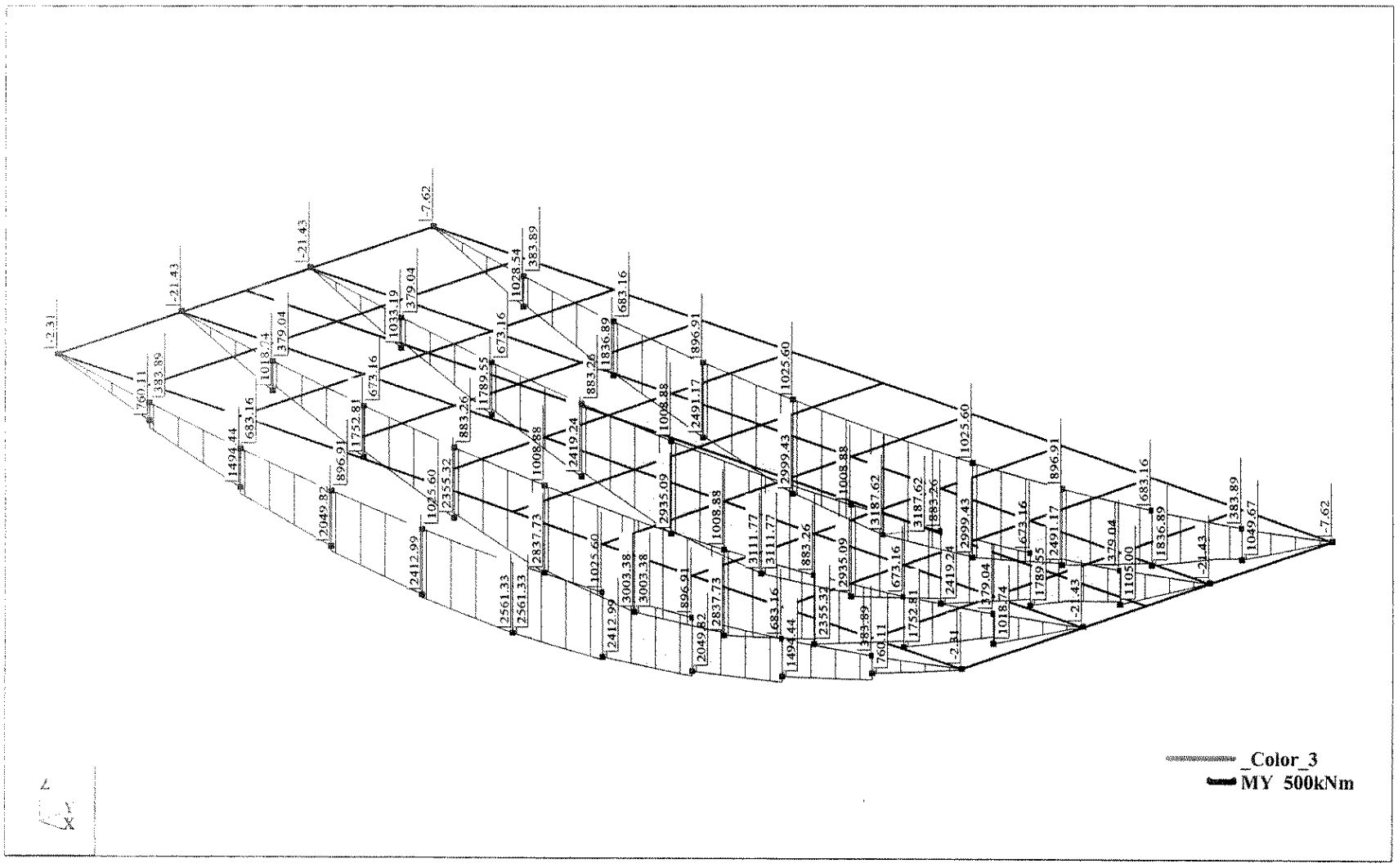
sistema de coordenadas global - Casos: 9 10

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	618.99	0.00	0.00
Nudo	54	5	52
Caso	ELS/4	ELS/2	ELS/2
MIN	238.80	-0.00	-0.00
Nudo	2	52	5
Caso	ELS/1	ELS/2	ELS/3

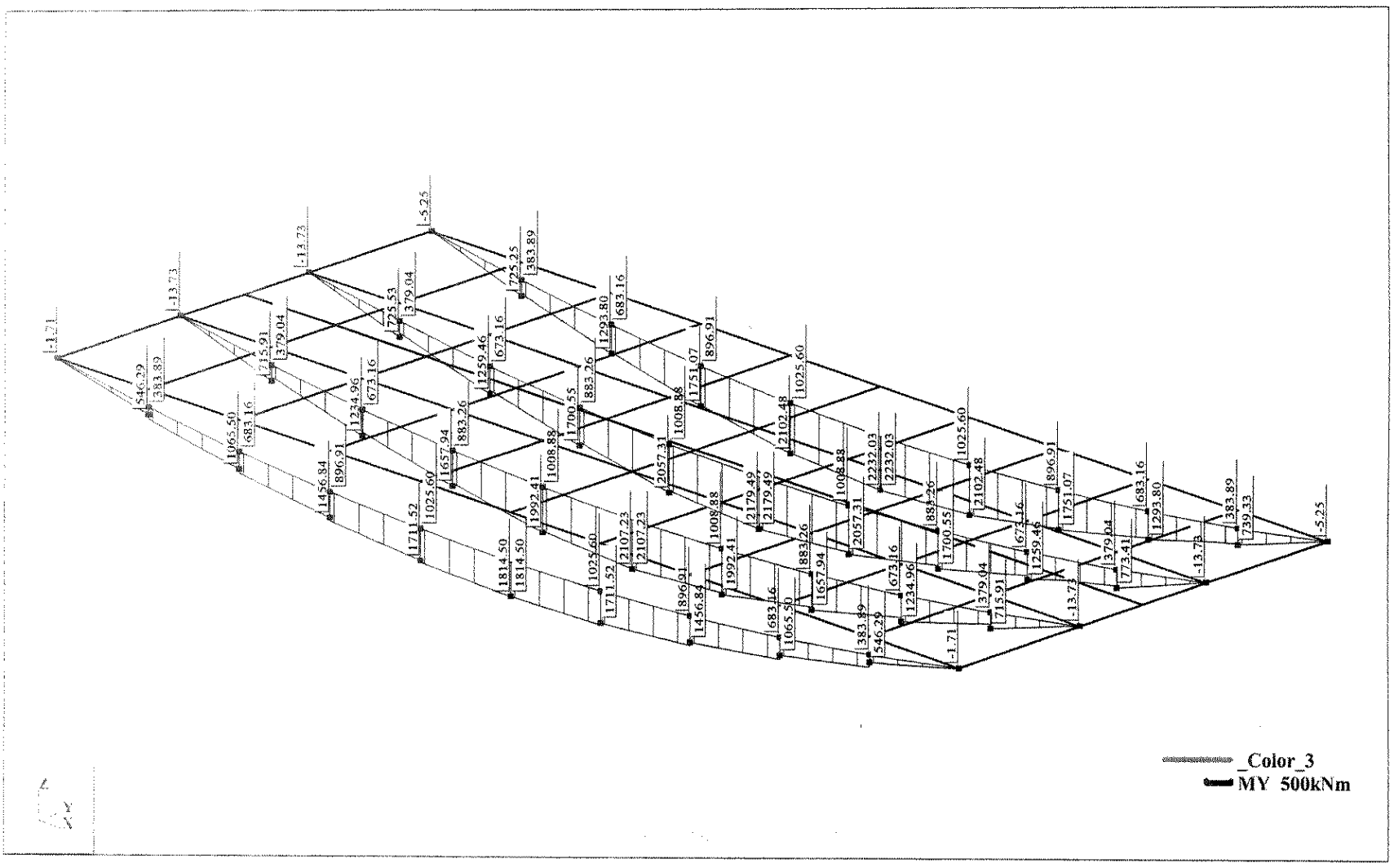
Vista - FZ; casos: 6 (ELU+) 1



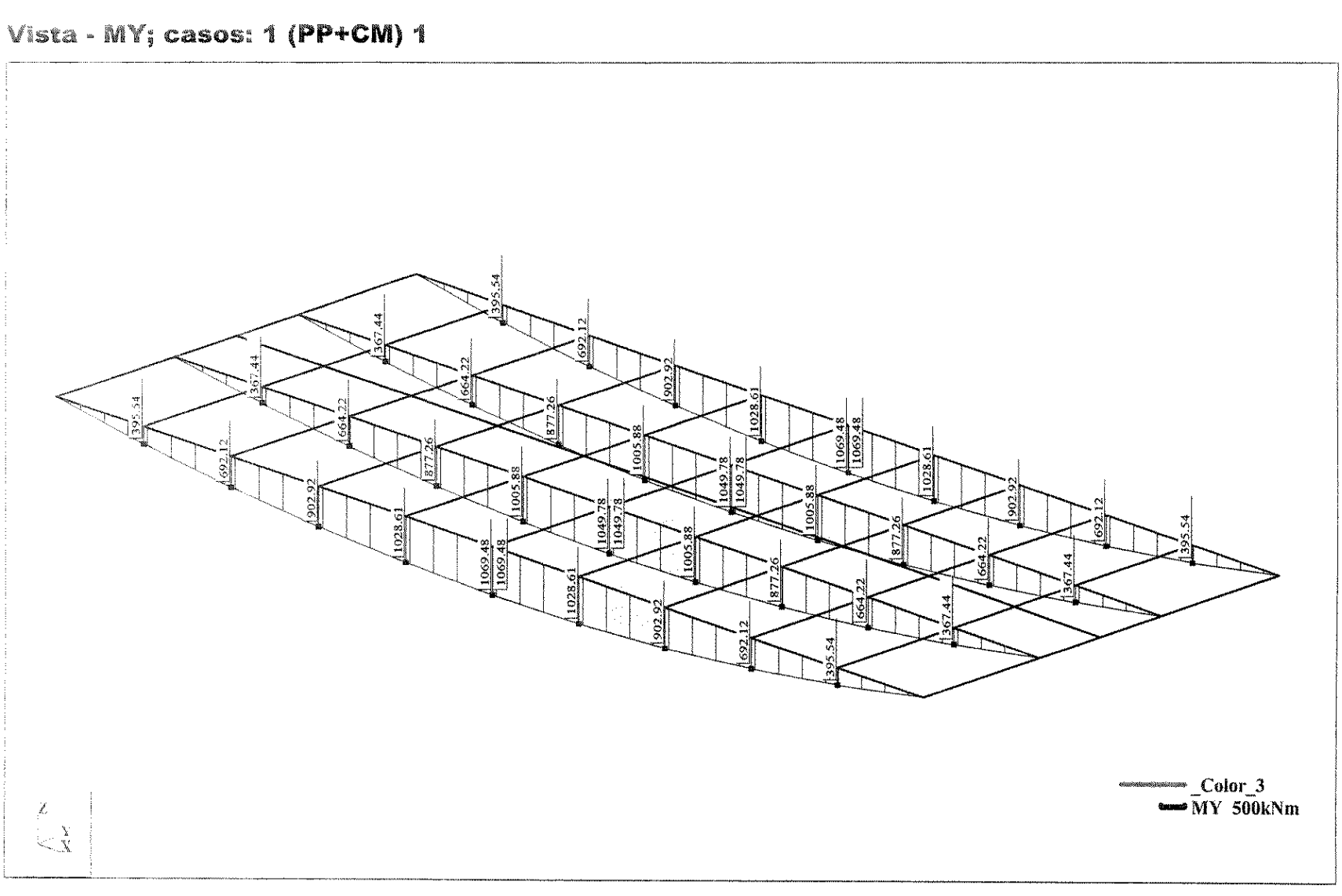
Vista - MY; casos: 6 (ELU+) 3



Vista - MY; casos: 9 (ELS+)



Vista - MY; casos: 1 (PP+CM) 1



Esfuerzos - Casos: 1A4 6 7 9 10 : Valores: 1

- Casos: 1A4 6 7 9 10

Filtrar	Barra	Caso
Lista completa	1A94	1A10
Selección	1A94	1A4 6 7 9 10
Número total	94	10
Número seleccionado	94	8

- Casos: 1A4 6 7 9 10

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
1/	1/	1	241.89	-0.44	-1.71
1/	1/	2	79.62	4.37	15.39
1/	1/	3	72.64	2.72	9.46
1/	1/	4	73.00	0.66	1.85
1/	1/	ELU+	445.99	6.12	21.37
1/	1/	ELU-	241.89	-0.59	-2.31
1/	1/	ELS+	321.52	3.94	13.67
1/	1/	ELS-	241.89	-0.44	-1.71
1/	6/	1	225.47	-0.44	395.54
1/	6/	2	79.62	4.37	150.75
1/	6/	3	72.64	2.72	132.95
1/	6/	4	73.00	0.66	125.96
1/	6/	ELU+	423.82	6.12	760.11
1/	6/	ELU-	225.47	-0.59	395.54
1/	6/	ELS+	305.09	3.94	546.29
1/	6/	ELS-	225.47	-0.44	395.54
2/	6/	1	189.52	-0.84	383.89
2/	6/	2	66.66	8.85	260.06
2/	6/	3	59.44	5.51	204.90
2/	6/	4	57.45	1.45	140.44

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
2/	6/	ELU+	355.85	12.43	908.34
2/	6/	ELU-	189.52	-1.14	383.89
2/	6/	ELS+	256.19	8.00	643.95
2/	6/	ELS-	189.52	-0.84	383.89
2/	11/	1	173.10	-0.84	692.12
2/	11/	2	66.66	8.85	373.39
2/	11/	3	59.44	5.51	305.94
2/	11/	4	57.45	1.45	238.11
2/	11/	ELU+	333.68	12.43	1494.44
2/	11/	ELU-	173.10	-1.14	692.12
2/	11/	ELS+	239.76	8.00	1065.50
2/	11/	ELS-	173.10	-0.84	692.12
3/	11/	1	137.48	-0.88	683.16
3/	11/	2	50.46	9.60	468.13
3/	11/	3	44.16	5.91	368.12
3/	11/	4	41.47	1.75	251.56
3/	11/	ELU+	261.30	13.53	1624.46
3/	11/	ELU-	137.48	-1.18	683.16
3/	11/	ELS+	187.95	8.73	1151.29
3/	11/	ELS-	137.48	-0.88	683.16
3/	16/	1	121.06	-0.88	902.92
3/	16/	2	50.46	9.60	553.91
3/	16/	3	44.16	5.91	443.20
3/	16/	4	41.47	1.75	322.06
3/	16/	ELU+	239.13	13.53	2049.82
3/	16/	ELU-	121.06	-1.18	902.92
3/	16/	ELS+	171.52	8.73	1456.84
3/	16/	ELS-	121.06	-0.88	902.92
4/	16/	1	85.68	-0.63	896.91
4/	16/	2	31.57	7.25	629.25
4/	16/	3	27.23	4.40	489.86
4/	16/	4	25.13	1.62	333.74

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
4/	16/	ELU+	163.02	10.24	2154.71
4/	16/	ELU-	85.68	-0.86	896.91
4/	16/	ELS+	117.25	6.61	1526.16
4/	16/	ELS-	85.68	-0.63	896.91
4/	21/	1	69.26	-0.63	1028.61
4/	21/	2	31.57	7.25	682.91
4/	21/	3	27.23	4.40	536.15
4/	21/	4	25.13	1.62	376.46
4/	21/	ELU+	140.85	10.24	2412.99
4/	21/	ELU-	69.26	-0.86	1028.61
4/	21/	ELS+	100.82	6.61	1711.52
4/	21/	ELS-	69.26	-0.63	1028.61
5/	21/	1	34.02	-0.23	1025.60
5/	21/	2	10.76	2.69	726.74
5/	21/	3	9.21	1.61	561.54
5/	21/	4	8.48	1.14	385.47
5/	21/	ELU+	62.06	3.80	2474.68
5/	21/	ELU-	34.02	-0.31	1025.60
5/	21/	ELS+	44.78	2.46	1752.34
5/	21/	ELS-	34.02	-0.23	1025.60
5/	26/	1	17.60	-0.23	1069.48
5/	26/	2	10.76	2.69	745.03
5/	26/	3	9.21	1.61	577.18
5/	26/	4	8.48	1.14	399.88
5/	26/	ELU+	39.89	3.80	2561.33
5/	26/	ELU-	17.60	-0.31	1069.48
5/	26/	ELS+	28.35	2.46	1814.50
5/	26/	ELS-	17.60	-0.23	1069.48
6/	26/	1	-17.60	0.23	1069.48
6/	26/	2	-10.76	-2.69	745.03
6/	26/	3	-9.21	-1.61	577.18
6/	26/	4	-8.37	0.42	405.04

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
6/	26/	ELU+	-17.60	0.95	2561.33
6/	26/	ELU-	-39.89	-3.80	1069.48
6/	26/	ELS+	-17.60	0.65	1814.50
6/	26/	ELS-	-28.35	-2.46	1069.48
6/	31/	1	-34.02	0.23	1025.60
6/	31/	2	-10.76	-2.69	726.74
6/	31/	3	-9.21	-1.61	561.54
6/	31/	4	-8.37	0.42	390.82
6/	31/	ELU+	-34.02	0.95	2474.68
6/	31/	ELU-	-62.06	-3.80	1025.60
6/	31/	ELS+	-34.02	0.65	1752.34
6/	31/	ELS-	-44.78	-2.46	1025.60
7/	31/	1	-69.26	0.63	1028.61
7/	31/	2	-31.57	-7.25	682.91
7/	31/	3	-27.23	-4.40	536.15
7/	31/	4	-25.27	-0.37	390.62
7/	31/	ELU+	-69.26	0.86	2412.99
7/	31/	ELU-	-140.85	-10.24	1028.61
7/	31/	ELS+	-69.26	0.63	1711.52
7/	31/	ELS-	-100.82	-6.61	1028.61
7/	36/	1	-85.68	0.63	896.91
7/	36/	2	-31.57	-7.25	629.25
7/	36/	3	-27.23	-4.40	489.86
7/	36/	4	-25.27	-0.37	347.66
7/	36/	ELU+	-85.68	0.86	2154.71
7/	36/	ELU-	-163.02	-10.24	896.91
7/	36/	ELS+	-85.68	0.63	1526.16
7/	36/	ELS-	-117.25	-6.61	896.91
8/	36/	1	-121.06	0.88	902.92
8/	36/	2	-50.46	-9.60	553.91
8/	36/	3	-44.16	-5.91	443.20
8/	36/	4	-42.04	-1.01	340.34

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
8/	36/	ELU+	-121.06	1.18	2049.82
8/	36/	ELU-	-239.13	-13.53	902.92
8/	36/	ELS+	-121.06	0.88	1456.84
8/	36/	ELS-	-171.52	-8.73	902.92
8/	41/	1	-137.48	0.88	683.16
8/	41/	2	-50.46	-9.60	468.13
8/	41/	3	-44.16	-5.91	368.12
8/	41/	4	-42.04	-1.01	268.88
8/	41/	ELU+	-137.48	1.18	1624.46
8/	41/	ELU-	-261.30	-13.53	683.16
8/	41/	ELS+	-137.48	0.88	1151.29
8/	41/	ELS-	-187.95	-8.73	683.16
9/	41/	1	-173.10	0.84	692.12
9/	41/	2	-66.66	-8.85	373.39
9/	41/	3	-59.44	-5.51	305.94
9/	41/	4	-58.43	-1.23	252.88
9/	41/	ELU+	-173.10	1.14	1494.44
9/	41/	ELU-	-333.68	-12.43	692.12
9/	41/	ELS+	-173.10	0.84	1065.50
9/	41/	ELS-	-239.76	-8.00	692.12
9/	46/	1	-189.52	0.84	383.89
9/	46/	2	-66.66	-8.85	260.06
9/	46/	3	-59.44	-5.51	204.90
9/	46/	4	-58.43	-1.23	153.54
9/	46/	ELU+	-189.52	1.14	908.34
9/	46/	ELU-	-355.85	-12.43	383.89
9/	46/	ELS+	-189.52	0.84	643.95
9/	46/	ELS-	-256.19	-8.00	383.89
10/	46/	1	-225.47	0.44	395.54
10/	46/	2	-79.62	-4.37	150.75
10/	46/	3	-72.64	-2.72	132.95
10/	46/	4	-74.19	-0.72	129.48

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
10/	46/	ELU+	-225.47	0.59	760.11
10/	46/	ELU-	-423.82	-6.12	395.54
10/	46/	ELS+	-225.47	0.44	546.29
10/	46/	ELS-	-305.09	-3.94	395.54
10/	51/	1	-241.89	0.44	-1.71
10/	51/	2	-79.62	-4.37	15.39
10/	51/	3	-72.64	-2.72	9.46
10/	51/	4	-74.19	-0.72	3.36
10/	51/	ELU+	-241.89	0.59	21.37
10/	51/	ELU-	-445.99	-6.12	-2.31
10/	51/	ELS+	-241.89	0.44	13.67
10/	51/	ELS-	-321.52	-3.94	-1.71
11/	2/	1	223.37	-0.52	1.67
11/	2/	2	214.04	5.75	-15.40
11/	2/	3	99.13	9.53	9.30
11/	2/	4	75.01	3.02	2.10
11/	2/	ELU+	622.61	13.77	16.20
11/	2/	ELU-	223.37	-0.70	-21.43
11/	2/	ELS+	437.41	9.01	10.97
11/	2/	ELS-	223.37	-0.52	-13.73
11/	7/	1	206.94	-0.52	367.44
11/	7/	2	214.04	5.75	348.47
11/	7/	3	99.13	9.53	177.81
11/	7/	4	75.01	3.02	129.62
11/	7/	ELU+	600.44	13.77	1018.74
11/	7/	ELU-	206.94	-0.70	367.44
11/	7/	ELS+	420.99	9.01	715.91
11/	7/	ELS-	206.94	-0.52	367.44
12/	7/	1	175.96	-0.93	379.04
12/	7/	2	194.99	13.15	239.25
12/	7/	3	83.43	19.37	243.73
12/	7/	4	59.75	7.21	144.75

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
12/	7/	ELU+	530.04	28.13	877.29
12/	7/	ELU-	175.96	-1.25	379.04
12/	7/	ELS+	370.96	18.44	622.77
12/	7/	ELS-	175.96	-0.93	379.04
12/	12/	1	159.54	-0.93	664.22
12/	12/	2	194.99	13.15	570.74
12/	12/	3	83.43	19.37	385.56
12/	12/	4	59.75	7.21	246.33
12/	12/	ELU+	507.87	28.13	1752.81
12/	12/	ELU-	159.54	-1.25	664.22
12/	12/	ELS+	354.53	18.44	1234.96
12/	12/	ELS-	159.54	-0.93	664.22
13/	12/	1	128.27	-0.93	673.16
13/	12/	2	179.03	16.76	476.33
13/	12/	3	65.07	21.96	444.30
13/	12/	4	43.95	9.88	260.19
13/	12/	ELU+	441.70	32.01	1623.27
13/	12/	ELU-	128.27	-1.26	673.16
13/	12/	ELS+	307.30	21.03	1149.49
13/	12/	ELS-	128.27	-0.93	673.16
13/	17/	1	111.85	-0.93	877.26
13/	17/	2	179.03	16.76	780.68
13/	17/	3	65.07	21.96	554.92
13/	17/	4	43.95	9.88	334.90
13/	17/	ELU+	419.53	32.01	2355.32
13/	17/	ELU-	111.85	-1.26	877.26
13/	17/	ELS+	290.87	21.03	1657.94
13/	17/	ELS-	111.85	-0.93	877.26
14/	17/	1	80.34	-0.67	883.26
14/	17/	2	164.25	16.39	707.30
14/	17/	3	44.09	18.31	604.38
14/	17/	4	27.73	11.24	347.72

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
14/	17/	ELU+	354.84	26.80	2253.35
14/	17/	ELU-	80.34	-0.90	883.26
14/	17/	ELS+	244.59	17.64	1590.56
14/	17/	ELS-	80.34	-0.67	883.26
14/	22/	1	63.92	-0.67	1005.88
14/	22/	2	164.25	16.39	986.53
14/	22/	3	44.09	18.31	679.33
14/	22/	4	27.73	11.24	394.85
14/	22/	ELU+	332.67	26.80	2837.73
14/	22/	ELU-	63.92	-0.90	1005.88
14/	22/	ELS+	228.17	17.64	1992.41
14/	22/	ELS-	63.92	-0.67	1005.88
15/	22/	1	32.27	-0.24	1008.88
15/	22/	2	66.06	6.77	945.15
15/	22/	3	15.75	7.11	709.70
15/	22/	4	11.12	11.47	406.54
15/	22/	ELU+	142.65	16.97	2779.72
15/	22/	ELU-	32.27	-0.33	1008.88
15/	22/	ELS+	98.33	11.23	1954.03
15/	22/	ELS-	32.27	-0.24	1008.88
15/	27/	1	15.85	-0.24	1049.78
15/	27/	2	66.06	6.77	1057.45
15/	27/	3	15.75	7.11	736.48
15/	27/	4	11.12	11.47	425.45
15/	27/	ELU+	120.48	16.97	3003.38
15/	27/	ELU-	15.85	-0.33	1049.78
15/	27/	ELS+	81.91	11.23	2107.23
15/	27/	ELS-	15.85	-0.24	1049.78
16/	27/	1	-15.85	0.24	1049.78
16/	27/	2	-66.06	-6.77	1057.45
16/	27/	3	-15.75	-7.11	736.48
16/	27/	4	-5.87	10.85	435.37

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
16/	27/	ELU+	-15.85	16.60	3003.38
16/	27/	ELU-	-120.48	-10.43	1049.78
16/	27/	ELS+	-15.85	11.09	2107.23
16/	27/	ELS-	-81.91	-6.87	1049.78
16/	32/	1	-32.27	0.24	1008.88
16/	32/	2	-66.06	-6.77	945.15
16/	32/	3	-15.75	-7.11	709.70
16/	32/	4	-5.87	10.85	425.39
16/	32/	ELU+	-32.27	16.60	2779.72
16/	32/	ELU-	-142.65	-10.43	1008.88
16/	32/	ELS+	-32.27	11.09	1954.03
16/	32/	ELS-	-98.33	-6.87	1008.88
17/	32/	1	-63.92	0.67	1005.88
17/	32/	2	-164.25	-16.39	986.53
17/	32/	3	-44.09	-18.31	679.33
17/	32/	4	-23.31	9.71	432.01
17/	32/	ELU+	-63.92	15.47	2837.73
17/	32/	ELU-	-332.67	-26.80	1005.88
17/	32/	ELS+	-63.92	10.38	1992.41
17/	32/	ELS-	-228.17	-17.64	1005.88
17/	37/	1	-80.34	0.67	883.26
17/	37/	2	-164.25	-16.39	707.30
17/	37/	3	-44.09	-18.31	604.38
17/	37/	4	-23.31	9.71	392.39
17/	37/	ELU+	-80.34	15.47	2253.35
17/	37/	ELU-	-354.84	-26.80	883.26
17/	37/	ELS+	-80.34	10.38	1590.56
17/	37/	ELS-	-244.59	-17.64	883.26
18/	37/	1	-111.85	0.93	877.26
18/	37/	2	-179.03	-16.76	780.68
18/	37/	3	-65.07	-21.96	554.92
18/	37/	4	-41.70	8.29	392.68

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
18/	37/	ELU+	-111.85	13.69	2355.32
18/	37/	ELU-	-419.53	-32.01	877.26
18/	37/	ELS+	-111.85	9.22	1657.94
18/	37/	ELS-	-290.87	-21.03	877.26
18/	42/	1	-128.27	0.93	673.16
18/	42/	2	-179.03	-16.76	476.33
18/	42/	3	-65.07	-21.96	444.30
18/	42/	4	-41.70	8.29	321.78
18/	42/	ELU+	-128.27	13.69	1623.27
18/	42/	ELU-	-441.70	-32.01	673.16
18/	42/	ELS+	-128.27	9.22	1149.49
18/	42/	ELS-	-307.30	-21.03	673.16
19/	42/	1	-159.54	0.93	664.22
19/	42/	2	-194.99	-13.15	570.74
19/	42/	3	-83.43	-19.37	385.56
19/	42/	4	-65.32	4.75	307.59
19/	42/	ELU+	-159.54	8.37	1752.81
19/	42/	ELU-	-507.87	-28.13	664.22
19/	42/	ELS+	-159.54	5.67	1234.96
19/	42/	ELS-	-354.53	-18.44	664.22
19/	47/	1	-175.96	0.93	379.04
19/	47/	2	-194.99	-13.15	239.25
19/	47/	3	-83.43	-19.37	243.73
19/	47/	4	-65.32	4.75	196.53
19/	47/	ELU+	-175.96	8.37	877.29
19/	47/	ELU-	-530.04	-28.13	379.04
19/	47/	ELS+	-175.96	5.67	622.77
19/	47/	ELS-	-370.96	-18.44	379.04
20/	47/	1	-206.94	0.52	367.44
20/	47/	2	-214.04	-5.75	348.47
20/	47/	3	-99.13	-9.53	177.81
20/	47/	4	-91.51	1.51	161.16

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
20/	47/	ELU+	-206.94	2.97	1018.74
20/	47/	ELU-	-600.44	-13.77	367.44
20/	47/	ELS+	-206.94	2.03	715.91
20/	47/	ELS-	-420.99	-9.01	367.44
20/	52/	1	-223.37	0.52	1.67
20/	52/	2	-214.04	-5.75	-15.40
20/	52/	3	-99.13	-9.53	9.30
20/	52/	4	-91.51	1.51	5.60
20/	52/	ELU+	-223.37	2.97	16.20
20/	52/	ELU-	-622.61	-13.77	-21.43
20/	52/	ELS+	-223.37	2.03	10.97
20/	52/	ELS-	-437.41	-9.01	-13.73
21/	4/	1	223.37	0.52	1.67
21/	4/	2	214.04	-5.75	-15.40
21/	4/	3	219.62	6.49	-15.25
21/	4/	4	96.52	1.34	-2.71
21/	4/	ELU+	630.97	10.43	2.26
21/	4/	ELU-	223.37	-8.11	-21.43
21/	4/	ELS+	442.99	7.01	1.67
21/	4/	ELS-	223.37	-5.23	-13.73
21/	9/	1	206.94	0.52	367.44
21/	9/	2	214.04	-5.75	348.47
21/	9/	3	219.62	6.49	358.10
21/	9/	4	96.52	1.34	161.37
21/	9/	ELU+	608.80	10.43	1033.19
21/	9/	ELU-	206.94	-8.11	367.44
21/	9/	ELS+	426.56	7.01	725.53
21/	9/	ELS-	206.94	-5.23	367.44
22/	9/	1	175.96	0.93	379.04
22/	9/	2	194.99	-13.15	239.25
22/	9/	3	203.11	11.64	249.95
22/	9/	4	80.52	2.18	141.73

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
22/	9/	ELU+	542.21	18.71	886.63
22/	9/	ELU-	175.96	-18.80	379.04
22/	9/	ELS+	379.07	12.57	628.99
22/	9/	ELS-	175.96	-12.23	379.04
22/	14/	1	159.54	0.93	664.22
22/	14/	2	194.99	-13.15	570.74
22/	14/	3	203.11	11.64	595.24
22/	14/	4	80.52	2.18	278.62
22/	14/	ELU+	520.04	18.71	1789.55
22/	14/	ELU-	159.54	-18.80	664.22
22/	14/	ELS+	362.65	12.57	1259.46
22/	14/	ELS-	159.54	-12.23	664.22
23/	14/	1	128.27	0.93	673.16
23/	14/	2	179.03	-16.76	476.33
23/	14/	3	190.38	11.06	499.64
23/	14/	4	65.24	1.64	259.89
23/	14/	ELU+	458.74	17.85	1658.22
23/	14/	ELU-	128.27	-24.21	673.16
23/	14/	ELS+	318.65	11.99	1172.80
23/	14/	ELS-	128.27	-15.83	673.16
23/	19/	1	111.85	0.93	877.26
23/	19/	2	179.03	-16.76	780.68
23/	19/	3	190.38	11.06	823.29
23/	19/	4	65.24	1.64	370.79
23/	19/	ELU+	436.57	17.85	2419.24
23/	19/	ELU-	111.85	-24.21	877.26
23/	19/	ELS+	302.23	11.99	1700.55
23/	19/	ELS-	111.85	-15.83	877.26
24/	19/	1	80.34	0.67	883.26
24/	19/	2	164.25	-16.39	707.30
24/	19/	3	179.83	6.33	745.71
24/	19/	4	50.52	-0.06	352.48

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
24/	19/	ELU+	378.21	10.40	2310.97
24/	19/	ELU-	80.34	-23.92	883.26
24/	19/	ELS+	260.17	7.00	1628.97
24/	19/	ELS-	80.34	-15.72	883.26
24/	24/	1	63.92	0.67	1005.88
24/	24/	2	164.25	-16.39	986.53
24/	24/	3	179.83	6.33	1051.43
24/	24/	4	50.52	-0.06	438.36
24/	24/	ELU+	356.04	10.40	2935.09
24/	24/	ELU-	63.92	-23.92	1005.88
24/	24/	ELS+	243.75	7.00	2057.31
24/	24/	ELS-	63.92	-15.72	1005.88
25/	24/	1	32.27	0.24	1008.88
25/	24/	2	66.06	-6.77	945.15
25/	24/	3	72.89	1.97	1005.80
25/	24/	4	36.34	-2.72	420.63
25/	24/	ELU+	152.90	3.28	2870.69
25/	24/	ELU-	32.27	-9.92	1008.88
25/	24/	ELS+	105.16	2.21	2014.68
25/	24/	ELS-	32.27	-6.53	1008.88
25/	29/	1	15.85	0.24	1049.78
25/	29/	2	66.06	-6.77	1057.45
25/	29/	3	72.89	1.97	1129.71
25/	29/	4	36.34	-2.72	482.42
25/	29/	ELU+	130.73	3.28	3111.77
25/	29/	ELU-	15.85	-9.92	1049.78
25/	29/	ELS+	88.74	2.21	2179.49
25/	29/	ELS-	15.85	-6.53	1049.78
26/	29/	1	-15.85	-0.24	1049.78
26/	29/	2	-66.06	6.77	1057.45
26/	29/	3	-72.89	-1.97	1129.71
26/	29/	4	22.71	-6.06	466.42

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
26/	29/	ELU+	18.21	9.92	3111.77
26/	29/	ELU-	-130.73	-9.41	1049.78
26/	29/	ELS+	6.86	6.53	2179.49
26/	29/	ELS-	-88.74	-6.30	1049.78
26/	34/	1	-32.27	-0.24	1008.88
26/	34/	2	-66.06	6.77	945.15
26/	34/	3	-72.89	-1.97	1005.80
26/	34/	4	22.71	-6.06	505.02
26/	34/	ELU+	1.79	9.92	2870.69
26/	34/	ELU-	-152.90	-9.41	1008.88
26/	34/	ELS+	-9.56	6.53	2014.68
26/	34/	ELS-	-105.16	-6.30	1008.88
27/	34/	1	-63.92	-0.67	1005.88
27/	34/	2	-164.25	16.39	986.53
27/	34/	3	-179.83	-6.33	1051.43
27/	34/	4	9.50	-9.68	493.65
27/	34/	ELU+	-49.67	23.92	2935.09
27/	34/	ELU-	-356.04	-15.42	1005.88
27/	34/	ELS+	-54.42	15.72	2057.31
27/	34/	ELS-	-243.75	-10.35	1005.88
27/	39/	1	-80.34	-0.67	883.26
27/	39/	2	-164.25	16.39	707.30
27/	39/	3	-179.83	-6.33	745.71
27/	39/	4	9.50	-9.68	509.80
27/	39/	ELU+	-66.09	23.92	2310.97
27/	39/	ELU-	-378.21	-15.42	883.26
27/	39/	ELS+	-70.84	15.72	1628.97
27/	39/	ELS-	-260.17	-10.35	883.26
28/	39/	1	-111.85	-0.93	877.26
28/	39/	2	-179.03	16.76	780.68
28/	39/	3	-190.38	-11.06	823.29
28/	39/	4	-4.03	-12.74	509.71

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
28/	39/	ELU+	-111.85	24.21	2419.24
28/	39/	ELU-	-436.57	-20.36	877.26
28/	39/	ELS+	-111.85	15.83	1700.55
28/	39/	ELS-	-302.23	-13.67	877.26
28/	44/	1	-128.27	-0.93	673.16
28/	44/	2	-179.03	16.76	476.33
28/	44/	3	-190.38	-11.06	499.64
28/	44/	4	-4.03	-12.74	502.87
28/	44/	ELU+	-128.27	24.21	1663.06
28/	44/	ELU-	-458.74	-20.36	673.16
28/	44/	ELS+	-128.27	15.83	1176.03
28/	44/	ELS-	-318.65	-13.67	673.16
29/	44/	1	-159.54	-0.93	664.22
29/	44/	2	-194.99	13.15	570.74
29/	44/	3	-203.11	-11.64	595.24
29/	44/	4	-103.35	-11.73	525.96
29/	44/	ELU+	-159.54	18.80	1789.55
29/	44/	ELU-	-520.04	-18.85	664.22
29/	44/	ELS+	-159.54	12.23	1259.46
29/	44/	ELS-	-362.65	-12.66	664.22
29/	49/	1	-175.96	-0.93	379.04
29/	49/	2	-194.99	13.15	239.25
29/	49/	3	-203.11	-11.64	249.95
29/	49/	4	-103.35	-11.73	350.28
29/	49/	ELU+	-175.96	18.80	1037.12
29/	49/	ELU-	-542.21	-18.85	379.04
29/	49/	ELS+	-175.96	12.23	729.31
29/	49/	ELS-	-379.07	-12.66	379.04
30/	49/	1	-206.94	-0.52	367.44
30/	49/	2	-214.04	5.75	348.47
30/	49/	3	-219.62	-6.49	358.10
30/	49/	4	-244.99	-6.49	405.98

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
30/	49/	ELU+	-206.94	8.11	1105.00
30/	49/	ELU-	-646.85	-10.44	367.44
30/	49/	ELS+	-206.94	5.23	773.41
30/	49/	ELS-	-451.93	-7.01	367.44
30/	54/	1	-223.37	-0.52	1.67
30/	54/	2	-214.04	5.75	-15.40
30/	54/	3	-219.62	-6.49	-15.25
30/	54/	4	-244.99	-6.49	-10.50
30/	54/	ELU+	-223.37	8.11	2.26
30/	54/	ELU-	-669.02	-10.44	-21.43
30/	54/	ELS+	-223.37	5.23	1.67
30/	54/	ELS-	-468.35	-7.01	-13.73
31/	5/	1	241.89	0.44	-1.71
31/	5/	2	79.62	-4.37	15.39
31/	5/	3	196.03	1.02	-3.54
31/	5/	4	95.93	0.33	-1.27
31/	5/	ELU+	620.59	2.12	21.37
31/	5/	ELU-	241.89	-6.12	-7.62
31/	5/	ELS+	437.92	1.46	13.67
31/	5/	ELS-	241.89	-3.94	-5.25
31/	10/	1	225.47	0.44	395.54
31/	10/	2	79.62	-4.37	150.75
31/	10/	3	196.03	1.02	329.71
31/	10/	4	95.93	0.33	161.81
31/	10/	ELU+	598.43	2.12	1028.54
31/	10/	ELU-	225.47	-6.12	395.54
31/	10/	ELS+	421.50	1.46	725.25
31/	10/	ELS-	225.47	-3.94	395.54
32/	10/	1	189.52	0.84	383.89
32/	10/	2	66.66	-8.85	260.06
32/	10/	3	177.46	2.06	300.00
32/	10/	4	78.81	0.65	151.82

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
32/	10/	ELU+	522.05	4.23	968.24
32/	10/	ELU-	189.52	-12.43	383.89
32/	10/	ELS+	366.99	2.90	683.88
32/	10/	ELS-	189.52	-8.00	383.89
32/	15/	1	173.10	0.84	692.12
32/	15/	2	66.66	-8.85	373.39
32/	15/	3	177.46	2.06	601.69
32/	15/	4	78.81	0.65	285.80
32/	15/	ELU+	499.88	4.23	1836.89
32/	15/	ELU-	173.10	-12.43	692.12
32/	15/	ELS+	350.56	2.90	1293.80
32/	15/	ELS-	173.10	-8.00	692.12
33/	15/	1	137.48	0.88	683.16
33/	15/	2	50.46	-9.60	468.13
33/	15/	3	159.71	2.15	576.64
33/	15/	4	61.98	0.63	277.23
33/	15/	ELU+	425.17	4.41	1787.23
33/	15/	ELU-	137.48	-13.53	683.16
33/	15/	ELS+	297.19	3.03	1259.81
33/	15/	ELS-	137.48	-8.73	683.16
33/	20/	1	121.06	0.88	902.92
33/	20/	2	50.46	-9.60	553.91
33/	20/	3	159.71	2.15	848.15
33/	20/	4	61.98	0.63	382.59
33/	20/	ELU+	403.00	4.41	2491.17
33/	20/	ELU-	121.06	-13.53	902.92
33/	20/	ELS+	280.77	3.03	1751.07
33/	20/	ELS-	121.06	-8.73	902.92
34/	20/	1	85.68	0.63	896.91
34/	20/	2	31.57	-7.25	629.25
34/	20/	3	142.56	1.55	831.52
34/	20/	4	45.37	0.36	376.43

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
34/	20/	ELU+	329.51	3.18	2458.11
34/	20/	ELU-	85.68	-10.24	896.91
34/	20/	ELS+	228.24	2.19	1728.43
34/	20/	ELS-	85.68	-6.61	896.91
34/	25/	1	69.26	0.63	1028.61
34/	25/	2	31.57	-7.25	682.91
34/	25/	3	142.56	1.55	1073.87
34/	25/	4	45.37	0.36	453.55
34/	25/	ELU+	307.34	3.18	2999.43
34/	25/	ELU-	69.26	-10.24	1028.61
34/	25/	ELS+	211.82	2.19	2102.48
34/	25/	ELS-	69.26	-6.61	1028.61
35/	25/	1	34.02	0.23	1025.60
35/	25/	2	10.76	-2.69	726.74
35/	25/	3	56.70	0.56	1066.17
35/	25/	4	28.89	-0.07	450.62
35/	25/	ELU+	130.97	1.15	2983.82
35/	25/	ELU-	34.02	-3.80	1025.60
35/	25/	ELS+	90.71	0.79	2091.78
35/	25/	ELS-	34.02	-2.46	1025.60
35/	30/	1	17.60	0.23	1069.48
35/	30/	2	10.76	-2.69	745.03
35/	30/	3	56.70	0.56	1162.55
35/	30/	4	28.89	-0.07	499.74
35/	30/	ELU+	108.80	1.15	3187.62
35/	30/	ELU-	17.60	-3.80	1069.48
35/	30/	ELS+	74.29	0.79	2232.03
35/	30/	ELS-	17.60	-2.46	1069.48
36/	30/	1	-17.60	-0.23	1069.48
36/	30/	2	-10.76	2.69	745.03
36/	30/	3	-56.70	-0.56	1162.55
36/	30/	4	12.45	-0.54	500.72

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
36/	30/	ELU+	1.08	3.80	3187.62
36/	30/	ELU-	-108.80	-1.15	1069.48
36/	30/	ELS+	-5.14	2.46	2232.03
36/	30/	ELS-	-74.29	-0.79	1069.48
36/	35/	1	-34.02	-0.23	1025.60
36/	35/	2	-10.76	2.69	726.74
36/	35/	3	-56.70	-0.56	1066.17
36/	35/	4	12.45	-0.54	521.89
36/	35/	ELU+	-15.34	3.80	2983.82
36/	35/	ELU-	-130.97	-1.15	1025.60
36/	35/	ELS+	-21.57	2.46	2091.78
36/	35/	ELS-	-90.71	-0.79	1025.60
37/	35/	1	-69.26	-0.63	1028.61
37/	35/	2	-31.57	7.25	682.91
37/	35/	3	-142.56	-1.55	1073.87
37/	35/	4	-4.08	-0.89	527.09
37/	35/	ELU+	-69.26	10.24	2999.43
37/	35/	ELU-	-307.34	-3.18	1028.61
37/	35/	ELS+	-69.26	6.61	2102.48
37/	35/	ELS-	-211.82	-2.19	1028.61
37/	40/	1	-85.68	-0.63	896.91
37/	40/	2	-31.57	7.25	629.25
37/	40/	3	-142.56	-1.55	831.52
37/	40/	4	-4.08	-0.89	520.15
37/	40/	ELU+	-85.68	10.24	2458.11
37/	40/	ELU-	-329.51	-3.18	896.91
37/	40/	ELS+	-85.68	6.61	1728.43
37/	40/	ELS-	-228.24	-2.19	896.91
38/	40/	1	-121.06	-0.88	902.92
38/	40/	2	-50.46	9.60	553.91
38/	40/	3	-159.71	-2.15	848.15
38/	40/	4	-20.83	-1.00	528.96

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
38/	40/	ELU+	-121.06	13.53	2491.17
38/	40/	ELU-	-403.00	-4.41	902.92
38/	40/	ELS+	-121.06	8.73	1751.07
38/	40/	ELS-	-280.77	-3.03	902.92
38/	45/	1	-137.48	-0.88	683.16
38/	45/	2	-50.46	9.60	468.13
38/	45/	3	-159.71	-2.15	576.64
38/	45/	4	-20.83	-1.00	493.56
38/	45/	ELU+	-137.48	13.53	1787.23
38/	45/	ELU-	-425.17	-4.41	683.16
38/	45/	ELS+	-137.48	8.73	1259.81
38/	45/	ELS-	-297.19	-3.03	683.16
39/	45/	1	-173.10	-0.84	692.12
39/	45/	2	-66.66	8.85	373.39
39/	45/	3	-177.46	-2.06	601.69
39/	45/	4	-97.69	-0.78	503.19
39/	45/	ELU+	-173.10	12.43	1836.89
39/	45/	ELU-	-499.88	-4.23	692.12
39/	45/	ELS+	-173.10	8.00	1293.80
39/	45/	ELS-	-350.56	-2.90	692.12
39/	50/	1	-189.52	-0.84	383.89
39/	50/	2	-66.66	8.85	260.06
39/	50/	3	-177.46	-2.06	300.00
39/	50/	4	-97.69	-0.78	337.12
39/	50/	ELU+	-189.52	12.43	1023.93
39/	50/	ELU-	-522.05	-4.23	383.89
39/	50/	ELS+	-189.52	8.00	721.01
39/	50/	ELS-	-366.99	-2.90	383.89
40/	50/	1	-225.47	-0.44	395.54
40/	50/	2	-79.62	4.37	150.75
40/	50/	3	-196.03	-1.02	329.71
40/	50/	4	-202.40	-0.30	343.79

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
40/	50/	ELU+	-225.47	6.12	1049.67
40/	50/	ELU-	-607.99	-2.12	395.54
40/	50/	ELS+	-225.47	3.94	739.33
40/	50/	ELS-	-427.87	-1.46	395.54
40/	55/	1	-241.89	-0.44	-1.71
40/	55/	2	-79.62	4.37	15.39
40/	55/	3	-196.03	-1.02	-3.54
40/	55/	4	-202.40	-0.30	-0.30
40/	55/	ELU+	-241.89	6.12	21.37
40/	55/	ELU-	-630.16	-2.12	-7.62
40/	55/	ELS+	-241.89	3.94	13.67
40/	55/	ELS-	-444.30	-1.46	-5.25
41/	3/	1	0.29	0.00	0.08
41/	3/	2	0.30	0.00	0.03
41/	3/	3	0.22	3.81	0.04
41/	3/	4	0.12	0.82	0.03
41/	3/	ELU+	0.84	5.72	0.18
41/	3/	ELU-	0.29	0.00	0.08
41/	3/	ELS+	0.59	3.81	0.13
41/	3/	ELS-	0.29	0.00	0.08
41/	8/	1	0.29	0.00	0.57
41/	8/	2	0.30	0.00	0.55
41/	8/	3	0.22	3.81	0.42
41/	8/	4	0.12	0.82	0.22
41/	8/	ELU+	0.84	5.72	1.59
41/	8/	ELU-	0.29	0.00	0.57
41/	8/	ELS+	0.59	3.81	1.11
41/	8/	ELS-	0.29	0.00	0.57
42/	8/	1	0.28	-0.00	0.68
42/	8/	2	0.41	0.00	0.35
42/	8/	3	0.28	4.71	0.41
42/	8/	4	0.12	1.05	0.25

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
42/	8/	ELU+	1.00	7.06	1.52
42/	8/	ELU-	0.28	-0.00	0.68
42/	8/	ELS+	0.69	4.71	1.08
42/	8/	ELS-	0.28	-0.00	0.68
42/	13/	1	0.28	-0.00	1.15
42/	13/	2	0.41	0.00	1.06
42/	13/	3	0.28	4.71	0.88
42/	13/	4	0.12	1.05	0.46
42/	13/	ELU+	1.00	7.06	3.14
42/	13/	ELU-	0.28	-0.00	1.15
42/	13/	ELS+	0.69	4.71	2.21
42/	13/	ELS-	0.28	-0.00	1.15
43/	13/	1	0.21	0.00	1.18
43/	13/	2	0.82	0.00	0.39
43/	13/	3	0.47	4.12	0.61
43/	13/	4	0.10	1.00	0.45
43/	13/	ELU+	1.51	6.17	2.51
43/	13/	ELU-	0.21	0.00	1.18
43/	13/	ELS+	1.03	4.12	1.79
43/	13/	ELS-	0.21	0.00	1.18
43/	18/	1	0.21	0.00	1.53
43/	18/	2	0.82	0.00	1.79
43/	18/	3	0.47	4.12	1.41
43/	18/	4	0.10	1.00	0.62
43/	18/	ELU+	1.51	6.17	4.75
43/	18/	ELU-	0.21	0.00	1.53
43/	18/	ELS+	1.03	4.12	3.32
43/	18/	ELS-	0.21	0.00	1.53
44/	18/	1	0.12	0.00	1.55
44/	18/	2	4.25	0.00	-2.13
44/	18/	3	2.17	2.86	-0.50
44/	18/	4	0.08	0.87	0.60

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
44/	18/	ELU+	6.54	4.29	2.99
44/	18/	ELU-	0.12	0.00	-1.65
44/	18/	ELS+	4.37	2.86	2.15
44/	18/	ELS-	0.12	0.00	-0.59
44/	23/	1	0.12	0.00	1.76
44/	23/	2	4.25	0.00	5.09
44/	23/	3	2.17	2.86	3.19
44/	23/	4	0.08	0.87	0.74
44/	23/	ELU+	6.54	4.29	10.00
44/	23/	ELU-	0.12	0.00	1.76
44/	23/	ELS+	4.37	2.86	6.84
44/	23/	ELS-	0.12	0.00	1.76
45/	23/	1	0.04	0.00	1.77
45/	23/	2	1.86	0.00	0.18
45/	23/	3	0.94	1.04	0.77
45/	23/	4	0.06	0.68	0.71
45/	23/	ELU+	2.84	1.56	3.54
45/	23/	ELU-	0.04	0.00	1.77
45/	23/	ELS+	1.90	1.04	2.53
45/	23/	ELS-	0.04	0.00	1.77
45/	28/	1	0.04	0.00	1.84
45/	28/	2	1.86	0.00	3.34
45/	28/	3	0.94	1.04	2.37
45/	28/	4	0.06	0.68	0.81
45/	28/	ELU+	2.84	1.56	7.49
45/	28/	ELU-	0.04	0.00	1.84
45/	28/	ELS+	1.90	1.04	5.18
45/	28/	ELS-	0.04	0.00	1.84
46/	28/	1	-0.04	0.00	1.84
46/	28/	2	-1.86	-0.00	3.34
46/	28/	3	-0.94	-1.04	2.37
46/	28/	4	0.06	0.39	0.75

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
46/	28/	ELU+	0.05	0.59	7.49
46/	28/	ELU-	-2.84	-1.56	1.84
46/	28/	ELS+	0.02	0.39	5.18
46/	28/	ELS-	-1.90	-1.04	1.84
46/	33/	1	-0.04	0.00	1.77
46/	33/	2	-1.86	-0.00	0.18
46/	33/	3	-0.94	-1.04	0.77
46/	33/	4	0.06	0.39	0.85
46/	33/	ELU+	0.05	0.59	3.66
46/	33/	ELU-	-2.84	-1.56	1.77
46/	33/	ELS+	0.02	0.39	2.62
46/	33/	ELS-	-1.90	-1.04	1.77
47/	33/	1	-0.12	-0.00	1.76
47/	33/	2	-4.25	-0.00	5.09
47/	33/	3	-2.17	-2.86	3.19
47/	33/	4	0.22	-0.07	0.61
47/	33/	ELU+	0.21	-0.00	10.00
47/	33/	ELU-	-6.54	-4.29	1.76
47/	33/	ELS+	0.10	-0.00	6.84
47/	33/	ELS-	-4.37	-2.86	1.76
47/	38/	1	-0.12	-0.00	1.55
47/	38/	2	-4.25	-0.00	-2.13
47/	38/	3	-2.17	-2.86	-0.50
47/	38/	4	0.22	-0.07	0.98
47/	38/	ELU+	0.21	-0.00	3.56
47/	38/	ELU-	-6.54	-4.29	-1.65
47/	38/	ELS+	0.10	-0.00	2.53
47/	38/	ELS-	-4.37	-2.86	-0.59
48/	38/	1	-0.21	-0.00	1.53
48/	38/	2	-0.82	-0.00	1.79
48/	38/	3	-0.47	-4.12	1.41
48/	38/	4	1.74	-0.78	-0.73

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
48/	38/	ELU+	2.40	-0.00	4.75
48/	38/	ELU-	-1.51	-6.17	0.45
48/	38/	ELS+	1.53	-0.00	3.32
48/	38/	ELS-	-1.03	-4.12	0.81
48/	43/	1	-0.21	-0.00	1.18
48/	43/	2	-0.82	-0.00	0.39
48/	43/	3	-0.47	-4.12	0.61
48/	43/	4	1.74	-0.78	2.23
48/	43/	ELU+	2.40	-0.00	4.94
48/	43/	ELU-	-1.51	-6.17	1.18
48/	43/	ELS+	1.53	-0.00	3.41
48/	43/	ELS-	-1.03	-4.12	1.18
49/	43/	1	-0.28	0.00	1.15
49/	43/	2	-0.41	-0.00	1.06
49/	43/	3	-0.28	-4.71	0.88
49/	43/	4	1.07	-1.63	-0.31
49/	43/	ELU+	1.33	0.00	3.14
49/	43/	ELU-	-1.00	-7.06	0.69
49/	43/	ELS+	0.79	0.00	2.21
49/	43/	ELS-	-0.69	-4.71	0.84
49/	48/	1	-0.28	0.00	0.68
49/	48/	2	-0.41	-0.00	0.35
49/	48/	3	-0.28	-4.71	0.41
49/	48/	4	1.07	-1.63	1.51
49/	48/	ELU+	1.33	0.00	3.19
49/	48/	ELU-	-1.00	-7.06	0.68
49/	48/	ELS+	0.79	0.00	2.19
49/	48/	ELS-	-0.69	-4.71	0.68
50/	48/	1	-0.29	-0.00	0.57
50/	48/	2	-0.30	-0.00	0.55
50/	48/	3	-0.22	-3.81	0.42
50/	48/	4	1.91	-1.80	-1.41

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
50/	48/	ELU+	2.59	-0.00	1.59
50/	48/	ELU-	-0.84	-5.72	-1.55
50/	48/	ELS+	1.63	-0.00	1.11
50/	48/	ELS-	-0.59	-3.81	-0.85
50/	53/	1	-0.29	-0.00	0.08
50/	53/	2	-0.30	-0.00	0.03
50/	53/	3	-0.22	-3.81	0.04
50/	53/	4	1.91	-1.80	1.84
50/	53/	ELU+	2.59	-0.00	2.87
50/	53/	ELU-	-0.84	-5.72	0.08
50/	53/	ELS+	1.63	-0.00	1.92
50/	53/	ELS-	-0.59	-3.81	0.08
51/	1/	1	8.83	1.71	-5.63
51/	1/	2	0.55	-15.39	1.92
51/	1/	3	1.37	-9.46	0.27
51/	1/	4	3.47	-1.85	-1.79
51/	1/	ELU+	17.13	2.31	-2.74
51/	1/	ELU-	8.83	-21.37	-10.28
51/	1/	ELS+	12.30	1.71	-3.70
51/	1/	ELS-	8.83	-13.67	-7.42
51/	2/	1	-6.49	1.71	-2.53
51/	2/	2	-7.27	-15.39	-5.81
51/	2/	3	-6.45	-9.46	-5.56
51/	2/	4	-4.35	-1.85	-2.80
51/	2/	ELU+	-6.49	2.31	-2.53
51/	2/	ELU-	-19.66	-21.37	-12.13
51/	2/	ELS+	-6.49	1.71	-2.53
51/	2/	ELS-	-13.76	-13.67	-8.34
52/	2/	1	8.95	0.04	-3.05
52/	2/	2	4.23	0.02	-0.06
52/	2/	3	-1.54	-18.75	3.97
52/	2/	4	2.68	-3.96	0.22

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
52/	2/	ELU+	18.43	0.08	2.90
52/	2/	ELU-	6.64	-28.09	-4.21
52/	2/	ELS+	13.18	0.06	0.92
52/	2/	ELS-	7.41	-18.71	-3.11
52/	3/	1	0.14	0.04	2.46
52/	3/	2	0.15	0.02	2.57
52/	3/	3	-5.62	-18.75	-0.33
52/	3/	4	-1.40	-3.96	0.99
52/	3/	ELU+	0.42	0.08	7.18
52/	3/	ELU-	-8.29	-28.09	1.96
52/	3/	ELS+	0.29	0.06	5.03
52/	3/	ELS-	-5.48	-18.71	2.13
53/	3/	1	-0.14	-0.04	2.46
53/	3/	2	-0.15	-0.02	2.57
53/	3/	3	-5.84	-18.79	3.48
53/	3/	4	-1.52	-3.98	1.81
53/	3/	ELU+	-0.14	-0.04	8.54
53/	3/	ELU-	-8.96	-28.25	2.46
53/	3/	ELS+	-0.14	-0.04	5.94
53/	3/	ELS-	-5.99	-18.84	2.46
53/	4/	1	-8.95	-0.04	-3.05
53/	4/	2	-4.23	-0.02	-0.06
53/	4/	3	-9.92	-18.79	-5.98
53/	4/	4	-5.60	-3.98	-2.46
53/	4/	ELU+	-8.95	-0.04	-3.05
53/	4/	ELU-	-26.97	-28.25	-13.09
53/	4/	ELS+	-8.95	-0.04	-3.05
53/	4/	ELS-	-18.87	-18.84	-9.03
54/	4/	1	6.49	-1.71	-2.53
54/	4/	2	7.27	15.39	-5.81
54/	4/	3	2.18	-3.54	0.50
54/	4/	4	3.19	-1.27	-1.12

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
54/	4/	ELU+	19.66	21.37	-1.77
54/	4/	ELU-	6.49	-7.62	-12.13
54/	4/	ELS+	13.76	13.67	-2.03
54/	4/	ELS-	6.49	-5.25	-8.34
54/	5/	1	-8.83	-1.71	-5.63
54/	5/	2	-0.55	15.39	1.92
54/	5/	3	-5.64	-3.54	-3.47
54/	5/	4	-4.63	-1.27	-2.78
54/	5/	ELU+	-8.83	21.37	-2.74
54/	5/	ELU-	-20.38	-7.62	-12.80
54/	5/	ELS+	-8.83	13.67	-3.70
54/	5/	ELS-	-14.47	-5.25	-9.10
55/	51/	1	8.83	-1.71	-5.63
55/	51/	2	0.55	15.39	1.92
55/	51/	3	1.37	9.46	0.27
55/	51/	4	3.39	3.36	-1.73
55/	51/	ELU+	17.01	21.37	-2.74
55/	51/	ELU-	8.83	-2.31	-10.19
55/	51/	ELS+	12.23	13.67	-3.70
55/	51/	ELS-	8.83	-1.71	-7.36
55/	52/	1	-6.49	-1.71	-2.53
55/	52/	2	-7.27	15.39	-5.81
55/	52/	3	-6.45	9.46	-5.56
55/	52/	4	-4.43	3.36	-2.92
55/	52/	ELU+	-6.49	21.37	-2.53
55/	52/	ELU-	-19.66	-2.31	-12.13
55/	52/	ELS+	-6.49	13.67	-2.53
55/	52/	ELS-	-13.76	-1.71	-8.34
56/	52/	1	8.95	-0.04	-3.05
56/	52/	2	4.23	-0.02	-0.06
56/	52/	3	-1.54	18.75	3.97
56/	52/	4	10.34	8.96	-4.43

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
56/	52/	ELU+	27.59	28.09	2.90
56/	52/	ELU-	6.64	-0.08	-10.77
56/	52/	ELS+	19.29	18.71	0.92
56/	52/	ELS-	7.41	-0.06	-7.48
56/	53/	1	0.14	-0.04	2.46
56/	53/	2	0.15	-0.02	2.57
56/	53/	3	-5.62	18.75	-0.33
56/	53/	4	6.26	8.96	5.52
56/	53/	ELU+	9.58	28.09	11.61
56/	53/	ELU-	-8.29	-0.08	1.96
56/	53/	ELS+	6.40	18.71	7.98
56/	53/	ELS-	-5.48	-0.06	2.13
57/	53/	1	-0.14	0.04	2.46
57/	53/	2	-0.15	0.02	2.57
57/	53/	3	-5.84	18.79	3.48
57/	53/	4	-10.46	10.80	7.32
57/	53/	ELU+	-0.14	28.25	14.30
57/	53/	ELU-	-15.88	0.04	2.46
57/	53/	ELS+	-0.14	18.84	9.78
57/	53/	ELS-	-10.60	0.04	2.46
57/	54/	1	-8.95	0.04	-3.05
57/	54/	2	-4.23	0.02	-0.06
57/	54/	3	-9.92	18.79	-5.98
57/	54/	4	-14.54	10.80	-7.68
57/	54/	ELU+	-8.95	28.25	-3.05
57/	54/	ELU-	-33.89	0.04	-15.63
57/	54/	ELS+	-8.95	18.84	-3.05
57/	54/	ELS-	-23.49	0.04	-10.73
58/	54/	1	6.49	-1.71	-2.53
58/	54/	2	7.27	-15.39	-5.81
58/	54/	3	2.18	3.54	0.50
58/	54/	4	3.23	0.30	-1.19

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
58/	54/	ELU+	19.66	7.62	-1.77
58/	54/	ELU-	6.49	-21.37	-12.13
58/	54/	ELS+	13.76	5.25	-2.03
58/	54/	ELS-	6.49	-13.67	-8.34
58/	55/	1	-8.83	1.71	-5.63
58/	55/	2	-0.55	-15.39	1.92
58/	55/	3	-5.64	3.54	-3.47
58/	55/	4	-4.59	0.30	-2.75
58/	55/	ELU+	-8.83	7.62	-2.74
58/	55/	ELU-	-20.38	-21.37	-12.80
58/	55/	ELS+	-8.83	5.25	-3.70
58/	55/	ELS-	-14.47	-13.67	-9.10
59/	6/	1	17.25	11.66	-10.78
59/	6/	2	4.80	-109.31	-0.42
59/	6/	3	5.05	-71.95	-2.11
59/	6/	4	7.39	-14.49	-4.11
59/	6/	ELU+	34.37	15.74	-10.78
59/	6/	ELU-	17.25	-152.31	-20.71
59/	6/	ELS+	24.64	11.66	-10.78
59/	6/	ELS-	17.25	-97.66	-14.89
59/	7/	1	-13.37	11.66	-5.52
59/	7/	2	-10.84	-109.31	-7.36
59/	7/	3	-10.59	-71.95	-8.49
59/	7/	4	-8.25	-14.49	-5.09
59/	7/	ELU+	-13.37	15.74	-5.52
59/	7/	ELU-	-34.30	-152.31	-20.18
59/	7/	ELS+	-13.37	11.66	-5.52
59/	7/	ELS-	-24.20	-97.66	-14.01
60/	7/	1	17.61	0.05	-5.93
60/	7/	2	8.22	-0.10	0.04
60/	7/	3	5.10	-137.87	1.36
60/	7/	4	7.01	-29.61	-0.90

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
60/	7/	ELU+	36.10	0.07	-3.90
60/	7/	ELU-	17.61	-206.74	-9.36
60/	7/	ELS+	25.83	0.05	-4.57
60/	7/	ELS-	17.61	-137.81	-6.83
60/	8/	1	-0.00	0.05	4.75
60/	8/	2	0.06	-0.10	5.00
60/	8/	3	-3.06	-137.87	2.58
60/	8/	4	-1.15	-29.61	2.62
60/	8/	ELU+	0.08	0.07	13.91
60/	8/	ELU-	-4.59	-206.74	4.75
60/	8/	ELS+	0.05	0.05	9.75
60/	8/	ELS-	-3.06	-137.81	4.75
61/	8/	1	0.00	-0.05	4.75
61/	8/	2	-0.06	0.10	5.00
61/	8/	3	-3.11	-137.85	3.48
61/	8/	4	-1.16	-29.64	2.85
61/	8/	ELU+	0.00	0.09	13.91
61/	8/	ELU-	-4.67	-206.85	4.75
61/	8/	ELS+	0.00	0.04	9.75
61/	8/	ELS-	-3.11	-137.91	4.75
61/	9/	1	-17.61	-0.05	-5.93
61/	9/	2	-8.22	0.10	0.04
61/	9/	3	-11.27	-137.85	-5.15
61/	9/	4	-9.32	-29.64	-3.44
61/	9/	ELU+	-17.61	0.09	-5.87
61/	9/	ELU-	-40.69	-206.85	-15.73
61/	9/	ELS+	-17.61	0.04	-5.89
61/	9/	ELS-	-28.89	-137.91	-11.08
62/	9/	1	13.37	-11.66	-5.52
62/	9/	2	10.84	109.31	-7.36
62/	9/	3	5.24	-29.71	0.01
62/	9/	4	6.68	-9.99	-2.60

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
62/	9/	ELU+	34.30	152.31	-5.51
62/	9/	ELU-	13.37	-60.30	-18.50
62/	9/	ELS+	24.20	97.66	-5.52
62/	9/	ELS-	13.37	-41.37	-12.89
62/	10/	1	-17.25	-11.66	-10.78
62/	10/	2	-4.80	109.31	-0.42
62/	10/	3	-10.40	-29.71	-5.94
62/	10/	4	-8.96	-9.99	-5.21
62/	10/	ELU+	-17.25	152.31	-10.78
62/	10/	ELU-	-38.89	-60.30	-23.45
62/	10/	ELS+	-17.25	97.66	-10.78
62/	10/	ELS-	-27.65	-41.37	-16.71
63/	11/	1	16.92	8.95	-10.40
63/	11/	2	8.04	-94.74	-4.15
63/	11/	3	7.11	-62.17	-4.49
63/	11/	4	7.82	-13.45	-4.60
63/	11/	ELU+	34.90	12.09	-10.40
63/	11/	ELU-	16.92	-133.15	-20.94
63/	11/	ELS+	24.96	8.95	-10.40
63/	11/	ELS-	16.92	-85.78	-15.00
63/	12/	1	-13.69	8.95	-5.90
63/	12/	2	-7.60	-94.74	-3.64
63/	12/	3	-8.53	-62.17	-6.12
63/	12/	4	-7.82	-13.45	-4.61
63/	12/	ELU+	-13.69	12.09	-5.90
63/	12/	ELU-	-31.28	-133.15	-17.15
63/	12/	ELS+	-13.69	8.95	-5.90
63/	12/	ELS-	-22.22	-85.78	-12.02
64/	12/	1	17.58	0.01	-5.91
64/	12/	2	8.36	-0.33	-0.03
64/	12/	3	9.83	-120.91	-3.53
64/	12/	4	7.98	-27.31	-1.93

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
64/	12/	ELU+	38.48	0.02	-5.91
64/	12/	ELU-	17.58	-181.36	-13.27
64/	12/	ELS+	27.41	0.01	-5.91
64/	12/	ELS-	17.58	-120.90	-9.44
64/	13/	1	-0.04	0.01	4.73
64/	13/	2	0.20	-0.33	5.11
64/	13/	3	1.67	-120.91	3.38
64/	13/	4	-0.18	-27.31	2.75
64/	13/	ELU+	2.47	0.02	14.04
64/	13/	ELU-	-0.32	-181.36	4.73
64/	13/	ELS+	1.64	0.01	9.84
64/	13/	ELS-	-0.21	-120.90	4.73
65/	13/	1	0.04	-0.01	4.73
65/	13/	2	-0.20	0.33	5.11
65/	13/	3	1.48	-120.64	2.78
65/	13/	4	-0.16	-27.30	2.70
65/	13/	ELU+	2.27	0.49	14.04
65/	13/	ELU-	-0.27	-180.98	4.73
65/	13/	ELS+	1.52	0.32	9.84
65/	13/	ELS-	-0.17	-120.66	4.73
65/	14/	1	-17.58	-0.01	-5.91
65/	14/	2	-8.36	0.33	-0.03
65/	14/	3	-6.68	-120.64	-0.34
65/	14/	4	-8.32	-27.30	-2.38
65/	14/	ELU+	-17.58	0.49	-5.91
65/	14/	ELU-	-36.28	-180.98	-11.55
65/	14/	ELS+	-17.58	0.32	-5.91
65/	14/	ELS-	-25.94	-120.66	-8.29
66/	14/	1	13.69	-8.95	-5.90
66/	14/	2	7.60	94.74	-3.64
66/	14/	3	6.05	-25.04	-0.92
66/	14/	4	6.97	-8.57	-2.92

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
66/	14/	ELU+	29.89	133.15	-5.90
66/	14/	ELU-	13.69	-49.65	-13.43
66/	14/	ELS+	21.30	85.78	-5.90
66/	14/	ELS-	13.69	-34.00	-9.54
66/	15/	1	-16.92	-8.95	-10.40
66/	15/	2	-8.04	94.74	-4.15
66/	15/	3	-9.59	-25.04	-5.00
66/	15/	4	-8.67	-8.57	-4.88
66/	15/	ELU+	-16.92	133.15	-10.40
66/	15/	ELU-	-37.23	-49.65	-21.54
66/	15/	ELS+	-16.92	85.78	-10.40
66/	15/	ELS-	-26.51	-34.00	-15.40
67/	16/	1	16.68	6.01	-10.13
67/	16/	2	10.74	-75.34	-7.25
67/	16/	3	8.77	-46.66	-6.42
67/	16/	4	8.19	-11.68	-5.03
67/	16/	ELU+	38.63	8.11	-10.13
67/	16/	ELU-	16.68	-107.00	-24.56
67/	16/	ELS+	27.42	6.01	-10.13
67/	16/	ELS-	16.68	-69.33	-17.38
67/	17/	1	-13.93	6.01	-6.17
67/	17/	2	-4.90	-75.34	-0.55
67/	17/	3	-6.87	-46.66	-4.22
67/	17/	4	-7.45	-11.68	-4.19
67/	17/	ELU+	-13.93	8.11	-6.17
67/	17/	ELU-	-29.99	-107.00	-14.67
67/	17/	ELS+	-13.93	6.01	-6.17
67/	17/	ELS-	-21.38	-69.33	-10.40
68/	17/	1	17.57	0.01	-5.91
68/	17/	2	9.87	-1.96	-0.92
68/	17/	3	14.12	-96.12	-7.88
68/	17/	4	8.77	-24.50	-2.83

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
68/	17/	ELU+	44.90	0.01	-5.91
68/	17/	ELU-	17.57	-144.17	-19.79
68/	17/	ELS+	31.69	0.01	-5.91
68/	17/	ELS-	17.57	-96.11	-13.79
68/	18/	1	-0.04	0.01	4.73
68/	18/	2	1.71	-1.96	6.04
68/	18/	3	5.96	-96.12	4.17
68/	18/	4	0.61	-24.50	2.79
68/	18/	ELU+	8.89	0.01	15.43
68/	18/	ELU-	-0.06	-144.17	4.73
68/	18/	ELS+	5.92	0.01	10.76
68/	18/	ELS-	-0.04	-96.11	4.73
69/	18/	1	0.04	-0.01	4.73
69/	18/	2	-1.71	1.96	6.04
69/	18/	3	4.26	-94.21	2.91
69/	18/	4	0.63	-24.48	2.67
69/	18/	ELU+	6.44	2.93	15.43
69/	18/	ELU-	-2.53	-141.33	4.73
69/	18/	ELS+	4.30	1.95	10.76
69/	18/	ELS-	-1.67	-94.22	4.73
69/	19/	1	-17.57	-0.01	-5.91
69/	19/	2	-9.87	1.96	-0.92
69/	19/	3	-3.90	-94.21	3.13
69/	19/	4	-7.53	-24.48	-1.47
69/	19/	ELU+	-17.57	2.93	-1.22
69/	19/	ELU-	-38.54	-141.33	-10.18
69/	19/	ELS+	-17.57	1.95	-2.78
69/	19/	ELS-	-27.45	-94.22	-7.38
70/	19/	1	13.93	-6.01	-6.17
70/	19/	2	4.90	75.34	-0.55
70/	19/	3	6.65	-16.63	-1.60
70/	19/	4	7.19	-6.16	-3.18

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
70/	19/	ELU+	29.59	107.00	-6.17
70/	19/	ELU-	13.93	-33.06	-13.10
70/	19/	ELS+	21.12	69.33	-6.17
70/	19/	ELS-	13.93	-22.64	-9.35
70/	20/	1	-16.68	-6.01	-10.13
70/	20/	2	-10.74	75.34	-7.25
70/	20/	3	-8.99	-16.63	-4.30
70/	20/	4	-8.45	-6.16	-4.63
70/	20/	ELU+	-16.68	107.00	-10.13
70/	20/	ELU-	-38.63	-33.06	-24.56
70/	20/	ELS+	-16.68	69.33	-10.13
70/	20/	ELS-	-27.42	-22.64	-17.38
71/	21/	1	16.54	3.01	-9.97
71/	21/	2	12.65	-43.83	-9.46
71/	21/	3	9.87	-25.38	-7.68
71/	21/	4	8.49	-9.01	-5.38
71/	21/	ELU+	41.30	4.06	-9.97
71/	21/	ELU-	16.54	-62.73	-27.64
71/	21/	ELS+	29.19	3.01	-9.97
71/	21/	ELS-	16.54	-40.82	-19.43
71/	22/	1	-14.07	3.01	-6.34
71/	22/	2	-2.99	-43.83	1.65
71/	22/	3	-5.77	-25.38	-2.98
71/	22/	4	-7.15	-9.01	-3.85
71/	22/	ELU+	-14.07	4.06	-3.87
71/	22/	ELU-	-29.73	-62.73	-14.32
71/	22/	ELS+	-14.07	3.01	-4.69
71/	22/	ELS-	-21.23	-40.82	-10.18
72/	22/	1	17.57	0.00	-5.91
72/	22/	2	21.67	-2.45	-7.97
72/	22/	3	22.56	-55.75	-14.18
72/	22/	4	9.45	-20.69	-3.61

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
72/	22/	ELU+	57.56	0.00	-5.91
72/	22/	ELU-	17.57	-83.62	-29.24
72/	22/	ELS+	40.13	0.00	-5.91
72/	22/	ELS-	17.57	-55.75	-20.09
72/	23/	1	-0.04	0.00	4.72
72/	23/	2	13.51	-2.45	13.14
72/	23/	3	14.40	-55.75	8.00
72/	23/	4	1.29	-20.69	2.83
72/	23/	ELU+	21.55	0.00	26.08
72/	23/	ELU-	-0.06	-83.62	4.72
72/	23/	ELS+	14.36	0.00	17.86
72/	23/	ELS-	-0.04	-55.75	4.72
73/	23/	1	0.04	-0.00	4.72
73/	23/	2	-13.51	2.45	13.14
73/	23/	3	0.91	-53.33	6.17
73/	23/	4	1.31	-20.66	2.64
73/	23/	ELU+	2.02	3.67	26.08
73/	23/	ELU-	-20.22	-80.00	4.72
73/	23/	ELS+	1.35	2.45	17.86
73/	23/	ELS-	-13.47	-53.34	4.72
73/	24/	1	-17.57	-0.00	-5.91
73/	24/	2	-21.67	2.45	-7.97
73/	24/	3	-7.25	-53.33	2.37
73/	24/	4	-6.85	-20.66	-0.68
73/	24/	ELU+	-17.57	3.67	-2.35
73/	24/	ELU-	-56.23	-80.00	-19.93
73/	24/	ELS+	-17.57	2.45	-3.54
73/	24/	ELS-	-39.24	-53.34	-13.88
74/	24/	1	14.07	-3.01	-6.34
74/	24/	2	2.99	43.83	1.65
74/	24/	3	6.99	-7.70	-1.99
74/	24/	4	7.33	-2.93	-3.34

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
74/	24/	ELU+	29.99	62.73	-3.87
74/	24/	ELU-	14.07	-15.60	-13.56
74/	24/	ELS+	21.40	40.82	-4.69
74/	24/	ELS-	14.07	-10.70	-9.67
74/	25/	1	-16.54	-3.01	-9.97
74/	25/	2	-12.65	43.83	-9.46
74/	25/	3	-8.65	-7.70	-3.91
74/	25/	4	-8.31	-2.93	-4.47
74/	25/	ELU+	-16.54	62.73	-9.97
74/	25/	ELU-	-41.30	-15.60	-27.64
74/	25/	ELS+	-16.54	40.82	-9.97
74/	25/	ELS-	-29.19	-10.70	-19.43
75/	26/	1	16.49	-0.00	-9.91
75/	26/	2	13.35	-0.00	-10.28
75/	26/	3	10.25	-0.00	-8.13
75/	26/	4	8.69	-5.16	-5.62
75/	26/	ELU+	42.30	-0.00	-9.91
75/	26/	ELU-	16.49	-7.74	-28.79
75/	26/	ELS+	29.85	-0.00	-9.91
75/	26/	ELS-	16.49	-5.16	-20.19
75/	27/	1	-14.12	-0.00	-6.39
75/	27/	2	-2.29	-0.00	2.46
75/	27/	3	-5.39	-0.00	-2.54
75/	27/	4	-6.95	-5.16	-3.63
75/	27/	ELU+	-14.12	-0.00	-2.71
75/	27/	ELU-	-29.49	-7.74	-14.07
75/	27/	ELS+	-14.12	-0.00	-3.94
75/	27/	ELS-	-21.07	-5.16	-10.02
76/	27/	1	17.57	-0.00	-5.91
76/	27/	2	26.89	-0.00	-11.09
76/	27/	3	26.12	-0.00	-16.76
76/	27/	4	10.04	-15.08	-4.25

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
76/	27/	ELU+	64.06	-0.00	-5.91
76/	27/	ELU-	17.57	-22.62	-33.12
76/	27/	ELS+	44.47	-0.00	-5.91
76/	27/	ELS-	17.57	-15.08	-22.67
76/	28/	1	-0.04	-0.00	4.72
76/	28/	2	18.73	-0.00	16.28
76/	28/	3	17.96	-0.00	9.69
76/	28/	4	1.88	-15.08	2.90
76/	28/	ELU+	28.06	-0.00	30.80
76/	28/	ELU-	-0.06	-22.62	4.72
76/	28/	ELS+	18.69	-0.00	21.00
76/	28/	ELS-	-0.04	-15.08	4.72
77/	28/	1	0.04	-0.00	4.72
77/	28/	2	-18.73	-0.00	16.28
77/	28/	3	-0.73	-0.00	7.61
77/	28/	4	1.88	-15.02	2.61
77/	28/	ELU+	2.87	-0.00	30.80
77/	28/	ELU-	-28.06	-22.53	4.72
77/	28/	ELS+	1.92	-0.00	21.00
77/	28/	ELS-	-18.69	-15.02	4.72
77/	29/	1	-17.57	-0.00	-5.91
77/	29/	2	-26.89	-0.00	-11.09
77/	29/	3	-8.89	-0.00	1.84
77/	29/	4	-6.28	-15.02	-0.03
77/	29/	ELU+	-17.57	-0.00	-3.15
77/	29/	ELU-	-64.06	-22.53	-24.62
77/	29/	ELS+	-17.57	-0.00	-4.07
77/	29/	ELS-	-44.47	-15.02	-17.00
78/	29/	1	14.12	0.00	-6.39
78/	29/	2	2.29	0.00	2.46
78/	29/	3	7.09	0.00	-2.11
78/	29/	4	7.36	0.98	-3.37

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
78/	29/	ELU+	30.10	1.46	-2.71
78/	29/	ELU-	14.12	0.00	-13.69
78/	29/	ELS+	21.48	0.98	-3.94
78/	29/	ELS-	14.12	0.00	-9.76
78/	30/	1	-16.49	0.00	-9.91
78/	30/	2	-13.35	0.00	-10.28
78/	30/	3	-8.55	0.00	-3.79
78/	30/	4	-8.28	0.98	-4.44
78/	30/	ELU+	-16.49	1.46	-9.91
78/	30/	ELU-	-42.30	0.00	-28.79
78/	30/	ELS+	-16.49	0.98	-9.91
78/	30/	ELS-	-29.85	0.00	-20.19
79/	31/	1	16.54	-3.01	-9.97
79/	31/	2	12.65	43.83	-9.46
79/	31/	3	9.87	25.38	-7.68
79/	31/	4	8.74	0.20	-5.69
79/	31/	ELU+	41.30	62.73	-9.97
79/	31/	ELU-	16.54	-4.06	-27.64
79/	31/	ELS+	29.19	40.82	-9.97
79/	31/	ELS-	16.54	-3.01	-19.43
79/	32/	1	-14.07	-3.01	-6.34
79/	32/	2	-2.99	43.83	1.65
79/	32/	3	-5.77	25.38	-2.98
79/	32/	4	-6.90	0.20	-3.57
79/	32/	ELU+	-14.07	62.73	-3.87
79/	32/	ELU-	-29.34	-4.06	-13.91
79/	32/	ELS+	-14.07	40.82	-4.69
79/	32/	ELS-	-20.97	-3.01	-9.90
80/	32/	1	17.57	-0.00	-5.91
80/	32/	2	21.67	2.45	-7.97
80/	32/	3	22.56	55.75	-14.18
80/	32/	4	10.54	-6.41	-4.71

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
80/	32/	ELU+	57.56	83.62	-5.91
80/	32/	ELU-	17.57	-9.63	-29.24
80/	32/	ELS+	40.13	55.75	-5.91
80/	32/	ELS-	17.57	-6.42	-20.09
80/	33/	1	-0.04	-0.00	4.72
80/	33/	2	13.51	2.45	13.14
80/	33/	3	14.40	55.75	8.00
80/	33/	4	2.38	-6.41	3.05
80/	33/	ELU+	21.55	83.62	26.08
80/	33/	ELU-	-0.06	-9.63	4.72
80/	33/	ELS+	14.36	55.75	17.86
80/	33/	ELS-	-0.04	-6.42	4.72
81/	33/	1	0.04	0.00	4.72
81/	33/	2	-13.51	-2.45	13.14
81/	33/	3	0.91	53.33	6.17
81/	33/	4	2.22	-6.17	2.59
81/	33/	ELU+	3.38	80.00	26.08
81/	33/	ELU-	-20.22	-9.25	4.72
81/	33/	ELS+	2.26	53.34	17.86
81/	33/	ELS-	-13.47	-6.17	4.72
81/	34/	1	-17.57	0.00	-5.91
81/	34/	2	-21.67	-2.45	-7.97
81/	34/	3	-7.25	53.33	2.37
81/	34/	4	-5.94	-6.17	0.35
81/	34/	ELU+	-17.57	80.00	-2.35
81/	34/	ELU-	-56.23	-9.25	-19.93
81/	34/	ELS+	-17.57	53.34	-3.54
81/	34/	ELS-	-39.24	-6.17	-13.88
82/	34/	1	14.07	3.01	-6.34
82/	34/	2	2.99	-43.83	1.65
82/	34/	3	6.99	7.70	-1.99
82/	34/	4	7.27	5.20	-3.27

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
82/	34/	ELU+	29.90	15.60	-3.87
82/	34/	ELU-	14.07	-62.73	-13.46
82/	34/	ELS+	21.34	10.70	-4.69
82/	34/	ELS-	14.07	-40.82	-9.61
82/	35/	1	-16.54	3.01	-9.97
82/	35/	2	-12.65	-43.83	-9.46
82/	35/	3	-8.65	7.70	-3.91
82/	35/	4	-8.37	5.20	-4.55
82/	35/	ELU+	-16.54	15.60	-9.97
82/	35/	ELU-	-41.30	-62.73	-27.64
82/	35/	ELS+	-16.54	10.70	-9.97
82/	35/	ELS-	-29.19	-40.82	-19.43
83/	36/	1	16.68	-6.01	-10.13
83/	36/	2	10.74	75.34	-7.25
83/	36/	3	8.77	46.66	-6.42
83/	36/	4	8.61	7.31	-5.55
83/	36/	ELU+	38.63	107.00	-10.13
83/	36/	ELU-	16.68	-8.11	-24.56
83/	36/	ELS+	27.42	69.33	-10.13
83/	36/	ELS-	16.68	-6.01	-17.38
83/	37/	1	-13.93	-6.01	-6.17
83/	37/	2	-4.90	75.34	-0.55
83/	37/	3	-6.87	46.66	-4.22
83/	37/	4	-7.03	7.31	-3.73
83/	37/	ELU+	-13.93	107.00	-6.17
83/	37/	ELU-	-29.35	-8.11	-14.67
83/	37/	ELS+	-13.93	69.33	-6.17
83/	37/	ELS-	-20.96	-6.01	-10.40
84/	37/	1	17.57	-0.01	-5.91
84/	37/	2	9.87	1.96	-0.92
84/	37/	3	14.12	96.12	-7.88
84/	37/	4	11.37	7.02	-5.16

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
84/	37/	ELU+	44.90	144.17	-5.91
84/	37/	ELU-	17.57	-0.01	-19.79
84/	37/	ELS+	31.69	96.11	-5.91
84/	37/	ELS-	17.57	-0.01	-13.79
84/	38/	1	-0.04	-0.01	4.73
84/	38/	2	1.71	1.96	6.04
84/	38/	3	5.96	96.12	4.17
84/	38/	4	3.21	7.02	3.59
84/	38/	ELU+	8.89	144.17	15.43
84/	38/	ELU-	-0.06	-0.01	4.73
84/	38/	ELS+	5.92	96.11	10.76
84/	38/	ELS-	-0.04	-0.01	4.73
85/	38/	1	0.04	0.01	4.73
85/	38/	2	-1.71	-1.96	6.04
85/	38/	3	4.26	94.21	2.91
85/	38/	4	1.69	8.73	2.88
85/	38/	ELU+	6.44	141.33	15.43
85/	38/	ELU-	-2.53	-2.93	4.73
85/	38/	ELS+	4.30	94.22	10.76
85/	38/	ELS-	-1.67	-1.95	4.73
85/	39/	1	-17.57	0.01	-5.91
85/	39/	2	-9.87	-1.96	-0.92
85/	39/	3	-3.90	94.21	3.13
85/	39/	4	-6.47	8.73	0.02
85/	39/	ELU+	-17.57	141.33	-1.22
85/	39/	ELU-	-38.54	-2.93	-9.35
85/	39/	ELS+	-17.57	94.22	-2.78
85/	39/	ELS-	-27.45	-1.95	-6.82
86/	39/	1	13.93	6.01	-6.17
86/	39/	2	4.90	-75.34	-0.55
86/	39/	3	6.65	16.63	-1.60
86/	39/	4	7.06	8.81	-3.04

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
86/	39/	ELU+	29.39	33.06	-6.17
86/	39/	ELU-	13.93	-107.00	-12.89
86/	39/	ELS+	20.99	22.64	-6.17
86/	39/	ELS-	13.93	-69.33	-9.21
86/	40/	1	-16.68	6.01	-10.13
86/	40/	2	-10.74	-75.34	-7.25
86/	40/	3	-8.99	16.63	-4.30
86/	40/	4	-8.58	8.81	-4.79
86/	40/	ELU+	-16.68	33.06	-10.13
86/	40/	ELU-	-38.63	-107.00	-24.56
86/	40/	ELS+	-16.68	22.64	-10.13
86/	40/	ELS-	-27.42	-69.33	-17.38
87/	41/	1	16.92	-8.95	-10.40
87/	41/	2	8.04	94.74	-4.15
87/	41/	3	7.11	62.17	-4.49
87/	41/	4	8.23	16.00	-5.12
87/	41/	ELU+	35.19	133.15	-10.40
87/	41/	ELU-	16.92	-12.09	-21.72
87/	41/	ELS+	25.15	85.78	-10.40
87/	41/	ELS-	16.92	-8.95	-15.52
87/	42/	1	-13.69	-8.95	-5.90
87/	42/	2	-7.60	94.74	-3.64
87/	42/	3	-8.53	62.17	-6.12
87/	42/	4	-7.41	16.00	-4.17
87/	42/	ELU+	-13.69	133.15	-5.90
87/	42/	ELU-	-31.28	-12.09	-17.15
87/	42/	ELS+	-13.69	85.78	-5.90
87/	42/	ELS-	-22.22	-8.95	-12.02
88/	42/	1	17.58	-0.01	-5.91
88/	42/	2	8.36	0.33	-0.03
88/	42/	3	9.83	120.91	-3.53
88/	42/	4	16.21	30.19	-7.71

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
88/	42/	ELU+	48.05	181.36	-5.91
88/	42/	ELU-	17.58	-0.02	-19.54
88/	42/	ELS+	33.79	120.90	-5.91
88/	42/	ELS-	17.58	-0.01	-13.62
88/	43/	1	-0.04	-0.01	4.73
88/	43/	2	0.20	0.33	5.11
88/	43/	3	1.67	120.91	3.38
88/	43/	4	8.05	30.19	6.85
88/	43/	ELU+	12.04	181.36	16.66
88/	43/	ELU-	-0.05	-0.02	4.73
88/	43/	ELS+	8.02	120.90	11.58
88/	43/	ELS-	-0.04	-0.01	4.73
89/	43/	1	0.04	0.01	4.73
89/	43/	2	-0.20	-0.33	5.11
89/	43/	3	1.48	120.64	2.78
89/	43/	4	-4.02	32.73	5.99
89/	43/	ELU+	2.27	180.98	15.37
89/	43/	ELU-	-6.00	-0.49	4.73
89/	43/	ELS+	1.52	120.66	10.72
89/	43/	ELS-	-3.99	-0.32	4.73
89/	44/	1	-17.58	0.01	-5.91
89/	44/	2	-8.36	-0.33	-0.03
89/	44/	3	-6.68	120.64	-0.34
89/	44/	4	-12.18	32.73	-3.74
89/	44/	ELU+	-17.58	180.98	-5.91
89/	44/	ELU-	-42.01	-0.49	-13.58
89/	44/	ELS+	-17.58	120.66	-5.91
89/	44/	ELS-	-29.76	-0.32	-9.64
90/	44/	1	13.69	8.95	-5.90
90/	44/	2	7.60	-94.74	-3.64
90/	44/	3	6.05	25.04	-0.92
90/	44/	4	6.78	9.64	-2.73

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
90/	44/	ELU+	29.89	49.65	-5.90
90/	44/	ELU-	13.69	-133.15	-13.43
90/	44/	ELS+	21.30	34.00	-5.90
90/	44/	ELS-	13.69	-85.78	-9.54
90/	45/	1	-16.92	8.95	-10.40
90/	45/	2	-8.04	-94.74	-4.15
90/	45/	3	-9.59	25.04	-5.00
90/	45/	4	-8.86	9.64	-5.12
90/	45/	ELU+	-16.92	49.65	-10.40
90/	45/	ELU-	-37.23	-133.15	-21.71
90/	45/	ELS+	-16.92	34.00	-10.40
90/	45/	ELS-	-26.51	-85.78	-15.52
91/	46/	1	17.25	-11.66	-10.78
91/	46/	2	4.80	109.31	-0.42
91/	46/	3	5.05	71.95	-2.11
91/	46/	4	7.59	24.07	-4.39
91/	46/	ELU+	34.68	152.31	-10.78
91/	46/	ELU-	17.25	-15.74	-21.14
91/	46/	ELS+	24.84	97.66	-10.78
91/	46/	ELS-	17.25	-11.66	-15.17
91/	47/	1	-13.37	-11.66	-5.52
91/	47/	2	-10.84	109.31	-7.36
91/	47/	3	-10.59	71.95	-8.49
91/	47/	4	-8.05	24.07	-4.91
91/	47/	ELU+	-13.37	152.31	-5.52
91/	47/	ELU-	-34.30	-15.74	-20.18
91/	47/	ELS+	-13.37	97.66	-5.52
91/	47/	ELS-	-24.20	-11.66	-14.01
92/	47/	1	17.61	-0.05	-5.93
92/	47/	2	8.22	0.10	0.04
92/	47/	3	5.10	137.87	1.36
92/	47/	4	18.14	59.44	-8.14

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
92/	47/	ELU+	50.98	206.74	-3.90
92/	47/	ELU-	17.61	-0.07	-20.21
92/	47/	ELS+	35.75	137.81	-4.57
92/	47/	ELS-	17.61	-0.05	-14.07
92/	48/	1	-0.00	-0.05	4.75
92/	48/	2	0.06	0.10	5.00
92/	48/	3	-3.06	137.87	2.58
92/	48/	4	9.98	59.44	8.73
92/	48/	ELU+	14.96	206.74	19.51
92/	48/	ELU-	-4.59	-0.07	4.75
92/	48/	ELS+	9.98	137.81	13.48
92/	48/	ELS-	-3.06	-0.05	4.75
93/	48/	1	0.00	0.05	4.75
93/	48/	2	-0.06	-0.10	5.00
93/	48/	3	-3.11	137.85	3.48
93/	48/	4	-9.49	62.37	8.57
93/	48/	ELU+	0.00	206.85	19.27
93/	48/	ELU-	-14.24	-0.09	4.75
93/	48/	ELS+	0.00	137.91	13.32
93/	48/	ELS-	-9.49	-0.04	4.75
93/	49/	1	-17.61	0.05	-5.93
93/	49/	2	-8.22	-0.10	0.04
93/	49/	3	-11.27	137.85	-5.15
93/	49/	4	-17.65	62.37	-7.72
93/	49/	ELU+	-17.61	206.85	-5.87
93/	49/	ELU-	-50.26	-0.09	-19.58
93/	49/	ELS+	-17.61	137.91	-5.89
93/	49/	ELS-	-35.27	-0.04	-13.65
94/	49/	1	13.37	11.66	-5.52
94/	49/	2	10.84	-109.31	-7.36
94/	49/	3	5.24	29.71	0.01
94/	49/	4	6.56	6.67	-2.48

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
94/	49/	ELU+	34.30	60.30	-5.51
94/	49/	ELU-	13.37	-152.31	-18.50
94/	49/	ELS+	24.20	41.37	-5.52
94/	49/	ELS-	13.37	-97.66	-12.89
94/	50/	1	-17.25	11.66	-10.78
94/	50/	2	-4.80	-109.31	-0.42
94/	50/	3	-10.40	29.71	-5.94
94/	50/	4	-9.08	6.67	-5.38
94/	50/	ELU+	-17.25	60.30	-10.78
94/	50/	ELU-	-38.89	-152.31	-23.45
94/	50/	ELS+	-17.25	41.37	-10.78
94/	50/	ELS-	-27.65	-97.66	-16.71

Esfuerzos - Casos: 6 7 : Envolvente: 1

- Caso: 5 (ELU)

Filtrar	Barra	Caso
Lista completa	1A94	1A10
Seleccion	1A94	5
Número total	94	10
Número seleccionado	94	1

- Casos: 6 7

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
1/	1/	ELU/2	**445.99>>**	5.97	20.77	1*1.35 + 2*1.50
1/	6/	ELU/5	**225.47<<**	-0.44	395.54	1*1.00
1/	1/	ELU/6	361.33	**6.12>>**	21.37	1*1.00 + 2*1.50
1/	1/	ELU/1	326.55	**-0.59<<**	-2.31	1*1.35
1/	6/	ELU/2	423.82	5.97	**760.11>>**	1*1.35 + 2*1.50
1/	1/	ELU/1	326.55	-0.59	**-2.31<<**	1*1.35
2/	6/	ELU/2	**355.85>>**	12.13	908.34	1*1.35 + 2*1.50
2/	11/	ELU/5	**173.10<<**	-0.84	692.12	1*1.00
2/	6/	ELU/6	289.52	**12.43>>**	773.98	1*1.00 + 2*1.50
2/	6/	ELU/1	255.86	**-1.14<<**	518.25	1*1.35
2/	11/	ELU/2	333.68	12.13	**1494.44>>**	1*1.35 + 2*1.50
2/	6/	ELU/5	189.52	-0.84	**383.89<<**	1*1.00
3/	11/	ELU/2	**261.30>>**	13.22	1624.46	1*1.35 + 2*1.50
3/	16/	ELU/5	**121.06<<**	-0.88	902.92	1*1.00
3/	11/	ELU/6	213.18	**13.53>>**	1385.35	1*1.00 + 2*1.50
3/	11/	ELU/1	185.60	**-1.18<<**	922.27	1*1.35
3/	16/	ELU/2	239.13	13.22	**2049.82>>**	1*1.35 + 2*1.50
3/	11/	ELU/5	137.48	-0.88	**683.16<<**	1*1.00
4/	16/	ELU/2	**163.02>>**	10.01	2154.71	1*1.35 + 2*1.50
4/	21/	ELU/5	**69.26<<**	-0.63	1028.61	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
4/	16/	ELU/6	133.03	10.24>>	1840.79	1*1.00 + 2*1.50
4/	16/	ELU/1	115.67	-0.86<<	1210.83	1*1.35
4/	21/	ELU/2	140.85	10.01	2412.99>>	1*1.35 + 2*1.50
4/	16/	ELU/5	85.68	-0.63	896.91<<	1*1.00
5/	21/	ELU/2	62.06>>	3.72	2474.68	1*1.35 + 2*1.50
5/	26/	ELU/5	17.60<<	-0.23	1069.48	1*1.00
5/	21/	ELU/6	50.15	3.80>>	2115.71	1*1.00 + 2*1.50
5/	21/	ELU/1	45.92	-0.31<<	1384.56	1*1.35
5/	26/	ELU/2	39.89	3.72	2561.33>>	1*1.35 + 2*1.50
5/	21/	ELU/5	34.02	-0.23	1025.60<<	1*1.00
6/	26/	ELU/5	-17.60>>	0.23	1069.48	1*1.00
6/	31/	ELU/2	-62.06<<	-3.72	2474.68	1*1.35 + 2*1.50
6/	26/	ELU/4	-36.30	0.95>>	2051.35	1*1.35 + 4*1.50
6/	26/	ELU/6	-33.73	-3.80<<	2187.02	1*1.00 + 2*1.50
6/	26/	ELU/2	-39.89	-3.72	2561.33>>	1*1.35 + 2*1.50
6/	31/	ELU/5	-34.02	0.23	1025.60<<	1*1.00
7/	31/	ELU/5	-69.26>>	0.63	1028.61	1*1.00
7/	36/	ELU/2	-163.02<<	-10.01	2154.71	1*1.35 + 2*1.50
7/	31/	ELU/1	-93.50	0.86>>	1388.62	1*1.35
7/	31/	ELU/6	-116.61	-10.24<<	2052.98	1*1.00 + 2*1.50
7/	31/	ELU/2	-140.85	-10.01	2412.99>>	1*1.35 + 2*1.50
7/	36/	ELU/5	-85.68	0.63	896.91<<	1*1.00
8/	36/	ELU/5	-121.06>>	0.88	902.92	1*1.00
8/	41/	ELU/2	-261.30<<	-13.22	1624.46	1*1.35 + 2*1.50
8/	36/	ELU/1	-163.43	1.18>>	1218.95	1*1.35
8/	36/	ELU/6	-196.76	-13.53<<	1733.79	1*1.00 + 2*1.50
8/	36/	ELU/2	-239.13	-13.22	2049.82>>	1*1.35 + 2*1.50
8/	41/	ELU/5	-137.48	0.88	683.16<<	1*1.00
9/	41/	ELU/5	-173.10>>	0.84	692.12	1*1.00
9/	46/	ELU/2	-355.85<<	-12.13	908.34	1*1.35 + 2*1.50
9/	41/	ELU/1	-233.69	1.14>>	934.36	1*1.35
9/	41/	ELU/6	-273.09	-12.43<<	1252.20	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
9/	41/	ELU/2	-333.68	-12.13	1494.44>>	1*1.35 + 2*1.50
9/	46/	ELU/5	-189.52	0.84	383.89<<	1*1.00
10/	46/	ELU/5	-225.47>>	0.44	395.54	1*1.00
10/	51/	ELU/2	-445.99<<	-5.97	20.77	1*1.35 + 2*1.50
10/	46/	ELU/1	-304.38	0.59>>	533.99	1*1.35
10/	46/	ELU/6	-344.91	-6.12<<	621.67	1*1.00 + 2*1.50
10/	46/	ELU/2	-423.82	-5.97	760.11>>	1*1.35 + 2*1.50
10/	51/	ELU/1	-326.55	0.59	-2.31<<	1*1.35
11/	2/	ELU/2	622.61>>	7.93	-20.85	1*1.35 + 2*1.50
11/	7/	ELU/5	206.94<<	-0.52	367.44	1*1.00
11/	2/	ELU/7	372.06	13.77>>	15.61	1*1.00 + 3*1.50
11/	2/	ELU/1	301.54	-0.70<<	2.26	1*1.35
11/	7/	ELU/2	600.44	7.93	1018.74>>	1*1.35 + 2*1.50
11/	2/	ELU/6	544.43	8.11	-21.43<<	1*1.00 + 2*1.50
12/	7/	ELU/2	530.04>>	18.48	870.58	1*1.35 + 2*1.50
12/	12/	ELU/5	159.54<<	-0.93	664.22	1*1.00
12/	7/	ELU/7	301.11	28.13>>	744.63	1*1.00 + 3*1.50
12/	7/	ELU/1	237.55	-1.25<<	511.70	1*1.35
12/	12/	ELU/2	507.87	18.48	1752.81>>	1*1.35 + 2*1.50
12/	7/	ELU/5	175.96	-0.93	379.04<<	1*1.00
13/	12/	ELU/2	441.70>>	23.88	1623.27	1*1.35 + 2*1.50
13/	17/	ELU/5	111.85<<	-0.93	877.26	1*1.00
13/	12/	ELU/7	225.88	32.01>>	1339.61	1*1.00 + 3*1.50
13/	12/	ELU/1	173.16	-1.26<<	908.77	1*1.35
13/	17/	ELU/2	419.53	23.88	2355.32>>	1*1.35 + 2*1.50
13/	12/	ELU/5	128.27	-0.93	673.16<<	1*1.00
14/	17/	ELU/2	354.84>>	23.68	2253.35	1*1.35 + 2*1.50
14/	22/	ELU/5	63.92<<	-0.67	1005.88	1*1.00
14/	17/	ELU/7	146.47	26.80>>	1789.83	1*1.00 + 3*1.50
14/	17/	ELU/1	108.46	-0.90<<	1192.40	1*1.35
14/	22/	ELU/2	332.67	23.68	2837.73>>	1*1.35 + 2*1.50
14/	17/	ELU/5	80.34	-0.67	883.26<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
15/	22/	ELU/2	**142.65>>**	9.84	2779.72	1*1.35 + 2*1.50
15/	27/	ELU/5	**15.85<<**	-0.24	1049.78	1*1.00
15/	22/	ELU/8	48.95	**16.97>>**	1618.69	1*1.00 + 4*1.50
15/	22/	ELU/1	43.56	**-0.33<<**	1361.99	1*1.35
15/	27/	ELU/2	120.48	9.84	**3003.38>>**	1*1.35 + 2*1.50
15/	22/	ELU/5	32.27	-0.24	**1008.88<<**	1*1.00
16/	27/	ELU/5	**-15.85>>**	0.24	1049.78	1*1.00
16/	32/	ELU/2	**-142.65<<**	-9.84	2779.72	1*1.35 + 2*1.50
16/	27/	ELU/4	-30.20	**16.60>>**	2070.26	1*1.35 + 4*1.50
16/	27/	ELU/7	-39.48	**-10.43<<**	2154.50	1*1.00 + 3*1.50
16/	27/	ELU/2	-120.48	-9.84	**3003.38>>**	1*1.35 + 2*1.50
16/	32/	ELU/5	-32.27	0.24	**1008.88<<**	1*1.00
17/	32/	ELU/5	**-63.92>>**	0.67	1005.88	1*1.00
17/	37/	ELU/2	**-354.84<<**	-23.68	2253.35	1*1.35 + 2*1.50
17/	32/	ELU/4	-121.25	**15.47>>**	2005.95	1*1.35 + 4*1.50
17/	32/	ELU/7	-130.05	**-26.80<<**	2024.87	1*1.00 + 3*1.50
17/	32/	ELU/2	-332.67	-23.68	**2837.73>>**	1*1.35 + 2*1.50
17/	37/	ELU/5	-80.34	0.67	**883.26<<**	1*1.00
18/	37/	ELU/5	**-111.85>>**	0.93	877.26	1*1.00
18/	42/	ELU/2	**-441.70<<**	-23.88	1623.27	1*1.35 + 2*1.50
18/	37/	ELU/4	-213.55	**13.69>>**	1773.31	1*1.35 + 4*1.50
18/	37/	ELU/7	-209.45	**-32.01<<**	1709.64	1*1.00 + 3*1.50
18/	37/	ELU/2	-419.53	-23.88	**2355.32>>**	1*1.35 + 2*1.50
18/	42/	ELU/5	-128.27	0.93	**673.16<<**	1*1.00
19/	42/	ELU/5	**-159.54>>**	0.93	664.22	1*1.00
19/	47/	ELU/2	**-530.04<<**	-18.48	870.58	1*1.35 + 2*1.50
19/	42/	ELU/4	-313.37	**8.37>>**	1358.08	1*1.35 + 4*1.50
19/	42/	ELU/7	-284.69	**-28.13<<**	1242.56	1*1.00 + 3*1.50
19/	42/	ELU/2	-507.87	-18.48	**1752.81>>**	1*1.35 + 2*1.50
19/	47/	ELU/5	-175.96	0.93	**379.04<<**	1*1.00
20/	47/	ELU/5	**-206.94>>**	0.52	367.44	1*1.00
20/	52/	ELU/2	**-622.61<<**	-7.93	-20.85	1*1.35 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
20/	47/	ELU/4	-416.64	**2.97>>**	737.78	1*1.35 + 4*1.50
20/	47/	ELU/7	-355.64	**-13.77<<**	634.16	1*1.00 + 3*1.50
20/	47/	ELU/2	-600.44	-7.93	**1018.74>>**	1*1.35 + 2*1.50
20/	52/	ELU/6	-544.43	-8.11	**-21.43<<**	1*1.00 + 2*1.50
21/	4/	ELU/3	**630.97>>**	10.43	-20.62	1*1.35 + 3*1.50
21/	9/	ELU/5	**206.94<<**	0.52	367.44	1*1.00
21/	4/	ELU/3	630.97	**10.43>>**	-20.62	1*1.35 + 3*1.50
21/	4/	ELU/6	544.43	**-8.11<<**	-21.43	1*1.00 + 2*1.50
21/	9/	ELU/3	608.80	10.43	**1033.19>>**	1*1.35 + 3*1.50
21/	4/	ELU/6	544.43	-8.11	**-21.43<<**	1*1.00 + 2*1.50
22/	9/	ELU/3	**542.21>>**	18.71	886.63	1*1.35 + 3*1.50
22/	14/	ELU/5	**159.54<<**	0.93	664.22	1*1.00
22/	9/	ELU/3	542.21	**18.71>>**	886.63	1*1.35 + 3*1.50
22/	9/	ELU/6	468.45	**-18.80<<**	737.92	1*1.00 + 2*1.50
22/	14/	ELU/3	520.04	18.71	**1789.55>>**	1*1.35 + 3*1.50
22/	9/	ELU/5	175.96	0.93	**379.04<<**	1*1.00
23/	14/	ELU/3	**458.74>>**	17.85	1658.22	1*1.35 + 3*1.50
23/	19/	ELU/5	**111.85<<**	0.93	877.26	1*1.00
23/	14/	ELU/3	458.74	**17.85>>**	1658.22	1*1.35 + 3*1.50
23/	14/	ELU/6	396.81	**-24.21<<**	1387.66	1*1.00 + 2*1.50
23/	19/	ELU/3	436.57	17.85	**2419.24>>**	1*1.35 + 3*1.50
23/	14/	ELU/5	128.27	0.93	**673.16<<**	1*1.00
24/	19/	ELU/3	**378.21>>**	10.40	2310.97	1*1.35 + 3*1.50
24/	24/	ELU/5	**63.92<<**	0.67	1005.88	1*1.00
24/	19/	ELU/3	378.21	**10.40>>**	2310.97	1*1.35 + 3*1.50
24/	19/	ELU/6	326.72	**-23.92<<**	1944.21	1*1.00 + 2*1.50
24/	24/	ELU/3	356.04	10.40	**2935.09>>**	1*1.35 + 3*1.50
24/	19/	ELU/5	80.34	0.67	**883.26<<**	1*1.00
25/	24/	ELU/3	**152.90>>**	3.28	2870.69	1*1.35 + 3*1.50
25/	29/	ELU/5	**15.85<<**	0.24	1049.78	1*1.00
25/	24/	ELU/3	152.90	**3.28>>**	2870.69	1*1.35 + 3*1.50
25/	24/	ELU/6	131.36	**-9.92<<**	2426.61	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
25/	29/	ELU/3	130.73	3.28	**3111.77>>**	1*1.35 + 3*1.50
25/	24/	ELU/5	32.27	0.24	**1008.88<<**	1*1.00
26/	29/	ELU/8	**18.21>>**	-9.33	1749.42	1*1.00 + 4*1.50
26/	34/	ELU/3	**-152.90<<**	-3.28	2870.69	1*1.35 + 3*1.50
26/	29/	ELU/6	-114.94	**9.92>>**	2635.96	1*1.00 + 2*1.50
26/	29/	ELU/4	12.66	**-9.41<<**	2116.84	1*1.35 + 4*1.50
26/	29/	ELU/3	-130.73	-3.28	**3111.77>>**	1*1.35 + 3*1.50
26/	34/	ELU/5	-32.27	-0.24	**1008.88<<**	1*1.00
27/	34/	ELU/8	**-49.67>>**	-15.19	1746.36	1*1.00 + 4*1.50
27/	39/	ELU/3	**-378.21<<**	-10.40	2310.97	1*1.35 + 3*1.50
27/	34/	ELU/6	-310.29	**23.92>>**	2485.67	1*1.00 + 2*1.50
27/	34/	ELU/4	-72.04	**-15.42<<**	2098.42	1*1.35 + 4*1.50
27/	34/	ELU/3	-356.04	-10.40	**2935.09>>**	1*1.35 + 3*1.50
27/	39/	ELU/5	-80.34	-0.67	**883.26<<**	1*1.00
28/	39/	ELU/5	**-111.85>>**	-0.93	877.26	1*1.00
28/	44/	ELU/3	**-458.74<<**	-17.85	1658.22	1*1.35 + 3*1.50
28/	39/	ELU/6	-380.39	**24.21>>**	2048.28	1*1.00 + 2*1.50
28/	39/	ELU/4	-157.03	**-20.36<<**	1948.87	1*1.35 + 4*1.50
28/	39/	ELU/3	-436.57	-17.85	**2419.24>>**	1*1.35 + 3*1.50
28/	44/	ELU/5	-128.27	-0.93	**673.16<<**	1*1.00
29/	44/	ELU/5	**-159.54>>**	-0.93	664.22	1*1.00
29/	49/	ELU/3	**-542.21<<**	-18.71	886.63	1*1.35 + 3*1.50
29/	44/	ELU/6	-452.03	**18.80>>**	1520.33	1*1.00 + 2*1.50
29/	44/	ELU/4	-370.40	**-18.85<<**	1685.64	1*1.35 + 4*1.50
29/	44/	ELU/3	-520.04	-18.71	**1789.55>>**	1*1.35 + 3*1.50
29/	49/	ELU/5	-175.96	-0.93	**379.04<<**	1*1.00
30/	49/	ELU/5	**-206.94>>**	-0.52	367.44	1*1.00
30/	54/	ELU/4	**-669.02<<**	-10.44	-13.49	1*1.35 + 4*1.50
30/	49/	ELU/6	-528.01	**8.11>>**	890.14	1*1.00 + 2*1.50
30/	49/	ELU/4	-646.85	**-10.44<<**	1105.00	1*1.35 + 4*1.50
30/	49/	ELU/4	-646.85	-10.44	**1105.00>>**	1*1.35 + 4*1.50
30/	54/	ELU/6	-544.43	8.11	**-21.43<<**	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
31/	5/	ELU/3	**620.59>>**	2.12	-7.62	1*1.35 + 3*1.50
31/	10/	ELU/5	**225.47<<**	0.44	395.54	1*1.00
31/	5/	ELU/3	620.59	**2.12>>**	-7.62	1*1.35 + 3*1.50
31/	5/	ELU/6	361.33	**-6.12<<**	21.37	1*1.00 + 2*1.50
31/	10/	ELU/3	598.43	2.12	**1028.54>>**	1*1.35 + 3*1.50
31/	5/	ELU/3	620.59	2.12	**-7.62<<**	1*1.35 + 3*1.50
32/	10/	ELU/3	**522.05>>**	4.23	968.24	1*1.35 + 3*1.50
32/	15/	ELU/5	**173.10<<**	0.84	692.12	1*1.00
32/	10/	ELU/3	522.05	**4.23>>**	968.24	1*1.35 + 3*1.50
32/	10/	ELU/6	289.52	**-12.43<<**	773.98	1*1.00 + 2*1.50
32/	15/	ELU/3	499.88	4.23	**1836.89>>**	1*1.35 + 3*1.50
32/	10/	ELU/5	189.52	0.84	**383.89<<**	1*1.00
33/	15/	ELU/3	**425.17>>**	4.41	1787.23	1*1.35 + 3*1.50
33/	20/	ELU/5	**121.06<<**	0.88	902.92	1*1.00
33/	15/	ELU/3	425.17	**4.41>>**	1787.23	1*1.35 + 3*1.50
33/	15/	ELU/6	213.18	**-13.53<<**	1385.35	1*1.00 + 2*1.50
33/	20/	ELU/3	403.00	4.41	**2491.17>>**	1*1.35 + 3*1.50
33/	15/	ELU/5	137.48	0.88	**683.16<<**	1*1.00
34/	20/	ELU/3	**329.51>>**	3.18	2458.11	1*1.35 + 3*1.50
34/	25/	ELU/5	**69.26<<**	0.63	1028.61	1*1.00
34/	20/	ELU/3	329.51	**3.18>>**	2458.11	1*1.35 + 3*1.50
34/	20/	ELU/6	133.03	**-10.24<<**	1840.79	1*1.00 + 2*1.50
34/	25/	ELU/3	307.34	3.18	**2999.43>>**	1*1.35 + 3*1.50
34/	20/	ELU/5	85.68	0.63	**896.91<<**	1*1.00
35/	25/	ELU/3	**130.97>>**	1.15	2983.82	1*1.35 + 3*1.50
35/	30/	ELU/5	**17.60<<**	0.23	1069.48	1*1.00
35/	25/	ELU/3	130.97	**1.15>>**	2983.82	1*1.35 + 3*1.50
35/	25/	ELU/6	50.15	**-3.80<<**	2115.71	1*1.00 + 2*1.50
35/	30/	ELU/3	108.80	1.15	**3187.62>>**	1*1.35 + 3*1.50
35/	25/	ELU/5	34.02	0.23	**1025.60<<**	1*1.00
36/	30/	ELU/8	**1.08>>**	-1.03	1820.56	1*1.00 + 4*1.50
36/	35/	ELU/3	**-130.97<<**	-1.15	2983.82	1*1.35 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
36/	30/	ELU/6	-33.73	3.80>>	2187.02	1*1.00 + 2*1.50
36/	30/	ELU/3	-108.80	-1.15<<	3187.62	1*1.35 + 3*1.50
36/	30/	ELU/3	-108.80	-1.15	3187.62>>	1*1.35 + 3*1.50
36/	35/	ELU/5	-34.02	-0.23	1025.60<<	1*1.00
37/	35/	ELU/5	-69.26>>	-0.63	1028.61	1*1.00
37/	40/	ELU/3	-329.51<<	-3.18	2458.11	1*1.35 + 3*1.50
37/	35/	ELU/6	-116.61	10.24>>	2052.98	1*1.00 + 2*1.50
37/	35/	ELU/3	-307.34	-3.18<<	2999.43	1*1.35 + 3*1.50
37/	35/	ELU/3	-307.34	-3.18	2999.43>>	1*1.35 + 3*1.50
37/	40/	ELU/5	-85.68	-0.63	896.91<<	1*1.00
38/	40/	ELU/5	-121.06>>	-0.88	902.92	1*1.00
38/	45/	ELU/3	-425.17<<	-4.41	1787.23	1*1.35 + 3*1.50
38/	40/	ELU/6	-196.76	13.53>>	1733.79	1*1.00 + 2*1.50
38/	40/	ELU/3	-403.00	-4.41<<	2491.17	1*1.35 + 3*1.50
38/	40/	ELU/3	-403.00	-4.41	2491.17>>	1*1.35 + 3*1.50
38/	45/	ELU/5	-137.48	-0.88	683.16<<	1*1.00
39/	45/	ELU/5	-173.10>>	-0.84	692.12	1*1.00
39/	50/	ELU/3	-522.05<<	-4.23	968.24	1*1.35 + 3*1.50
39/	45/	ELU/6	-273.09	12.43>>	1252.20	1*1.00 + 2*1.50
39/	45/	ELU/3	-499.88	-4.23<<	1836.89	1*1.35 + 3*1.50
39/	45/	ELU/3	-499.88	-4.23	1836.89>>	1*1.35 + 3*1.50
39/	50/	ELU/5	-189.52	-0.84	383.89<<	1*1.00
40/	50/	ELU/5	-225.47>>	-0.44	395.54	1*1.00
40/	55/	ELU/4	-630.16<<	-1.04	-2.76	1*1.35 + 4*1.50
40/	50/	ELU/6	-344.91	6.12>>	621.67	1*1.00 + 2*1.50
40/	50/	ELU/3	-598.43	-2.12<<	1028.54	1*1.35 + 3*1.50
40/	50/	ELU/4	-607.99	-1.04	1049.67>>	1*1.35 + 4*1.50
40/	55/	ELU/3	-620.59	-2.12	-7.62<<	1*1.35 + 3*1.50
41/	3/	ELU/2	0.84>>	0.00	0.16	1*1.35 + 2*1.50
41/	3/	ELU/5	0.29<<	0.00	0.08	1*1.00
41/	3/	ELU/3	0.72	5.72>>	0.18	1*1.35 + 3*1.50
41/	3/	ELU/5	0.29	0.00<<	0.08	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
41/	8/	ELU/2	0.84	0.00	1.59>>	1*1.35 + 2*1.50
41/	3/	ELU/5	0.29	0.00	0.08<<	1*1.00
42/	8/	ELU/2	1.00>>	0.00	1.44	1*1.35 + 2*1.50
42/	8/	ELU/5	0.28<<	-0.00	0.68	1*1.00
42/	8/	ELU/7	0.70	7.06>>	1.28	1*1.00 + 3*1.50
42/	8/	ELU/1	0.38	-0.00<<	0.91	1*1.35
42/	13/	ELU/2	1.00	0.00	3.14>>	1*1.35 + 2*1.50
42/	8/	ELU/5	0.28	-0.00	0.68<<	1*1.00
43/	13/	ELU/2	1.51>>	0.00	2.18	1*1.35 + 2*1.50
43/	13/	ELU/5	0.21<<	0.00	1.18	1*1.00
43/	13/	ELU/3	0.98	6.17>>	2.51	1*1.35 + 3*1.50
43/	13/	ELU/5	0.21	0.00<<	1.18	1*1.00
43/	18/	ELU/2	1.51	0.00	4.75>>	1*1.35 + 2*1.50
43/	13/	ELU/5	0.21	0.00	1.18<<	1*1.00
44/	18/	ELU/2	6.54>>	0.00	-1.11	1*1.35 + 2*1.50
44/	18/	ELU/5	0.12<<	0.00	1.55	1*1.00
44/	18/	ELU/3	3.42	4.29>>	1.34	1*1.35 + 3*1.50
44/	18/	ELU/5	0.12	0.00<<	1.55	1*1.00
44/	23/	ELU/2	6.54	0.00	10.00>>	1*1.35 + 2*1.50
44/	18/	ELU/6	6.49	0.00	-1.65<<	1*1.00 + 2*1.50
45/	23/	ELU/2	2.84>>	0.00	2.66	1*1.35 + 2*1.50
45/	23/	ELU/5	0.04<<	0.00	1.77	1*1.00
45/	23/	ELU/3	1.47	1.56>>	3.54	1*1.35 + 3*1.50
45/	23/	ELU/5	0.04	0.00<<	1.77	1*1.00
45/	28/	ELU/2	2.84	0.00	7.49>>	1*1.35 + 2*1.50
45/	23/	ELU/5	0.04	0.00	1.77<<	1*1.00
46/	28/	ELU/8	0.05>>	0.59	2.96	1*1.00 + 4*1.50
46/	28/	ELU/2	-2.84<<	-0.00	7.49	1*1.35 + 2*1.50
46/	28/	ELU/4	0.03	0.59>>	3.60	1*1.35 + 4*1.50
46/	28/	ELU/7	-1.46	-1.56<<	5.40	1*1.00 + 3*1.50
46/	28/	ELU/2	-2.84	-0.00	7.49>>	1*1.35 + 2*1.50
46/	33/	ELU/5	-0.04	0.00	1.77<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
47/	33/	ELU/8	0.21>>	-0.11	2.67	1*1.00 + 4*1.50
47/	33/	ELU/2	-6.54<<	-0.00	10.00	1*1.35 + 2*1.50
47/	33/	ELU/5	-0.12	-0.00>>	1.76	1*1.00
47/	33/	ELU/3	-3.42	-4.29<<	7.16	1*1.35 + 3*1.50
47/	33/	ELU/2	-6.54	-0.00	10.00>>	1*1.35 + 2*1.50
47/	38/	ELU/6	-6.49	-0.00	-1.65<<	1*1.00 + 2*1.50
48/	38/	ELU/8	2.40>>	-1.16	0.45	1*1.00 + 4*1.50
48/	38/	ELU/2	-1.51<<	-0.00	4.75	1*1.35 + 2*1.50
48/	38/	ELU/5	-0.21	-0.00>>	1.53	1*1.00
48/	38/	ELU/3	-0.98	-6.17<<	4.18	1*1.35 + 3*1.50
48/	43/	ELU/4	2.33	-1.16	4.94>>	1*1.35 + 4*1.50
48/	38/	ELU/8	2.40	-1.16	0.45<<	1*1.00 + 4*1.50
49/	43/	ELU/8	1.33>>	-2.45	0.69	1*1.00 + 4*1.50
49/	43/	ELU/2	-1.00<<	-0.00	3.14	1*1.35 + 2*1.50
49/	43/	ELU/1	-0.38	0.00>>	1.56	1*1.35
49/	43/	ELU/7	-0.70	-7.06<<	2.47	1*1.00 + 3*1.50
49/	48/	ELU/4	1.23	-2.45	3.19>>	1*1.35 + 4*1.50
49/	48/	ELU/5	-0.28	0.00	0.68<<	1*1.00
50/	48/	ELU/8	2.59>>	-2.70	-1.55	1*1.00 + 4*1.50
50/	48/	ELU/2	-0.84<<	-0.00	1.59	1*1.35 + 2*1.50
50/	48/	ELU/5	-0.29	-0.00>>	0.57	1*1.00
50/	48/	ELU/3	-0.72	-5.72<<	1.39	1*1.35 + 3*1.50
50/	53/	ELU/4	2.49	-2.70	2.87>>	1*1.35 + 4*1.50
50/	48/	ELU/8	2.59	-2.70	-1.55<<	1*1.00 + 4*1.50
51/	1/	ELU/4	17.13>>	-0.46	-10.28	1*1.35 + 4*1.50
51/	2/	ELU/2	-19.66<<	-20.77	-12.13	1*1.35 + 2*1.50
51/	1/	ELU/1	11.92	2.31>>	-7.59	1*1.35
51/	1/	ELU/6	9.65	-21.37<<	-2.74	1*1.00 + 2*1.50
51/	2/	ELU/5	-6.49	1.71	-2.53>>	1*1.00
51/	2/	ELU/2	-19.66	-20.77	-12.13<<	1*1.35 + 2*1.50
52/	2/	ELU/2	18.43>>	0.08	-4.21	1*1.35 + 2*1.50
52/	3/	ELU/7	-8.29<<	-28.09	1.96	1*1.00 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
52/	2/	ELU/2	18.43	0.08>>	-4.21	1*1.35 + 2*1.50
52/	2/	ELU/7	6.64	-28.09<<	2.90	1*1.00 + 3*1.50
52/	3/	ELU/2	0.42	0.08	7.18>>	1*1.35 + 2*1.50
52/	2/	ELU/2	18.43	0.08	-4.21<<	1*1.35 + 2*1.50
53/	3/	ELU/5	-0.14>>	-0.04	2.46	1*1.00
53/	4/	ELU/3	-26.97<<	-28.25	-13.09	1*1.35 + 3*1.50
53/	3/	ELU/5	-0.14	-0.04>>	2.46	1*1.00
53/	3/	ELU/3	-8.96	-28.25<<	8.54	1*1.35 + 3*1.50
53/	3/	ELU/3	-8.96	-28.25	8.54>>	1*1.35 + 3*1.50
53/	4/	ELU/3	-26.97	-28.25	-13.09<<	1*1.35 + 3*1.50
54/	4/	ELU/2	19.66>>	20.77	-12.13	1*1.35 + 2*1.50
54/	5/	ELU/3	-20.38<<	-7.62	-12.80	1*1.35 + 3*1.50
54/	4/	ELU/6	17.39	21.37>>	-11.25	1*1.00 + 2*1.50
54/	4/	ELU/3	12.03	-7.62<<	-2.66	1*1.35 + 3*1.50
54/	4/	ELU/7	9.76	-7.02	-1.77>>	1*1.00 + 3*1.50
54/	5/	ELU/3	-20.38	-7.62	-12.80<<	1*1.35 + 3*1.50
55/	51/	ELU/4	17.01>>	2.73	-10.19	1*1.35 + 4*1.50
55/	52/	ELU/2	-19.66<<	20.77	-12.13	1*1.35 + 2*1.50
55/	51/	ELU/6	9.65	21.37>>	-2.74	1*1.00 + 2*1.50
55/	51/	ELU/1	11.92	-2.31<<	-7.59	1*1.35
55/	52/	ELU/5	-6.49	-1.71	-2.53>>	1*1.00
55/	52/	ELU/2	-19.66	20.77	-12.13<<	1*1.35 + 2*1.50
56/	52/	ELU/4	27.59>>	13.38	-10.77	1*1.35 + 4*1.50
56/	53/	ELU/7	-8.29<<	28.09	1.96	1*1.00 + 3*1.50
56/	52/	ELU/7	6.64	28.09>>	2.90	1*1.00 + 3*1.50
56/	52/	ELU/2	18.43	-0.08<<	-4.21	1*1.35 + 2*1.50
56/	53/	ELU/4	9.58	13.38	11.61>>	1*1.35 + 4*1.50
56/	52/	ELU/4	27.59	13.38	-10.77<<	1*1.35 + 4*1.50
57/	53/	ELU/5	-0.14>>	0.04	2.46	1*1.00
57/	54/	ELU/4	-33.89<<	16.25	-15.63	1*1.35 + 4*1.50
57/	53/	ELU/3	-8.96	28.25>>	8.54	1*1.35 + 3*1.50
57/	53/	ELU/5	-0.14	0.04<<	2.46	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
57/	53/	ELU/4	-15.88	16.25	**14.30>>**	1*1.35 + 4*1.50
57/	54/	ELU/4	-33.89	16.25	**-15.63<<**	1*1.35 + 4*1.50
58/	54/	ELU/2	**19.66>>**	-20.77	-12.13	1*1.35 + 2*1.50
58/	55/	ELU/3	**-20.38<<**	7.62	-12.80	1*1.35 + 3*1.50
58/	54/	ELU/3	12.03	**7.62>>**	-2.66	1*1.35 + 3*1.50
58/	54/	ELU/6	17.39	**-21.37<<**	-11.25	1*1.00 + 2*1.50
58/	54/	ELU/7	9.76	7.02	**-1.77>>**	1*1.00 + 3*1.50
58/	55/	ELU/3	-20.38	7.62	**-12.80<<**	1*1.35 + 3*1.50
59/	6/	ELU/4	**34.37>>**	-5.99	-20.71	1*1.35 + 4*1.50
59/	7/	ELU/2	**-34.30<<**	-148.23	-18.50	1*1.35 + 2*1.50
59/	6/	ELU/1	23.28	**15.74>>**	-14.55	1*1.35
59/	6/	ELU/6	24.45	**-152.31<<**	-11.41	1*1.00 + 2*1.50
59/	7/	ELU/5	-13.37	11.66	**-5.52>>**	1*1.00
59/	6/	ELU/4	34.37	-5.99	**-20.71<<**	1*1.35 + 4*1.50
60/	7/	ELU/2	**36.10>>**	-0.07	-7.95	1*1.35 + 2*1.50
60/	8/	ELU/3	**-4.59<<**	-206.73	10.29	1*1.35 + 3*1.50
60/	7/	ELU/1	23.78	**0.07>>**	-8.00	1*1.35
60/	7/	ELU/7	25.27	**-206.74<<**	-3.90	1*1.00 + 3*1.50
60/	8/	ELU/2	0.08	-0.07	**13.91>>**	1*1.35 + 2*1.50
60/	7/	ELU/4	34.30	-44.34	**-9.36<<**	1*1.35 + 4*1.50
61/	8/	ELU/1	**0.00>>**	-0.07	6.41	1*1.35
61/	9/	ELU/3	**-40.69<<**	-206.85	-15.73	1*1.35 + 3*1.50
61/	8/	ELU/6	-0.08	**0.09>>**	12.25	1*1.00 + 2*1.50
61/	8/	ELU/3	-4.67	**-206.85<<**	11.64	1*1.35 + 3*1.50
61/	8/	ELU/2	-0.08	0.07	**13.91>>**	1*1.35 + 2*1.50
61/	9/	ELU/3	-40.69	-206.85	**-15.73<<**	1*1.35 + 3*1.50
62/	9/	ELU/2	**34.30>>**	148.23	-18.50	1*1.35 + 2*1.50
62/	10/	ELU/3	**-38.89<<**	-60.30	-23.45	1*1.35 + 3*1.50
62/	9/	ELU/6	29.62	**152.31>>**	-16.57	1*1.00 + 2*1.50
62/	9/	ELU/3	25.90	**-60.30<<**	-7.45	1*1.35 + 3*1.50
62/	9/	ELU/7	21.22	-56.22	**-5.51>>**	1*1.00 + 3*1.50
62/	10/	ELU/3	-38.89	-60.30	**-23.45<<**	1*1.35 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
63/	11/	ELU/2	**34.90>>**	-130.02	-20.26	1*1.35 + 2*1.50
63/	12/	ELU/3	**-31.28<<**	-81.17	-17.15	1*1.35 + 3*1.50
63/	11/	ELU/1	22.84	**12.09>>**	-14.04	1*1.35
63/	11/	ELU/6	28.98	**-133.15<<**	-16.62	1*1.00 + 2*1.50
63/	12/	ELU/5	-13.69	8.95	**-5.90>>**	1*1.00
63/	11/	ELU/4	34.56	-8.09	**-20.94<<**	1*1.35 + 4*1.50
64/	12/	ELU/3	**38.48>>**	-181.35	-13.27	1*1.35 + 3*1.50
64/	13/	ELU/4	**-0.32<<**	-40.95	10.51	1*1.35 + 4*1.50
64/	12/	ELU/1	23.73	**0.02>>**	-7.98	1*1.35
64/	12/	ELU/7	32.33	**-181.36<<**	-11.20	1*1.00 + 3*1.50
64/	13/	ELU/2	0.26	-0.48	**14.04>>**	1*1.35 + 2*1.50
64/	12/	ELU/3	38.48	-181.35	**-13.27<<**	1*1.35 + 3*1.50
65/	13/	ELU/3	**2.27>>**	-180.98	10.56	1*1.35 + 3*1.50
65/	14/	ELU/2	**-36.28<<**	0.48	-8.03	1*1.35 + 2*1.50
65/	13/	ELU/6	-0.27	**0.49>>**	12.39	1*1.00 + 2*1.50
65/	13/	ELU/3	2.27	**-180.98<<**	10.56	1*1.35 + 3*1.50
65/	13/	ELU/2	-0.26	0.48	**14.04>>**	1*1.35 + 2*1.50
65/	14/	ELU/4	-36.21	-40.97	**-11.55<<**	1*1.35 + 4*1.50
66/	14/	ELU/2	**29.89>>**	130.02	-13.43	1*1.35 + 2*1.50
66/	15/	ELU/3	**-37.23<<**	-49.65	-21.54	1*1.35 + 3*1.50
66/	14/	ELU/6	25.10	**133.15>>**	-11.37	1*1.00 + 2*1.50
66/	14/	ELU/3	27.56	**-49.65<<**	-9.34	1*1.35 + 3*1.50
66/	14/	ELU/5	13.69	-8.95	**-5.90>>**	1*1.00
66/	15/	ELU/3	-37.23	-49.65	**-21.54<<**	1*1.35 + 3*1.50
67/	16/	ELU/2	**38.63>>**	-104.89	-24.56	1*1.35 + 2*1.50
67/	17/	ELU/4	**-29.99<<**	-9.41	-14.61	1*1.35 + 4*1.50
67/	16/	ELU/1	22.52	**8.11>>**	-13.67	1*1.35
67/	16/	ELU/6	32.79	**-107.00<<**	-21.01	1*1.00 + 2*1.50
67/	17/	ELU/5	-13.93	6.01	**-6.17>>**	1*1.00
67/	16/	ELU/2	38.63	-104.89	**-24.56<<**	1*1.35 + 2*1.50
68/	17/	ELU/3	**44.90>>**	-144.17	-19.79	1*1.35 + 3*1.50
68/	18/	ELU/1	**-0.06<<**	0.01	6.38	1*1.35

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
68/	17/	ELU/1	23.73	0.01>>	-7.98	1*1.35
68/	17/	ELU/7	38.75	-144.17<<	-17.73	1*1.00 + 3*1.50
68/	18/	ELU/2	2.51	-2.93	15.43>>	1*1.35 + 2*1.50
68/	17/	ELU/3	44.90	-144.17	-19.79<<	1*1.35 + 3*1.50
69/	18/	ELU/3	6.44>>	-141.33	10.75	1*1.35 + 3*1.50
69/	19/	ELU/2	-38.54<<	2.93	-9.35	1*1.35 + 2*1.50
69/	18/	ELU/6	-2.53	2.93>>	13.78	1*1.00 + 2*1.50
69/	18/	ELU/3	6.44	-141.33<<	10.75	1*1.35 + 3*1.50
69/	18/	ELU/2	-2.51	2.93	15.43>>	1*1.35 + 2*1.50
69/	19/	ELU/4	-35.02	-36.73	-10.18<<	1*1.35 + 4*1.50
70/	19/	ELU/4	29.59>>	-17.36	-13.10	1*1.35 + 4*1.50
70/	20/	ELU/2	-38.63<<	104.89	-24.56	1*1.35 + 2*1.50
70/	19/	ELU/6	21.29	107.00>>	-6.99	1*1.00 + 2*1.50
70/	19/	ELU/3	28.78	-33.06<<	-10.74	1*1.35 + 3*1.50
70/	19/	ELU/5	13.93	-6.01	-6.17>>	1*1.00
70/	20/	ELU/2	-38.63	104.89	-24.56<<	1*1.35 + 2*1.50
71/	21/	ELU/2	41.30>>	-61.68	-27.64	1*1.35 + 2*1.50
71/	22/	ELU/4	-29.73<<	-9.45	-14.32	1*1.35 + 4*1.50
71/	21/	ELU/1	22.33	4.06>>	-13.45	1*1.35
71/	21/	ELU/6	35.51	-62.73<<	-24.16	1*1.00 + 2*1.50
71/	22/	ELU/6	-18.56	-62.73	-3.87>>	1*1.00 + 2*1.50
71/	21/	ELU/2	41.30	-61.68	-27.64<<	1*1.35 + 2*1.50
72/	22/	ELU/3	57.56>>	-83.62	-29.24	1*1.35 + 3*1.50
72/	23/	ELU/1	-0.06<<	0.00	6.38	1*1.35
72/	22/	ELU/1	23.73	0.00>>	-7.98	1*1.35
72/	22/	ELU/7	51.41	-83.62<<	-27.17	1*1.00 + 3*1.50
72/	23/	ELU/2	20.21	-3.67	26.08>>	1*1.35 + 2*1.50
72/	22/	ELU/3	57.56	-83.62	-29.24<<	1*1.35 + 3*1.50
73/	23/	ELU/4	2.02>>	-30.99	10.34	1*1.35 + 4*1.50
73/	24/	ELU/2	-56.23<<	3.67	-19.93	1*1.35 + 2*1.50
73/	23/	ELU/6	-20.22	3.67>>	24.43	1*1.00 + 2*1.50
73/	23/	ELU/3	1.42	-80.00<<	15.63	1*1.35 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
73/	23/	ELU/2	-20.21	3.67	26.08>>	1*1.35 + 2*1.50
73/	24/	ELU/2	-56.23	3.67	-19.93<<	1*1.35 + 2*1.50
74/	24/	ELU/4	29.99>>	-8.45	-13.56	1*1.35 + 4*1.50
74/	25/	ELU/2	-41.30<<	61.68	-27.64	1*1.35 + 2*1.50
74/	24/	ELU/6	18.56	62.73>>	-3.87	1*1.00 + 2*1.50
74/	24/	ELU/3	29.48	-15.60<<	-11.54	1*1.35 + 3*1.50
74/	24/	ELU/6	18.56	62.73	-3.87>>	1*1.00 + 2*1.50
74/	25/	ELU/2	-41.30	61.68	-27.64<<	1*1.35 + 2*1.50
75/	26/	ELU/2	42.30>>	-0.00	-28.79	1*1.35 + 2*1.50
75/	27/	ELU/4	-29.49<<	-7.74	-14.07	1*1.35 + 4*1.50
75/	26/	ELU/5	16.49	-0.00>>	-9.91	1*1.00
75/	26/	ELU/4	35.29	-7.74<<	-21.81	1*1.35 + 4*1.50
75/	27/	ELU/6	-17.55	-0.00	-2.71>>	1*1.00 + 2*1.50
75/	26/	ELU/2	42.30	-0.00	-28.79<<	1*1.35 + 2*1.50
76/	27/	ELU/2	64.06>>	-0.00	-24.62	1*1.35 + 2*1.50
76/	28/	ELU/1	-0.06<<	-0.00	6.38	1*1.35
76/	27/	ELU/5	17.57	-0.00>>	-5.91	1*1.00
76/	27/	ELU/4	38.78	-22.62<<	-14.35	1*1.35 + 4*1.50
76/	28/	ELU/2	28.04	-0.00	30.80>>	1*1.35 + 2*1.50
76/	27/	ELU/3	62.91	-0.00	-33.12<<	1*1.35 + 3*1.50
77/	28/	ELU/4	2.87>>	-22.53	10.29	1*1.35 + 4*1.50
77/	29/	ELU/2	-64.06<<	-0.00	-24.62	1*1.35 + 2*1.50
77/	28/	ELU/5	0.04	-0.00>>	4.72	1*1.00
77/	28/	ELU/4	2.87	-22.53<<	10.29	1*1.35 + 4*1.50
77/	28/	ELU/2	-28.04	-0.00	30.80>>	1*1.35 + 2*1.50
77/	29/	ELU/2	-64.06	-0.00	-24.62<<	1*1.35 + 2*1.50
78/	29/	ELU/4	30.10>>	1.46	-13.69	1*1.35 + 4*1.50
78/	30/	ELU/2	-42.30<<	0.00	-28.79	1*1.35 + 2*1.50
78/	29/	ELU/4	30.10	1.46>>	-13.69	1*1.35 + 4*1.50
78/	29/	ELU/5	14.12	0.00<<	-6.39	1*1.00
78/	29/	ELU/6	17.55	0.00	-2.71>>	1*1.00 + 2*1.50
78/	30/	ELU/2	-42.30	0.00	-28.79<<	1*1.35 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
79/	31/	ELU/2	**41.30>>**	61.68	-27.64	1*1.35 + 2*1.50
79/	32/	ELU/4	**-29.34<<**	-3.76	-13.91	1*1.35 + 4*1.50
79/	31/	ELU/6	35.51	**62.73>>**	-24.16	1*1.00 + 2*1.50
79/	31/	ELU/1	22.33	**-4.06<<**	-13.45	1*1.35
79/	32/	ELU/6	-18.56	62.73	**-3.87>>**	1*1.00 + 2*1.50
79/	31/	ELU/2	41.30	61.68	**-27.64<<**	1*1.35 + 2*1.50
80/	32/	ELU/3	**57.56>>**	83.62	-29.24	1*1.35 + 3*1.50
80/	33/	ELU/1	**-0.06<<**	-0.00	6.38	1*1.35
80/	32/	ELU/7	51.41	**83.62>>**	-27.17	1*1.00 + 3*1.50
80/	32/	ELU/4	39.54	**-9.63<<**	-15.03	1*1.35 + 4*1.50
80/	33/	ELU/2	20.21	3.67	**26.08>>**	1*1.35 + 2*1.50
80/	32/	ELU/3	57.56	83.62	**-29.24<<**	1*1.35 + 3*1.50
81/	33/	ELU/4	**3.38>>**	-9.25	10.26	1*1.35 + 4*1.50
81/	34/	ELU/2	**-56.23<<**	-3.67	-19.93	1*1.35 + 2*1.50
81/	33/	ELU/3	1.42	**80.00>>**	15.63	1*1.35 + 3*1.50
81/	33/	ELU/8	3.37	**-9.25<<**	8.60	1*1.00 + 4*1.50
81/	33/	ELU/2	-20.21	-3.67	**26.08>>**	1*1.35 + 2*1.50
81/	34/	ELU/2	-56.23	-3.67	**-19.93<<**	1*1.35 + 2*1.50
82/	34/	ELU/4	**29.90>>**	11.86	-13.46	1*1.35 + 4*1.50
82/	35/	ELU/2	**-41.30<<**	-61.68	-27.64	1*1.35 + 2*1.50
82/	34/	ELU/3	29.48	**15.60>>**	-11.54	1*1.35 + 3*1.50
82/	34/	ELU/6	18.56	**-62.73<<**	-3.87	1*1.00 + 2*1.50
82/	34/	ELU/6	18.56	-62.73	**-3.87>>**	1*1.00 + 2*1.50
82/	35/	ELU/2	-41.30	-61.68	**-27.64<<**	1*1.35 + 2*1.50
83/	36/	ELU/2	**38.63>>**	104.89	-24.56	1*1.35 + 2*1.50
83/	37/	ELU/4	**-29.35<<**	2.85	-13.93	1*1.35 + 4*1.50
83/	36/	ELU/6	32.79	**107.00>>**	-21.01	1*1.00 + 2*1.50
83/	36/	ELU/1	22.52	**-8.11<<**	-13.67	1*1.35
83/	37/	ELU/5	-13.93	-6.01	**-6.17>>**	1*1.00
83/	36/	ELU/2	38.63	104.89	**-24.56<<**	1*1.35 + 2*1.50
84/	37/	ELU/3	**44.90>>**	144.17	-19.79	1*1.35 + 3*1.50
84/	38/	ELU/1	**-0.06<<**	-0.01	6.38	1*1.35

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
84/	37/	ELU/7	38.75	**144.17>>**	-17.73	1*1.00 + 3*1.50
84/	37/	ELU/1	23.73	**-0.01<<**	-7.98	1*1.35
84/	38/	ELU/2	2.51	2.93	**15.43>>**	1*1.35 + 2*1.50
84/	37/	ELU/3	44.90	144.17	**-19.79<<**	1*1.35 + 3*1.50
85/	38/	ELU/3	**6.44>>**	141.33	10.75	1*1.35 + 3*1.50
85/	39/	ELU/2	**-38.54<<**	-2.93	-9.35	1*1.35 + 2*1.50
85/	38/	ELU/3	6.44	**141.33>>**	10.75	1*1.35 + 3*1.50
85/	38/	ELU/6	-2.53	**-2.93<<**	13.78	1*1.00 + 2*1.50
85/	38/	ELU/2	-2.51	-2.93	**15.43>>**	1*1.35 + 2*1.50
85/	39/	ELU/2	-38.54	-2.93	**-9.35<<**	1*1.35 + 2*1.50
86/	39/	ELU/4	**29.39>>**	21.34	-12.89	1*1.35 + 4*1.50
86/	40/	ELU/2	**-38.63<<**	-104.89	-24.56	1*1.35 + 2*1.50
86/	39/	ELU/3	28.78	**33.06>>**	-10.74	1*1.35 + 3*1.50
86/	39/	ELU/6	21.29	**-107.00<<**	-6.99	1*1.00 + 2*1.50
86/	39/	ELU/5	13.93	6.01	**-6.17>>**	1*1.00
86/	40/	ELU/2	-38.63	-104.89	**-24.56<<**	1*1.35 + 2*1.50
87/	41/	ELU/4	**35.19>>**	11.91	-21.72	1*1.35 + 4*1.50
87/	42/	ELU/3	**-31.28<<**	81.17	-17.15	1*1.35 + 3*1.50
87/	41/	ELU/6	28.98	**133.15>>**	-16.62	1*1.00 + 2*1.50
87/	41/	ELU/1	22.84	**-12.09<<**	-14.04	1*1.35
87/	42/	ELU/5	-13.69	-8.95	**-5.90>>**	1*1.00
87/	41/	ELU/4	35.19	11.91	**-21.72<<**	1*1.35 + 4*1.50
88/	42/	ELU/4	**48.05>>**	45.27	-19.54	1*1.35 + 4*1.50
88/	43/	ELU/1	**-0.05<<**	-0.02	6.38	1*1.35
88/	42/	ELU/7	32.33	**181.36>>**	-11.20	1*1.00 + 3*1.50
88/	42/	ELU/1	23.73	**-0.02<<**	-7.98	1*1.35
88/	43/	ELU/4	12.03	45.27	**16.66>>**	1*1.35 + 4*1.50
88/	42/	ELU/4	48.05	45.27	**-19.54<<**	1*1.35 + 4*1.50
89/	43/	ELU/3	**2.27>>**	180.98	10.56	1*1.35 + 3*1.50
89/	44/	ELU/4	**-42.01<<**	49.12	-13.58	1*1.35 + 4*1.50
89/	43/	ELU/3	2.27	**180.98>>**	10.56	1*1.35 + 3*1.50
89/	43/	ELU/6	-0.27	**-0.49<<**	12.39	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
89/	43/	ELU/4	-5.99	49.12	**15.37>>**	1*1.35 + 4*1.50
89/	44/	ELU/4	-42.01	49.12	**-13.58<<**	1*1.35 + 4*1.50
90/	44/	ELU/2	**29.89>>**	-130.02	-13.43	1*1.35 + 2*1.50
90/	45/	ELU/3	**-37.23<<**	49.65	-21.54	1*1.35 + 3*1.50
90/	44/	ELU/3	27.56	**49.65>>**	-9.34	1*1.35 + 3*1.50
90/	44/	ELU/6	25.10	**-133.15<<**	-11.37	1*1.00 + 2*1.50
90/	44/	ELU/5	13.69	8.95	**-5.90>>**	1*1.00
90/	45/	ELU/4	-36.12	26.54	**-21.71<<**	1*1.35 + 4*1.50
91/	46/	ELU/4	**34.68>>**	20.36	-21.14	1*1.35 + 4*1.50
91/	47/	ELU/2	**-34.30<<**	148.23	-18.50	1*1.35 + 2*1.50
91/	46/	ELU/6	24.45	**152.31>>**	-11.41	1*1.00 + 2*1.50
91/	46/	ELU/1	23.28	**-15.74<<**	-14.55	1*1.35
91/	47/	ELU/5	-13.37	-11.66	**-5.52>>**	1*1.00
91/	46/	ELU/4	34.68	20.36	**-21.14<<**	1*1.35 + 4*1.50
92/	47/	ELU/4	**50.98>>**	89.09	-20.21	1*1.35 + 4*1.50
92/	48/	ELU/3	**-4.59<<**	206.73	10.29	1*1.35 + 3*1.50
92/	47/	ELU/7	25.27	**206.74>>**	-3.90	1*1.00 + 3*1.50
92/	47/	ELU/1	23.78	**-0.07<<**	-8.00	1*1.35
92/	48/	ELU/4	14.96	89.09	**19.51>>**	1*1.35 + 4*1.50
92/	47/	ELU/4	50.98	89.09	**-20.21<<**	1*1.35 + 4*1.50
93/	48/	ELU/1	**0.00>>**	0.07	6.41	1*1.35
93/	49/	ELU/4	**-50.26<<**	93.63	-19.58	1*1.35 + 4*1.50
93/	48/	ELU/3	-4.67	**206.85>>**	11.64	1*1.35 + 3*1.50
93/	48/	ELU/6	-0.08	**-0.09<<**	12.25	1*1.00 + 2*1.50
93/	48/	ELU/4	-14.24	93.63	**19.27>>**	1*1.35 + 4*1.50
93/	49/	ELU/4	-50.26	93.63	**-19.58<<**	1*1.35 + 4*1.50
94/	49/	ELU/2	**34.30>>**	-148.23	-18.50	1*1.35 + 2*1.50
94/	50/	ELU/3	**-38.89<<**	60.30	-23.45	1*1.35 + 3*1.50
94/	49/	ELU/3	25.90	**60.30>>**	-7.45	1*1.35 + 3*1.50
94/	49/	ELU/6	29.62	**-152.31<<**	-16.57	1*1.00 + 2*1.50
94/	49/	ELU/7	21.22	56.22	**-5.51>>**	1*1.00 + 3*1.50
94/	50/	ELU/3	-38.89	60.30	**-23.45<<**	1*1.35 + 3*1.50

Esfuerzos - Casos: 9 10 : Envolvente: 2

- Caso: 8 (ELS)

Filtrar	Barra	Caso
Lista completa	1A94	1A10
Selección	1A94	8
Número total	94	10
Número seleccionado	94	1

- Casos: 9 10

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
1/	1/	ELS/2	**321.52>>**	3.94	13.67	1*1.00 + 2*1.00
1/	6/	ELS/1	**225.47<<**	-0.44	395.54	1*1.00
1/	1/	ELS/2	321.52	**3.94>>**	13.67	1*1.00 + 2*1.00
1/	1/	ELS/1	241.89	**-0.44<<**	-1.71	1*1.00
1/	6/	ELS/2	305.09	3.94	**546.29>>**	1*1.00 + 2*1.00
1/	1/	ELS/1	241.89	-0.44	**-1.71<<**	1*1.00
2/	6/	ELS/2	**256.19>>**	8.00	643.95	1*1.00 + 2*1.00
2/	11/	ELS/1	**173.10<<**	-0.84	692.12	1*1.00
2/	6/	ELS/2	256.19	**8.00>>**	643.95	1*1.00 + 2*1.00
2/	6/	ELS/1	189.52	**-0.84<<**	383.89	1*1.00
2/	11/	ELS/2	239.76	8.00	**1065.50>>**	1*1.00 + 2*1.00
2/	6/	ELS/1	189.52	-0.84	**383.89<<**	1*1.00
3/	11/	ELS/2	**187.95>>**	8.73	1151.29	1*1.00 + 2*1.00
3/	16/	ELS/1	**121.06<<**	-0.88	902.92	1*1.00
3/	11/	ELS/2	187.95	**8.73>>**	1151.29	1*1.00 + 2*1.00
3/	11/	ELS/1	137.48	**-0.88<<**	683.16	1*1.00
3/	16/	ELS/2	171.52	8.73	**1456.84>>**	1*1.00 + 2*1.00
3/	11/	ELS/1	137.48	-0.88	**683.16<<**	1*1.00
4/	16/	ELS/2	**117.25>>**	6.61	1526.16	1*1.00 + 2*1.00
4/	21/	ELS/1	**69.26<<**	-0.63	1028.61	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
4/	16/	ELS/2	117.25	**6.61>>**	1526.16	1*1.00 + 2*1.00
4/	16/	ELS/1	85.68	**-0.63<<**	896.91	1*1.00
4/	21/	ELS/2	100.82	6.61	**1711.52>>**	1*1.00 + 2*1.00
4/	16/	ELS/1	85.68	-0.63	**896.91<<**	1*1.00
5/	21/	ELS/2	**44.78>>**	2.46	1752.34	1*1.00 + 2*1.00
5/	26/	ELS/1	**17.60<<**	-0.23	1069.48	1*1.00
5/	21/	ELS/2	44.78	**2.46>>**	1752.34	1*1.00 + 2*1.00
5/	21/	ELS/1	34.02	**-0.23<<**	1025.60	1*1.00
5/	26/	ELS/2	28.35	2.46	**1814.50>>**	1*1.00 + 2*1.00
5/	21/	ELS/1	34.02	-0.23	**1025.60<<**	1*1.00
6/	26/	ELS/1	**-17.60>>**	0.23	1069.48	1*1.00
6/	31/	ELS/2	**-44.78<<**	-2.46	1752.34	1*1.00 + 2*1.00
6/	26/	ELS/4	-25.96	**0.65>>**	1474.51	1*1.00 + 4*1.00
6/	26/	ELS/2	-28.35	**-2.46<<**	1814.50	1*1.00 + 2*1.00
6/	26/	ELS/2	-28.35	-2.46	**1814.50>>**	1*1.00 + 2*1.00
6/	31/	ELS/1	-34.02	0.23	**1025.60<<**	1*1.00
7/	31/	ELS/1	**-69.26>>**	0.63	1028.61	1*1.00
7/	36/	ELS/2	**-117.25<<**	-6.61	1526.16	1*1.00 + 2*1.00
7/	31/	ELS/1	-69.26	**0.63>>**	1028.61	1*1.00
7/	31/	ELS/2	-100.82	**-6.61<<**	1711.52	1*1.00 + 2*1.00
7/	31/	ELS/2	-100.82	-6.61	**1711.52>>**	1*1.00 + 2*1.00
7/	36/	ELS/1	-85.68	0.63	**896.91<<**	1*1.00
8/	36/	ELS/1	**-121.06>>**	0.88	902.92	1*1.00
8/	41/	ELS/2	**-187.95<<**	-8.73	1151.29	1*1.00 + 2*1.00
8/	36/	ELS/1	-121.06	**0.88>>**	902.92	1*1.00
8/	36/	ELS/2	-171.52	**-8.73<<**	1456.84	1*1.00 + 2*1.00
8/	36/	ELS/2	-171.52	-8.73	**1456.84>>**	1*1.00 + 2*1.00
8/	41/	ELS/1	-137.48	0.88	**683.16<<**	1*1.00
9/	41/	ELS/1	**-173.10>>**	0.84	692.12	1*1.00
9/	46/	ELS/2	**-256.19<<**	-8.00	643.95	1*1.00 + 2*1.00
9/	41/	ELS/1	-173.10	**0.84>>**	692.12	1*1.00
9/	41/	ELS/2	-239.76	**-8.00<<**	1065.50	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
9/	41/	ELS/2	-239.76	-8.00	**1065.50>>**	1*1.00 + 2*1.00
9/	46/	ELS/1	-189.52	0.84	**383.89<<**	1*1.00
10/	46/	ELS/1	**-225.47>>**	0.44	395.54	1*1.00
10/	51/	ELS/2	**-321.52<<**	-3.94	13.67	1*1.00 + 2*1.00
10/	46/	ELS/1	-225.47	**0.44>>**	395.54	1*1.00
10/	46/	ELS/2	-305.09	**-3.94<<**	546.29	1*1.00 + 2*1.00
10/	46/	ELS/2	-305.09	-3.94	**546.29>>**	1*1.00 + 2*1.00
10/	51/	ELS/1	-241.89	0.44	**-1.71<<**	1*1.00
11/	2/	ELS/2	**437.41>>**	5.23	-13.73	1*1.00 + 2*1.00
11/	7/	ELS/1	**206.94<<**	-0.52	367.44	1*1.00
11/	2/	ELS/3	322.50	**9.01>>**	10.97	1*1.00 + 3*1.00
11/	2/	ELS/1	223.37	**-0.52<<**	1.67	1*1.00
11/	7/	ELS/2	420.99	5.23	**715.91>>**	1*1.00 + 2*1.00
11/	2/	ELS/2	437.41	5.23	**-13.73<<**	1*1.00 + 2*1.00
12/	7/	ELS/2	**370.96>>**	12.23	618.29	1*1.00 + 2*1.00
12/	12/	ELS/1	**159.54<<**	-0.93	664.22	1*1.00
12/	7/	ELS/3	259.40	**18.44>>**	622.77	1*1.00 + 3*1.00
12/	7/	ELS/1	175.96	**-0.93<<**	379.04	1*1.00
12/	12/	ELS/2	354.53	12.23	**1234.96>>**	1*1.00 + 2*1.00
12/	7/	ELS/1	175.96	-0.93	**379.04<<**	1*1.00
13/	12/	ELS/2	**307.30>>**	15.83	1149.49	1*1.00 + 2*1.00
13/	17/	ELS/1	**111.85<<**	-0.93	877.26	1*1.00
13/	12/	ELS/3	193.34	**21.03>>**	1117.46	1*1.00 + 3*1.00
13/	12/	ELS/1	128.27	**-0.93<<**	673.16	1*1.00
13/	17/	ELS/2	290.87	15.83	**1657.94>>**	1*1.00 + 2*1.00
13/	12/	ELS/1	128.27	-0.93	**673.16<<**	1*1.00
14/	17/	ELS/2	**244.59>>**	15.72	1590.56	1*1.00 + 2*1.00
14/	22/	ELS/1	**63.92<<**	-0.67	1005.88	1*1.00
14/	17/	ELS/3	124.43	**17.64>>**	1487.64	1*1.00 + 3*1.00
14/	17/	ELS/1	80.34	**-0.67<<**	883.26	1*1.00
14/	22/	ELS/2	228.17	15.72	**1992.41>>**	1*1.00 + 2*1.00
14/	17/	ELS/1	80.34	-0.67	**883.26<<**	1*1.00

Barra/Nudo/Caso	FZ (kN)	MX (kNm)	MY (kNm)	Definición
15/ 22/ ELS/2	**98.33>>**	6.53	1954.03	1*1.00 + 2*1.00
15/ 27/ ELS/1	**15.85<<**	-0.24	1049.78	1*1.00
15/ 22/ ELS/4	43.39	**11.23>>**	1415.42	1*1.00 + 4*1.00
15/ 22/ ELS/1	32.27	**-0.24<<**	1008.88	1*1.00
15/ 27/ ELS/2	81.91	6.53	**2107.23>>**	1*1.00 + 2*1.00
15/ 22/ ELS/1	32.27	-0.24	**1008.88<<**	1*1.00
16/ 27/ ELS/1	**-15.85>>**	0.24	1049.78	1*1.00
16/ 32/ ELS/2	**-98.33<<**	-6.53	1954.03	1*1.00 + 2*1.00
16/ 27/ ELS/4	-21.72	**11.09>>**	1485.15	1*1.00 + 4*1.00
16/ 27/ ELS/3	-31.60	**-6.87<<**	1786.26	1*1.00 + 3*1.00
16/ 27/ ELS/2	-81.91	-6.53	**2107.23>>**	1*1.00 + 2*1.00
16/ 32/ ELS/1	-32.27	0.24	**1008.88<<**	1*1.00
17/ 32/ ELS/1	**-63.92>>**	0.67	1005.88	1*1.00
17/ 37/ ELS/2	**-244.59<<**	-15.72	1590.56	1*1.00 + 2*1.00
17/ 32/ ELS/4	-87.22	**10.38>>**	1437.89	1*1.00 + 4*1.00
17/ 32/ ELS/3	-108.00	**-17.64<<**	1685.21	1*1.00 + 3*1.00
17/ 32/ ELS/2	-228.17	-15.72	**1992.41>>**	1*1.00 + 2*1.00
17/ 37/ ELS/1	-80.34	0.67	**883.26<<**	1*1.00
18/ 37/ ELS/1	**-111.85>>**	0.93	877.26	1*1.00
18/ 42/ ELS/2	**-307.30<<**	-15.83	1149.49	1*1.00 + 2*1.00
18/ 37/ ELS/4	-153.55	**9.22>>**	1269.93	1*1.00 + 4*1.00
18/ 37/ ELS/3	-176.92	**-21.03<<**	1432.18	1*1.00 + 3*1.00
18/ 37/ ELS/2	-290.87	-15.83	**1657.94>>**	1*1.00 + 2*1.00
18/ 42/ ELS/1	-128.27	0.93	**673.16<<**	1*1.00
19/ 42/ ELS/1	**-159.54>>**	0.93	664.22	1*1.00
19/ 47/ ELS/2	**-370.96<<**	-12.23	618.29	1*1.00 + 2*1.00
19/ 42/ ELS/4	-224.87	**5.67>>**	971.81	1*1.00 + 4*1.00
19/ 42/ ELS/3	-242.98	**-18.44<<**	1049.78	1*1.00 + 3*1.00
19/ 42/ ELS/2	-354.53	-12.23	**1234.96>>**	1*1.00 + 2*1.00
19/ 47/ ELS/1	-175.96	0.93	**379.04<<**	1*1.00
20/ 47/ ELS/1	**-206.94>>**	0.52	367.44	1*1.00
20/ 52/ ELS/2	**-437.41<<**	-5.23	-13.73	1*1.00 + 2*1.00

Barra/Nudo/Caso	FZ (kN)	MX (kNm)	MY (kNm)	Definición
20/ 47/ ELS/4	-298.45	**2.03>>**	528.59	1*1.00 + 4*1.00
20/ 47/ ELS/3	-306.07	**-9.01<<**	545.25	1*1.00 + 3*1.00
20/ 47/ ELS/2	-420.99	-5.23	**715.91>>**	1*1.00 + 2*1.00
20/ 52/ ELS/2	-437.41	-5.23	**-13.73<<**	1*1.00 + 2*1.00
21/ 4/ ELS/3	**442.99>>**	7.01	-13.58	1*1.00 + 3*1.00
21/ 9/ ELS/1	**206.94<<**	0.52	367.44	1*1.00
21/ 4/ ELS/3	442.99	**7.01>>**	-13.58	1*1.00 + 3*1.00
21/ 4/ ELS/2	437.41	**-5.23<<**	-13.73	1*1.00 + 2*1.00
21/ 9/ ELS/3	426.56	7.01	**725.53>>**	1*1.00 + 3*1.00
21/ 4/ ELS/2	437.41	-5.23	**-13.73<<**	1*1.00 + 2*1.00
22/ 9/ ELS/3	**379.07>>**	12.57	628.99	1*1.00 + 3*1.00
22/ 14/ ELS/1	**159.54<<**	0.93	664.22	1*1.00
22/ 9/ ELS/3	379.07	**12.57>>**	628.99	1*1.00 + 3*1.00
22/ 9/ ELS/2	370.96	**-12.23<<**	618.29	1*1.00 + 2*1.00
22/ 14/ ELS/3	362.65	12.57	**1259.46>>**	1*1.00 + 3*1.00
22/ 9/ ELS/1	175.96	0.93	**379.04<<**	1*1.00
23/ 14/ ELS/3	**318.65>>**	11.99	1172.80	1*1.00 + 3*1.00
23/ 19/ ELS/1	**111.85<<**	0.93	877.26	1*1.00
23/ 14/ ELS/3	318.65	**11.99>>**	1172.80	1*1.00 + 3*1.00
23/ 14/ ELS/2	307.30	**-15.83<<**	1149.49	1*1.00 + 2*1.00
23/ 19/ ELS/3	302.23	11.99	**1700.55>>**	1*1.00 + 3*1.00
23/ 14/ ELS/1	128.27	0.93	**673.16<<**	1*1.00
24/ 19/ ELS/3	**260.17>>**	7.00	1628.97	1*1.00 + 3*1.00
24/ 24/ ELS/1	**63.92<<**	0.67	1005.88	1*1.00
24/ 19/ ELS/3	260.17	**7.00>>**	1628.97	1*1.00 + 3*1.00
24/ 19/ ELS/2	244.59	**-15.72<<**	1590.56	1*1.00 + 2*1.00
24/ 24/ ELS/3	243.75	7.00	**2057.31>>**	1*1.00 + 3*1.00
24/ 19/ ELS/1	80.34	0.67	**883.26<<**	1*1.00
25/ 24/ ELS/3	**105.16>>**	2.21	2014.68	1*1.00 + 3*1.00
25/ 29/ ELS/1	**15.85<<**	0.24	1049.78	1*1.00
25/ 24/ ELS/3	105.16	**2.21>>**	2014.68	1*1.00 + 3*1.00
25/ 24/ ELS/2	98.33	**-6.53<<**	1954.03	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
25/	29/	ELS/3	88.74	2.21	**2179.49>>**	1*1.00 + 3*1.00
25/	24/	ELS/1	32.27	0.24	**1008.88<<**	1*1.00
26/	29/	ELS/4	**6.86>>**	-6.30	1516.20	1*1.00 + 4*1.00
26/	34/	ELS/3	**-105.16<<**	-2.21	2014.68	1*1.00 + 3*1.00
26/	29/	ELS/2	-81.91	**6.53>>**	2107.23	1*1.00 + 2*1.00
26/	29/	ELS/4	6.86	**-6.30<<**	1516.20	1*1.00 + 4*1.00
26/	29/	ELS/3	-88.74	-2.21	**2179.49>>**	1*1.00 + 3*1.00
26/	34/	ELS/1	-32.27	-0.24	**1008.88<<**	1*1.00
27/	34/	ELS/4	**-54.42>>**	-10.35	1499.53	1*1.00 + 4*1.00
27/	39/	ELS/3	**-260.17<<**	-7.00	1628.97	1*1.00 + 3*1.00
27/	34/	ELS/2	-228.17	**15.72>>**	1992.41	1*1.00 + 2*1.00
27/	34/	ELS/4	-54.42	**-10.35<<**	1499.53	1*1.00 + 4*1.00
27/	34/	ELS/3	-243.75	-7.00	**2057.31>>**	1*1.00 + 3*1.00
27/	39/	ELS/1	-80.34	-0.67	**883.26<<**	1*1.00
28/	39/	ELS/1	**-111.85>>**	-0.93	877.26	1*1.00
28/	44/	ELS/3	**-318.65<<**	-11.99	1172.80	1*1.00 + 3*1.00
28/	39/	ELS/2	-290.87	**15.83>>**	1657.94	1*1.00 + 2*1.00
28/	39/	ELS/4	-115.87	**-13.67<<**	1386.97	1*1.00 + 4*1.00
28/	39/	ELS/3	-302.23	-11.99	**1700.55>>**	1*1.00 + 3*1.00
28/	44/	ELS/1	-128.27	-0.93	**673.16<<**	1*1.00
29/	44/	ELS/1	**-159.54>>**	-0.93	664.22	1*1.00
29/	49/	ELS/3	**-379.07<<**	-12.57	628.99	1*1.00 + 3*1.00
29/	44/	ELS/2	-354.53	**12.23>>**	1234.96	1*1.00 + 2*1.00
29/	44/	ELS/4	-262.89	**-12.66<<**	1190.18	1*1.00 + 4*1.00
29/	44/	ELS/3	-362.65	-12.57	**1259.46>>**	1*1.00 + 3*1.00
29/	49/	ELS/1	-175.96	-0.93	**379.04<<**	1*1.00
30/	49/	ELS/1	**-206.94>>**	-0.52	367.44	1*1.00
30/	54/	ELS/4	**-468.35<<**	-7.01	-8.83	1*1.00 + 4*1.00
30/	49/	ELS/2	-420.99	**5.23>>**	715.91	1*1.00 + 2*1.00
30/	49/	ELS/4	-451.93	**-7.01<<**	773.41	1*1.00 + 4*1.00
30/	49/	ELS/4	-451.93	-7.01	**773.41>>**	1*1.00 + 4*1.00
30/	54/	ELS/2	-437.41	5.23	**-13.73<<**	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
31/	5/	ELS/3	**437.92>>**	1.46	-5.25	1*1.00 + 3*1.00
31/	10/	ELS/1	**225.47<<**	0.44	395.54	1*1.00
31/	5/	ELS/3	437.92	**1.46>>**	-5.25	1*1.00 + 3*1.00
31/	5/	ELS/2	321.52	**-3.94<<**	13.67	1*1.00 + 2*1.00
31/	10/	ELS/3	421.50	1.46	**725.25>>**	1*1.00 + 3*1.00
31/	5/	ELS/3	437.92	1.46	**-5.25<<**	1*1.00 + 3*1.00
32/	10/	ELS/3	**366.99>>**	2.90	683.88	1*1.00 + 3*1.00
32/	15/	ELS/1	**173.10<<**	0.84	692.12	1*1.00
32/	10/	ELS/3	366.99	**2.90>>**	683.88	1*1.00 + 3*1.00
32/	10/	ELS/2	256.19	**-8.00<<**	643.95	1*1.00 + 2*1.00
32/	15/	ELS/3	350.56	2.90	**1293.80>>**	1*1.00 + 3*1.00
32/	10/	ELS/1	189.52	0.84	**383.89<<**	1*1.00
33/	15/	ELS/3	**297.19>>**	3.03	1259.81	1*1.00 + 3*1.00
33/	20/	ELS/1	**121.06<<**	0.88	902.92	1*1.00
33/	15/	ELS/3	297.19	**3.03>>**	1259.81	1*1.00 + 3*1.00
33/	15/	ELS/2	187.95	**-8.73<<**	1151.29	1*1.00 + 2*1.00
33/	20/	ELS/3	280.77	3.03	**1751.07>>**	1*1.00 + 3*1.00
33/	15/	ELS/1	137.48	0.88	**683.16<<**	1*1.00
34/	20/	ELS/3	**228.24>>**	2.19	1728.43	1*1.00 + 3*1.00
34/	25/	ELS/1	**69.26<<**	0.63	1028.61	1*1.00
34/	20/	ELS/3	228.24	**2.19>>**	1728.43	1*1.00 + 3*1.00
34/	20/	ELS/2	117.25	**-6.61<<**	1526.16	1*1.00 + 2*1.00
34/	25/	ELS/3	211.82	2.19	**2102.48>>**	1*1.00 + 3*1.00
34/	20/	ELS/1	85.68	0.63	**896.91<<**	1*1.00
35/	25/	ELS/3	**90.71>>**	0.79	2091.78	1*1.00 + 3*1.00
35/	30/	ELS/1	**17.60<<**	0.23	1069.48	1*1.00
35/	25/	ELS/3	90.71	**0.79>>**	2091.78	1*1.00 + 3*1.00
35/	25/	ELS/2	44.78	**-2.46<<**	1752.34	1*1.00 + 2*1.00
35/	30/	ELS/3	74.29	0.79	**2232.03>>**	1*1.00 + 3*1.00
35/	25/	ELS/1	34.02	0.23	**1025.60<<**	1*1.00
36/	30/	ELS/4	**-5.14>>**	-0.76	1570.20	1*1.00 + 4*1.00
36/	35/	ELS/3	**-90.71<<**	-0.79	2091.78	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
36/	30/	ELS/2	-28.35	2.46>>	1814.50	1*1.00 + 2*1.00
36/	30/	ELS/3	-74.29	-0.79<<	2232.03	1*1.00 + 3*1.00
36/	30/	ELS/3	-74.29	-0.79	2232.03>>	1*1.00 + 3*1.00
36/	35/	ELS/1	-34.02	-0.23	1025.60<<	1*1.00
37/	35/	ELS/1	-69.26>>	-0.63	1028.61	1*1.00
37/	40/	ELS/3	-228.24<<	-2.19	1728.43	1*1.00 + 3*1.00
37/	35/	ELS/2	-100.82	6.61>>	1711.52	1*1.00 + 2*1.00
37/	35/	ELS/3	-211.82	-2.19<<	2102.48	1*1.00 + 3*1.00
37/	35/	ELS/3	-211.82	-2.19	2102.48>>	1*1.00 + 3*1.00
37/	40/	ELS/1	-85.68	-0.63	896.91<<	1*1.00
38/	40/	ELS/1	-121.06>>	-0.88	902.92	1*1.00
38/	45/	ELS/3	-297.19<<	-3.03	1259.81	1*1.00 + 3*1.00
38/	40/	ELS/2	-171.52	8.73>>	1456.84	1*1.00 + 2*1.00
38/	40/	ELS/3	-280.77	-3.03<<	1751.07	1*1.00 + 3*1.00
38/	40/	ELS/3	-280.77	-3.03	1751.07>>	1*1.00 + 3*1.00
38/	45/	ELS/1	-137.48	-0.88	683.16<<	1*1.00
39/	45/	ELS/1	-173.10>>	-0.84	692.12	1*1.00
39/	50/	ELS/3	-366.99<<	-2.90	683.88	1*1.00 + 3*1.00
39/	45/	ELS/2	-239.76	8.00>>	1065.50	1*1.00 + 2*1.00
39/	45/	ELS/3	-350.56	-2.90<<	1293.80	1*1.00 + 3*1.00
39/	45/	ELS/3	-350.56	-2.90	1293.80>>	1*1.00 + 3*1.00
39/	50/	ELS/1	-189.52	-0.84	383.89<<	1*1.00
40/	50/	ELS/1	-225.47>>	-0.44	395.54	1*1.00
40/	55/	ELS/4	-444.30<<	-0.74	-2.01	1*1.00 + 4*1.00
40/	50/	ELS/2	-305.09	3.94>>	546.29	1*1.00 + 2*1.00
40/	50/	ELS/3	-421.50	-1.46<<	725.25	1*1.00 + 3*1.00
40/	50/	ELS/4	-427.87	-0.74	739.33>>	1*1.00 + 4*1.00
40/	55/	ELS/3	-437.92	-1.46	-5.25<<	1*1.00 + 3*1.00
41/	3/	ELS/2	0.59>>	0.00	0.11	1*1.00 + 2*1.00
41/	3/	ELS/1	0.29<<	0.00	0.08	1*1.00
41/	3/	ELS/3	0.51	3.81>>	0.13	1*1.00 + 3*1.00
41/	3/	ELS/1	0.29	0.00<<	0.08	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
41/	8/	ELS/2	0.59	0.00	1.11>>	1*1.00 + 2*1.00
41/	3/	ELS/1	0.29	0.00	0.08<<	1*1.00
42/	8/	ELS/2	0.69>>	0.00	1.03	1*1.00 + 2*1.00
42/	8/	ELS/1	0.28<<	-0.00	0.68	1*1.00
42/	8/	ELS/3	0.56	4.71>>	1.08	1*1.00 + 3*1.00
42/	8/	ELS/1	0.28	-0.00<<	0.68	1*1.00
42/	13/	ELS/2	0.69	0.00	2.21>>	1*1.00 + 2*1.00
42/	8/	ELS/1	0.28	-0.00	0.68<<	1*1.00
43/	13/	ELS/2	1.03>>	0.00	1.57	1*1.00 + 2*1.00
43/	13/	ELS/1	0.21<<	0.00	1.18	1*1.00
43/	13/	ELS/3	0.68	4.12>>	1.79	1*1.00 + 3*1.00
43/	13/	ELS/1	0.21	0.00<<	1.18	1*1.00
43/	18/	ELS/2	1.03	0.00	3.32>>	1*1.00 + 2*1.00
43/	13/	ELS/1	0.21	0.00	1.18<<	1*1.00
44/	18/	ELS/2	4.37>>	0.00	-0.59	1*1.00 + 2*1.00
44/	18/	ELS/1	0.12<<	0.00	1.55	1*1.00
44/	18/	ELS/3	2.29	2.86>>	1.05	1*1.00 + 3*1.00
44/	18/	ELS/1	0.12	0.00<<	1.55	1*1.00
44/	23/	ELS/2	4.37	0.00	6.84>>	1*1.00 + 2*1.00
44/	18/	ELS/2	4.37	0.00	-0.59<<	1*1.00 + 2*1.00
45/	23/	ELS/2	1.90>>	0.00	1.95	1*1.00 + 2*1.00
45/	23/	ELS/1	0.04<<	0.00	1.77	1*1.00
45/	23/	ELS/3	0.99	1.04>>	2.53	1*1.00 + 3*1.00
45/	23/	ELS/1	0.04	0.00<<	1.77	1*1.00
45/	28/	ELS/2	1.90	0.00	5.18>>	1*1.00 + 2*1.00
45/	23/	ELS/1	0.04	0.00	1.77<<	1*1.00
46/	28/	ELS/4	0.02>>	0.39	2.59	1*1.00 + 4*1.00
46/	28/	ELS/2	-1.90<<	-0.00	5.18	1*1.00 + 2*1.00
46/	28/	ELS/4	0.02	0.39>>	2.59	1*1.00 + 4*1.00
46/	28/	ELS/3	-0.99	-1.04<<	4.21	1*1.00 + 3*1.00
46/	28/	ELS/2	-1.90	-0.00	5.18>>	1*1.00 + 2*1.00
46/	33/	ELS/1	-0.04	0.00	1.77<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
47/	33/	ELS/4	0.10>>	-0.07	2.36	1*1.00 + 4*1.00
47/	33/	ELS/2	-4.37<<	-0.00	6.84	1*1.00 + 2*1.00
47/	33/	ELS/1	-0.12	-0.00>>	1.76	1*1.00
47/	33/	ELS/3	-2.29	-2.86<<	4.95	1*1.00 + 3*1.00
47/	33/	ELS/2	-4.37	-0.00	6.84>>	1*1.00 + 2*1.00
47/	38/	ELS/2	-4.37	-0.00	-0.59<<	1*1.00 + 2*1.00
48/	38/	ELS/4	1.53>>	-0.78	0.81	1*1.00 + 4*1.00
48/	38/	ELS/2	-1.03<<	-0.00	3.32	1*1.00 + 2*1.00
48/	38/	ELS/1	-0.21	-0.00>>	1.53	1*1.00
48/	38/	ELS/3	-0.68	-4.12<<	2.94	1*1.00 + 3*1.00
48/	43/	ELS/4	1.53	-0.78	3.41>>	1*1.00 + 4*1.00
48/	38/	ELS/4	1.53	-0.78	0.81<<	1*1.00 + 4*1.00
49/	43/	ELS/4	0.79>>	-1.63	0.84	1*1.00 + 4*1.00
49/	43/	ELS/2	-0.69<<	-0.00	2.21	1*1.00 + 2*1.00
49/	43/	ELS/1	-0.28	0.00>>	1.15	1*1.00
49/	43/	ELS/3	-0.56	-4.71<<	2.03	1*1.00 + 3*1.00
49/	43/	ELS/2	-0.69	-0.00	2.21>>	1*1.00 + 2*1.00
49/	48/	ELS/1	-0.28	0.00	0.68<<	1*1.00
50/	48/	ELS/4	1.63>>	-1.80	-0.85	1*1.00 + 4*1.00
50/	48/	ELS/2	-0.59<<	-0.00	1.11	1*1.00 + 2*1.00
50/	48/	ELS/1	-0.29	-0.00>>	0.57	1*1.00
50/	48/	ELS/3	-0.51	-3.81<<	0.98	1*1.00 + 3*1.00
50/	53/	ELS/4	1.63	-1.80	1.92>>	1*1.00 + 4*1.00
50/	48/	ELS/4	1.63	-1.80	-0.85<<	1*1.00 + 4*1.00
51/	1/	ELS/4	12.30>>	-0.14	-7.42	1*1.00 + 4*1.00
51/	2/	ELS/2	-13.76<<	-13.67	-8.34	1*1.00 + 2*1.00
51/	1/	ELS/1	8.83	1.71>>	-5.63	1*1.00
51/	1/	ELS/2	9.38	-13.67<<	-3.70	1*1.00 + 2*1.00
51/	2/	ELS/1	-6.49	1.71	-2.53>>	1*1.00
51/	2/	ELS/2	-13.76	-13.67	-8.34<<	1*1.00 + 2*1.00
52/	2/	ELS/2	13.18>>	0.06	-3.11	1*1.00 + 2*1.00
52/	3/	ELS/3	-5.48<<	-18.71	2.13	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
52/	2/	ELS/2	13.18	0.06>>	-3.11	1*1.00 + 2*1.00
52/	2/	ELS/3	7.41	-18.71<<	0.92	1*1.00 + 3*1.00
52/	3/	ELS/2	0.29	0.06	5.03>>	1*1.00 + 2*1.00
52/	2/	ELS/2	13.18	0.06	-3.11<<	1*1.00 + 2*1.00
53/	3/	ELS/1	-0.14>>	-0.04	2.46	1*1.00
53/	4/	ELS/3	-18.87<<	-18.84	-9.03	1*1.00 + 3*1.00
53/	3/	ELS/1	-0.14	-0.04>>	2.46	1*1.00
53/	3/	ELS/3	-5.99	-18.84<<	5.94	1*1.00 + 3*1.00
53/	3/	ELS/3	-5.99	-18.84	5.94>>	1*1.00 + 3*1.00
53/	4/	ELS/3	-18.87	-18.84	-9.03<<	1*1.00 + 3*1.00
54/	4/	ELS/2	13.76>>	13.67	-8.34	1*1.00 + 2*1.00
54/	5/	ELS/3	-14.47<<	-5.25	-9.10	1*1.00 + 3*1.00
54/	4/	ELS/2	13.76	13.67>>	-8.34	1*1.00 + 2*1.00
54/	4/	ELS/3	8.67	-5.25<<	-2.03	1*1.00 + 3*1.00
54/	4/	ELS/3	8.67	-5.25	-2.03>>	1*1.00 + 3*1.00
54/	5/	ELS/3	-14.47	-5.25	-9.10<<	1*1.00 + 3*1.00
55/	51/	ELS/4	12.23>>	1.65	-7.36	1*1.00 + 4*1.00
55/	52/	ELS/2	-13.76<<	13.67	-8.34	1*1.00 + 2*1.00
55/	51/	ELS/2	9.38	13.67>>	-3.70	1*1.00 + 2*1.00
55/	51/	ELS/1	8.83	-1.71<<	-5.63	1*1.00
55/	52/	ELS/1	-6.49	-1.71	-2.53>>	1*1.00
55/	52/	ELS/2	-13.76	13.67	-8.34<<	1*1.00 + 2*1.00
56/	52/	ELS/4	19.29>>	8.91	-7.48	1*1.00 + 4*1.00
56/	53/	ELS/3	-5.48<<	18.71	2.13	1*1.00 + 3*1.00
56/	52/	ELS/3	7.41	18.71>>	0.92	1*1.00 + 3*1.00
56/	52/	ELS/2	13.18	-0.06<<	-3.11	1*1.00 + 2*1.00
56/	53/	ELS/4	6.40	8.91	7.98>>	1*1.00 + 4*1.00
56/	52/	ELS/4	19.29	8.91	-7.48<<	1*1.00 + 4*1.00
57/	53/	ELS/1	-0.14>>	0.04	2.46	1*1.00
57/	54/	ELS/4	-23.49<<	10.84	-10.73	1*1.00 + 4*1.00
57/	53/	ELS/3	-5.99	18.84>>	5.94	1*1.00 + 3*1.00
57/	53/	ELS/1	-0.14	0.04<<	2.46	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
57/	53/	ELS/4	-10.60	10.84	9.78>>	1*1.00 + 4*1.00
57/	54/	ELS/4	-23.49	10.84	-10.73<<	1*1.00 + 4*1.00
58/	54/	ELS/2	13.76>>	-13.67	-8.34	1*1.00 + 2*1.00
58/	55/	ELS/3	-14.47<<	5.25	-9.10	1*1.00 + 3*1.00
58/	54/	ELS/3	8.67	5.25>>	-2.03	1*1.00 + 3*1.00
58/	54/	ELS/2	13.76	-13.67<<	-8.34	1*1.00 + 2*1.00
58/	54/	ELS/3	8.67	5.25	-2.03>>	1*1.00 + 3*1.00
58/	55/	ELS/3	-14.47	5.25	-9.10<<	1*1.00 + 3*1.00
59/	6/	ELS/4	24.64>>	-2.83	-14.89	1*1.00 + 4*1.00
59/	7/	ELS/2	-24.20<<	-97.66	-12.89	1*1.00 + 2*1.00
59/	6/	ELS/1	17.25	11.66>>	-10.78	1*1.00
59/	6/	ELS/2	22.05	-97.66<<	-11.20	1*1.00 + 2*1.00
59/	7/	ELS/1	-13.37	11.66	-5.52>>	1*1.00
59/	6/	ELS/4	24.64	-2.83	-14.89<<	1*1.00 + 4*1.00
60/	7/	ELS/2	25.83>>	-0.04	-5.89	1*1.00 + 2*1.00
60/	8/	ELS/3	-3.06<<	-137.81	7.34	1*1.00 + 3*1.00
60/	7/	ELS/1	17.61	0.05>>	-5.93	1*1.00
60/	7/	ELS/3	22.72	-137.81<<	-4.57	1*1.00 + 3*1.00
60/	8/	ELS/2	0.05	-0.04	9.75>>	1*1.00 + 2*1.00
60/	7/	ELS/4	24.63	-29.56	-6.83<<	1*1.00 + 4*1.00
61/	8/	ELS/1	0.00>>	-0.05	4.75	1*1.00
61/	9/	ELS/3	-28.89<<	-137.91	-11.08	1*1.00 + 3*1.00
61/	8/	ELS/2	-0.05	0.04>>	9.75	1*1.00 + 2*1.00
61/	8/	ELS/3	-3.11	-137.91<<	8.23	1*1.00 + 3*1.00
61/	8/	ELS/2	-0.05	0.04	9.75>>	1*1.00 + 2*1.00
61/	9/	ELS/3	-28.89	-137.91	-11.08<<	1*1.00 + 3*1.00
62/	9/	ELS/2	24.20>>	97.66	-12.89	1*1.00 + 2*1.00
62/	10/	ELS/3	-27.65<<	-41.37	-16.71	1*1.00 + 3*1.00
62/	9/	ELS/2	24.20	97.66>>	-12.89	1*1.00 + 2*1.00
62/	9/	ELS/3	18.60	-41.37<<	-5.52	1*1.00 + 3*1.00
62/	9/	ELS/3	18.60	-41.37	-5.52>>	1*1.00 + 3*1.00
62/	10/	ELS/3	-27.65	-41.37	-16.71<<	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
63/	11/	ELS/2	24.96>>	-85.78	-14.55	1*1.00 + 2*1.00
63/	12/	ELS/3	-22.22<<	-53.22	-12.02	1*1.00 + 3*1.00
63/	11/	ELS/1	16.92	8.95>>	-10.40	1*1.00
63/	11/	ELS/2	24.96	-85.78<<	-14.55	1*1.00 + 2*1.00
63/	12/	ELS/1	-13.69	8.95	-5.90>>	1*1.00
63/	11/	ELS/4	24.73	-4.50	-15.00<<	1*1.00 + 4*1.00
64/	12/	ELS/3	27.41>>	-120.90	-9.44	1*1.00 + 3*1.00
64/	13/	ELS/4	-0.21<<	-27.30	7.48	1*1.00 + 4*1.00
64/	12/	ELS/1	17.58	0.01>>	-5.91	1*1.00
64/	12/	ELS/3	27.41	-120.90<<	-9.44	1*1.00 + 3*1.00
64/	13/	ELS/2	0.17	-0.32	9.84>>	1*1.00 + 2*1.00
64/	12/	ELS/3	27.41	-120.90	-9.44<<	1*1.00 + 3*1.00
65/	13/	ELS/3	1.52>>	-120.66	7.51	1*1.00 + 3*1.00
65/	14/	ELS/2	-25.94<<	0.32	-5.94	1*1.00 + 2*1.00
65/	13/	ELS/2	-0.17	0.32>>	9.84	1*1.00 + 2*1.00
65/	13/	ELS/3	1.52	-120.66<<	7.51	1*1.00 + 3*1.00
65/	13/	ELS/2	-0.17	0.32	9.84>>	1*1.00 + 2*1.00
65/	14/	ELS/4	-25.90	-27.32	-8.29<<	1*1.00 + 4*1.00
66/	14/	ELS/2	21.30>>	85.78	-9.54	1*1.00 + 2*1.00
66/	15/	ELS/3	-26.51<<	-34.00	-15.40	1*1.00 + 3*1.00
66/	14/	ELS/2	21.30	85.78>>	-9.54	1*1.00 + 2*1.00
66/	14/	ELS/3	19.74	-34.00<<	-6.82	1*1.00 + 3*1.00
66/	14/	ELS/1	13.69	-8.95	-5.90>>	1*1.00
66/	15/	ELS/3	-26.51	-34.00	-15.40<<	1*1.00 + 3*1.00
67/	16/	ELS/2	27.42>>	-69.33	-17.38	1*1.00 + 2*1.00
67/	17/	ELS/4	-21.38<<	-5.67	-10.36	1*1.00 + 4*1.00
67/	16/	ELS/1	16.68	6.01>>	-10.13	1*1.00
67/	16/	ELS/2	27.42	-69.33<<	-17.38	1*1.00 + 2*1.00
67/	17/	ELS/1	-13.93	6.01	-6.17>>	1*1.00
67/	16/	ELS/2	27.42	-69.33	-17.38<<	1*1.00 + 2*1.00
68/	17/	ELS/3	31.69>>	-96.11	-13.79	1*1.00 + 3*1.00
68/	18/	ELS/1	-0.04<<	0.01	4.73	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
68/	17/	ELS/1	17.57	0.01>>	-5.91	1*1.00
68/	17/	ELS/3	31.69	-96.11<<	-13.79	1*1.00 + 3*1.00
68/	18/	ELS/2	1.67	-1.95	10.76>>	1*1.00 + 2*1.00
68/	17/	ELS/3	31.69	-96.11	-13.79<<	1*1.00 + 3*1.00
69/	18/	ELS/3	4.30>>	-94.22	7.64	1*1.00 + 3*1.00
69/	19/	ELS/2	-27.45<<	1.95	-6.82	1*1.00 + 2*1.00
69/	18/	ELS/2	-1.67	1.95>>	10.76	1*1.00 + 2*1.00
69/	18/	ELS/3	4.30	-94.22<<	7.64	1*1.00 + 3*1.00
69/	18/	ELS/2	-1.67	1.95	10.76>>	1*1.00 + 2*1.00
69/	19/	ELS/4	-25.11	-24.49	-7.38<<	1*1.00 + 4*1.00
70/	19/	ELS/4	21.12>>	-12.17	-9.35	1*1.00 + 4*1.00
70/	20/	ELS/2	-27.42<<	69.33	-17.38	1*1.00 + 2*1.00
70/	19/	ELS/2	18.83	69.33>>	-6.72	1*1.00 + 2*1.00
70/	19/	ELS/3	20.58	-22.64<<	-7.78	1*1.00 + 3*1.00
70/	19/	ELS/1	13.93	-6.01	-6.17>>	1*1.00
70/	20/	ELS/2	-27.42	69.33	-17.38<<	1*1.00 + 2*1.00
71/	21/	ELS/2	29.19>>	-40.82	-19.43	1*1.00 + 2*1.00
71/	22/	ELS/4	-21.23<<	-6.00	-10.18	1*1.00 + 4*1.00
71/	21/	ELS/1	16.54	3.01>>	-9.97	1*1.00
71/	21/	ELS/2	29.19	-40.82<<	-19.43	1*1.00 + 2*1.00
71/	22/	ELS/2	-17.07	-40.82	-4.69>>	1*1.00 + 2*1.00
71/	21/	ELS/2	29.19	-40.82	-19.43<<	1*1.00 + 2*1.00
72/	22/	ELS/3	40.13>>	-55.75	-20.09	1*1.00 + 3*1.00
72/	23/	ELS/1	-0.04<<	0.00	4.72	1*1.00
72/	22/	ELS/1	17.57	0.00>>	-5.91	1*1.00
72/	22/	ELS/3	40.13	-55.75<<	-20.09	1*1.00 + 3*1.00
72/	23/	ELS/2	13.47	-2.45	17.86>>	1*1.00 + 2*1.00
72/	22/	ELS/3	40.13	-55.75	-20.09<<	1*1.00 + 3*1.00
73/	23/	ELS/4	1.35>>	-20.66	7.37	1*1.00 + 4*1.00
73/	24/	ELS/2	-39.24<<	2.45	-13.88	1*1.00 + 2*1.00
73/	23/	ELS/2	-13.47	2.45>>	17.86	1*1.00 + 2*1.00
73/	23/	ELS/3	0.95	-53.34<<	10.90	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
73/	23/	ELS/2	-13.47	2.45	17.86>>	1*1.00 + 2*1.00
73/	24/	ELS/2	-39.24	2.45	-13.88<<	1*1.00 + 2*1.00
74/	24/	ELS/4	21.40>>	-5.94	-9.67	1*1.00 + 4*1.00
74/	25/	ELS/2	-29.19<<	40.82	-19.43	1*1.00 + 2*1.00
74/	24/	ELS/2	17.07	40.82>>	-4.69	1*1.00 + 2*1.00
74/	24/	ELS/3	21.06	-10.70<<	-8.32	1*1.00 + 3*1.00
74/	24/	ELS/2	17.07	40.82	-4.69>>	1*1.00 + 2*1.00
74/	25/	ELS/2	-29.19	40.82	-19.43<<	1*1.00 + 2*1.00
75/	26/	ELS/2	29.85>>	-0.00	-20.19	1*1.00 + 2*1.00
75/	27/	ELS/4	-21.07<<	-5.16	-10.02	1*1.00 + 4*1.00
75/	26/	ELS/1	16.49	-0.00>>	-9.91	1*1.00
75/	26/	ELS/4	25.18	-5.16<<	-15.53	1*1.00 + 4*1.00
75/	27/	ELS/2	-16.41	-0.00	-3.94>>	1*1.00 + 2*1.00
75/	26/	ELS/2	29.85	-0.00	-20.19<<	1*1.00 + 2*1.00
76/	27/	ELS/2	44.47>>	-0.00	-17.00	1*1.00 + 2*1.00
76/	28/	ELS/1	-0.04<<	-0.00	4.72	1*1.00
76/	27/	ELS/1	17.57	-0.00>>	-5.91	1*1.00
76/	27/	ELS/4	27.61	-15.08<<	-10.16	1*1.00 + 4*1.00
76/	28/	ELS/2	18.69	-0.00	21.00>>	1*1.00 + 2*1.00
76/	27/	ELS/3	43.69	-0.00	-22.67<<	1*1.00 + 3*1.00
77/	28/	ELS/4	1.92>>	-15.02	7.33	1*1.00 + 4*1.00
77/	29/	ELS/2	-44.47<<	-0.00	-17.00	1*1.00 + 2*1.00
77/	28/	ELS/1	0.04	-0.00>>	4.72	1*1.00
77/	28/	ELS/4	1.92	-15.02<<	7.33	1*1.00 + 4*1.00
77/	28/	ELS/2	-18.69	-0.00	21.00>>	1*1.00 + 2*1.00
77/	29/	ELS/2	-44.47	-0.00	-17.00<<	1*1.00 + 2*1.00
78/	29/	ELS/4	21.48>>	0.98	-9.76	1*1.00 + 4*1.00
78/	30/	ELS/2	-29.85<<	0.00	-20.19	1*1.00 + 2*1.00
78/	29/	ELS/4	21.48	0.98>>	-9.76	1*1.00 + 4*1.00
78/	29/	ELS/1	14.12	0.00<<	-6.39	1*1.00
78/	29/	ELS/2	16.41	0.00	-3.94>>	1*1.00 + 2*1.00
78/	30/	ELS/2	-29.85	0.00	-20.19<<	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
79/	31/	ELS/2	**29.19>>**	40.82	-19.43	1*1.00 + 2*1.00
79/	32/	ELS/4	**-20.97<<**	-2.80	-9.90	1*1.00 + 4*1.00
79/	31/	ELS/2	29.19	**40.82>>**	-19.43	1*1.00 + 2*1.00
79/	31/	ELS/1	16.54	**-3.01<<**	-9.97	1*1.00
79/	32/	ELS/2	-17.07	40.82	**-4.69>>**	1*1.00 + 2*1.00
79/	31/	ELS/2	29.19	40.82	**-19.43<<**	1*1.00 + 2*1.00
80/	32/	ELS/3	**40.13>>**	55.75	-20.09	1*1.00 + 3*1.00
80/	33/	ELS/1	**-0.04<<**	-0.00	4.72	1*1.00
80/	32/	ELS/3	40.13	**55.75>>**	-20.09	1*1.00 + 3*1.00
80/	32/	ELS/4	28.12	**-6.42<<**	-10.61	1*1.00 + 4*1.00
80/	33/	ELS/2	13.47	2.45	**17.86>>**	1*1.00 + 2*1.00
80/	32/	ELS/3	40.13	55.75	**-20.09<<**	1*1.00 + 3*1.00
81/	33/	ELS/4	**2.26>>**	-6.17	7.31	1*1.00 + 4*1.00
81/	34/	ELS/2	**-39.24<<**	-2.45	-13.88	1*1.00 + 2*1.00
81/	33/	ELS/3	0.95	**53.34>>**	10.90	1*1.00 + 3*1.00
81/	33/	ELS/4	2.26	**-6.17<<**	7.31	1*1.00 + 4*1.00
81/	33/	ELS/2	-13.47	-2.45	**17.86>>**	1*1.00 + 2*1.00
81/	34/	ELS/2	-39.24	-2.45	**-13.88<<**	1*1.00 + 2*1.00
82/	34/	ELS/4	**21.34>>**	8.21	-9.61	1*1.00 + 4*1.00
82/	35/	ELS/2	**-29.19<<**	-40.82	-19.43	1*1.00 + 2*1.00
82/	34/	ELS/3	21.06	**10.70>>**	-8.32	1*1.00 + 3*1.00
82/	34/	ELS/2	17.07	**-40.82<<**	-4.69	1*1.00 + 2*1.00
82/	34/	ELS/2	17.07	-40.82	**-4.69>>**	1*1.00 + 2*1.00
82/	35/	ELS/2	-29.19	-40.82	**-19.43<<**	1*1.00 + 2*1.00
83/	36/	ELS/2	**27.42>>**	69.33	-17.38	1*1.00 + 2*1.00
83/	37/	ELS/4	**-20.96<<**	1.30	-9.90	1*1.00 + 4*1.00
83/	36/	ELS/2	27.42	**69.33>>**	-17.38	1*1.00 + 2*1.00
83/	36/	ELS/1	16.68	**-6.01<<**	-10.13	1*1.00
83/	37/	ELS/1	-13.93	-6.01	**-6.17>>**	1*1.00
83/	36/	ELS/2	27.42	69.33	**-17.38<<**	1*1.00 + 2*1.00
84/	37/	ELS/3	**31.69>>**	96.11	-13.79	1*1.00 + 3*1.00
84/	38/	ELS/1	**-0.04<<**	-0.01	4.73	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
84/	37/	ELS/3	31.69	**96.11>>**	-13.79	1*1.00 + 3*1.00
84/	37/	ELS/1	17.57	**-0.01<<**	-5.91	1*1.00
84/	38/	ELS/2	1.67	1.95	**10.76>>**	1*1.00 + 2*1.00
84/	37/	ELS/3	31.69	96.11	**-13.79<<**	1*1.00 + 3*1.00
85/	38/	ELS/3	**4.30>>**	94.22	7.64	1*1.00 + 3*1.00
85/	39/	ELS/2	**-27.45<<**	-1.95	-6.82	1*1.00 + 2*1.00
85/	38/	ELS/3	4.30	**94.22>>**	7.64	1*1.00 + 3*1.00
85/	38/	ELS/2	-1.67	**-1.95<<**	10.76	1*1.00 + 2*1.00
85/	38/	ELS/2	-1.67	-1.95	**10.76>>**	1*1.00 + 2*1.00
85/	39/	ELS/2	-27.45	-1.95	**-6.82<<**	1*1.00 + 2*1.00
86/	39/	ELS/4	**20.99>>**	14.83	-9.21	1*1.00 + 4*1.00
86/	40/	ELS/2	**-27.42<<**	-69.33	-17.38	1*1.00 + 2*1.00
86/	39/	ELS/3	20.58	**22.64>>**	-7.78	1*1.00 + 3*1.00
86/	39/	ELS/2	18.83	**-69.33<<**	-6.72	1*1.00 + 2*1.00
86/	39/	ELS/1	13.93	6.01	**-6.17>>**	1*1.00
86/	40/	ELS/2	-27.42	-69.33	**-17.38<<**	1*1.00 + 2*1.00
87/	41/	ELS/4	**25.15>>**	7.05	-15.52	1*1.00 + 4*1.00
87/	42/	ELS/3	**-22.22<<**	53.22	-12.02	1*1.00 + 3*1.00
87/	41/	ELS/2	24.96	**85.78>>**	-14.55	1*1.00 + 2*1.00
87/	41/	ELS/1	16.92	**-8.95<<**	-10.40	1*1.00
87/	42/	ELS/1	-13.69	-8.95	**-5.90>>**	1*1.00
87/	41/	ELS/4	25.15	7.05	**-15.52<<**	1*1.00 + 4*1.00
88/	42/	ELS/4	**33.79>>**	30.18	-13.62	1*1.00 + 4*1.00
88/	43/	ELS/1	**-0.04<<**	-0.01	4.73	1*1.00
88/	42/	ELS/3	27.41	**120.90>>**	-9.44	1*1.00 + 3*1.00
88/	42/	ELS/1	17.58	**-0.01<<**	-5.91	1*1.00
88/	43/	ELS/4	8.02	30.18	**11.58>>**	1*1.00 + 4*1.00
88/	42/	ELS/4	33.79	30.18	**-13.62<<**	1*1.00 + 4*1.00
89/	43/	ELS/3	**1.52>>**	120.66	7.51	1*1.00 + 3*1.00
89/	44/	ELS/4	**-29.76<<**	32.75	-9.64	1*1.00 + 4*1.00
89/	43/	ELS/3	1.52	**120.66>>**	7.51	1*1.00 + 3*1.00
89/	43/	ELS/2	-0.17	**-0.32<<**	9.84	1*1.00 + 2*1.00

Barra/Nudo/Caso	FZ (kN)	MX (kNm)	MY (kNm)	Definición
89/ 43/ ELS/4	-3.99	32.75	**10.72>>**	1*1.00 + 4*1.00
89/ 44/ ELS/4	-29.76	32.75	**-9.64<<**	1*1.00 + 4*1.00
90/ 44/ ELS/2	**21.30>>**	-85.78	-9.54	1*1.00 + 2*1.00
90/ 45/ ELS/3	**-26.51<<**	34.00	-15.40	1*1.00 + 3*1.00
90/ 44/ ELS/3	19.74	**34.00>>**	-6.82	1*1.00 + 3*1.00
90/ 44/ ELS/2	21.30	**-85.78<<**	-9.54	1*1.00 + 2*1.00
90/ 44/ ELS/1	13.69	8.95	**-5.90>>**	1*1.00
90/ 45/ ELS/4	-25.77	18.59	**-15.52<<**	1*1.00 + 4*1.00
91/ 46/ ELS/4	**24.84>>**	12.41	-15.17	1*1.00 + 4*1.00
91/ 47/ ELS/2	**-24.20<<**	97.66	-12.89	1*1.00 + 2*1.00
91/ 46/ ELS/2	22.05	**97.66>>**	-11.20	1*1.00 + 2*1.00
91/ 46/ ELS/1	17.25	**-11.66<<**	-10.78	1*1.00
91/ 47/ ELS/1	-13.37	-11.66	**-5.52>>**	1*1.00
91/ 46/ ELS/4	24.84	12.41	**-15.17<<**	1*1.00 + 4*1.00
92/ 47/ ELS/4	**35.75>>**	59.39	-14.07	1*1.00 + 4*1.00
92/ 48/ ELS/3	**-3.06<<**	137.81	7.34	1*1.00 + 3*1.00
92/ 47/ ELS/3	22.72	**137.81>>**	-4.57	1*1.00 + 3*1.00
92/ 47/ ELS/1	17.61	**-0.05<<**	-5.93	1*1.00
92/ 48/ ELS/4	9.98	59.39	**13.48>>**	1*1.00 + 4*1.00
92/ 47/ ELS/4	35.75	59.39	**-14.07<<**	1*1.00 + 4*1.00
93/ 48/ ELS/1	**0.00>>**	0.05	4.75	1*1.00
93/ 49/ ELS/4	**-35.27<<**	62.43	-13.65	1*1.00 + 4*1.00
93/ 48/ ELS/3	-3.11	**137.91>>**	8.23	1*1.00 + 3*1.00
93/ 48/ ELS/2	-0.05	**-0.04<<**	9.75	1*1.00 + 2*1.00
93/ 48/ ELS/4	-9.49	62.43	**13.32>>**	1*1.00 + 4*1.00
93/ 49/ ELS/4	-35.27	62.43	**-13.65<<**	1*1.00 + 4*1.00
94/ 49/ ELS/2	**24.20>>**	-97.66	-12.89	1*1.00 + 2*1.00
94/ 50/ ELS/3	**-27.65<<**	41.37	-16.71	1*1.00 + 3*1.00
94/ 49/ ELS/3	18.60	**41.37>>**	-5.52	1*1.00 + 3*1.00
94/ 49/ ELS/2	24.20	**-97.66<<**	-12.89	1*1.00 + 2*1.00
94/ 49/ ELS/3	18.60	41.37	**-5.52>>**	1*1.00 + 3*1.00
94/ 50/ ELS/3	-27.65	41.37	**-16.71<<**	1*1.00 + 3*1.00

Esfuerzos - Casos: 9 10 : Extremos globales: 1

- Caso: 8 (ELS)

Filtrar	Barra	Caso
Lista completa	1A94	1A10
Selección	1A94	8
Número total	94	10
Número seleccionado	94	1

- Casos: 9 10

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	442.99	137.91	2232.03
Barra	21	93	36
Nudo	4	48	30
Caso	ELS/3	ELS/3	ELS/3
MIN	-468.35	-137.91	-22.67
Barra	30	61	76
Nudo	54	8	27
Caso	ELS/4	ELS/3	ELS/3

Esfuerzos - Casos: 6 7 : Extremos globales: 2

- Caso: 5 (ELU)

Filtrar	Barra	Caso
Lista completa	1A94	1A10
Selección	1A94	5
Número total	94	10
Número seleccionado	94	1

- Casos: 6 7

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	630.97	206.85	3187.62
Barra	21	93	36
Nudo	4	48	30
Caso	ELU/3	ELU/3	ELU/3
MIN	-669.02	-206.85	-33.12
Barra	30	61	76
Nudo	54	8	27
Caso	ELU/4	ELU/3	ELU/3

O.F. 5.9. **Cálculos justificativos**

CENTRO TRAMO

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	17.00	m.
Ancho del tablero	2b=	9.00	m.
Número de vigas	N=	2	u.
Canto de la viga	H=	0.90	m.
Canto de la losa	h=	0.20	m.
Voladizo	v=	2.15	m.
Distancia inter-eje	d_{ie}=	4.70	m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

	f_{ck}	f_{ctm}	E_c	
Hormigón vigas =	400	35.09	294449	Kp/cm^2
Hormigón losa =	250	25.65	275431	Kp/cm^2

Acero pasivo

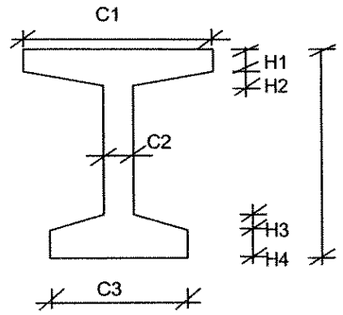
Límite elástico f_y = 5000 Kg/cm^2 E_s = 2100000

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura =	26.00	Tn.
Límite elástico al 0,2	22.10	Tn.
Sección =	140.00	mm^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	34.00	u	4.00 u
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	49.95 kg/m^3

	Pasiva		Activa	
Recubrimiento armadura superior =	3.00	cm	5.00	cm
Recubrimiento armadura inferior =	3.00	cm	10.00	cm

Recubrimiento armadura de pretensado = 0.19 m

Coeficiente de equivalencia (n-1) = 7.13 Viga-Acero

Sección real	S=	0.75	m^2
Sección resistente		0.76	m^2
Centro de gravedad		0.53	m.
Inercia prop.	I_p=	0.0200	m^4
Inercia relav	I_r=	0.0517	m^4
Inercia total	I_1=	0.0717	m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 =	7.16	m^{-2}
K_2 =	4.66	m^{-2}

Coeficientes del pretensado

Para centro viga, resulta:

R_1 = 1/S - K x d	R_1 =	0.07	m^{-2}
R_2 = 1/S + K x d	R_2 =	2.04	m^{-2}

Viga homogeneizada

S_2 = 0.79 m^2
d_2 = 0.55 m.
I_2 = 0.0761 m^4

Coeficientes de flexión para centro viga

K_3 = 7.16 m^{-2}
K_4 = 4.66 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.65 m^2
d_3 = 0.21 m.
I_3 = 0.2505 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.76 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 34 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 663.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 663.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en cabeza

N_3 = 538.76 Tn

Esfuerzo final en centro vano

N_4 = 538.76 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 67.63 m.Tn

Tensión borde superior = **531.35** Tn/m^2
Tensión borde inferior = **1037.80** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **522.52** Tn/m^2
Tensión borde inferior = **784.27** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 77.67 m.Tn
M. F. Sobrecargas fijas = 68.35 m.Tn
M. F. sobrecargas de uso = 229.28 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **1135.71** Tn/m^2
Tensión borde inferior = **233.75** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **1327.10** Tn/m^2
Tensión borde inferior = **-398.61** Tn/m^2

O.F. 5.9. **Cálculos justificativos**

CUARTOS DE LUZ

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_C=	17.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2.00 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0.20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

Hormigón vigas f_{ck} = 400 Kg/cm^2
Hormigón losa f_{ck} = 250 Kg/cm^2

Acero pasivo

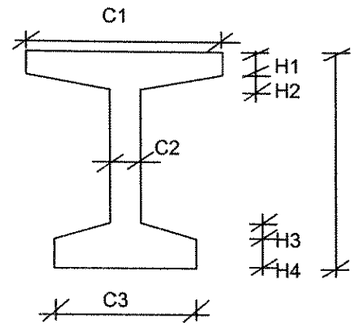
Límite elástico f_y = 5000 Kg/cm^2

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura = 26.00 Tn.
Límite elástico al 0,2% = 22.10 Tn.
Sección = 140.00 m.m^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2,5%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07 m.
H_2=	0.20 m.
H_3=	0.00 m.
H_4=	0.24 m.
C_1=	1.14 m.
C_2=	0.30 m.
C_3=	1.70 m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	26.00	u	4.00
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	

		Activa
Recubrimiento armadura superior =	3.00 cm	5.00
Recubrimiento armadura inferior =	3.00 cm	10.00

Recubrimiento armadura de pretensado = 0.22 m
Coeficiente de equivalencia (n-1) = 6.00

Sección real	S=	0.75 m^2
Sección resistente		0.76 m^2
Centro de gravedad		0.53 m.
Inercia prop.	I_p=	0.0200 m^4
Inercia relav	I_r=	0.0514 m^4
Inercia total	I_1=	0.0715 m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 = 7.26 m^{-2}
K_2 = 4.84 m^{-2}

Coeficientes del pretensado — Para centro viga, resulta:

$R_1 = 1/S - K \times d$ — R_1 = 0.23 m^{-2}
$R_2 = 1/S - K \times d$ — R_2 = 1.99 m^{-2}

cuartos vano

Viga homogeneizada

S_2 = 0.78 m^2
d_2 = 0.54 m.
I_2 = 0.0744 m^4

Coeficientes de flexión para centro viga

K_3 = 7.26 m^{-2}
K_4 = 4.84 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.64 m^2
d_3 = 0.20 m.
I_3 = 0.2444 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2 85 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 26 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 507.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 507.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en anclajes

N_3 = 412.00 Tn

Esfuerzo final en centro vano

N_4 = 412.00 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 50.72 m.Tn

Tensión borde superior = **487.25** Tn/m^2
Tensión borde inferior = **761.89** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **464.95** Tn/m^2
Tensión borde inferior = **573.09** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 58.25 m.Tn
M. F. Sobrecargas fijas = 51.26 m.Tn
M. F. sobrecargas de uso = 171.96 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **930.63** Tn/m^2
Tensión borde inferior = **144.88** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **1074.04** Tn/m^2
Tensión borde inferior = **-344.95** Tn/m^2

O.F. 5.9.

Cálculos justificativos

APOYOS
Sólo se comprueba la de mayor pretensado

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	17.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2.00 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0.20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE
- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

Hormigón vigas f_{ck} =	400 Kg/cm^2
Hormigón losa f_{ck} =	250 Kg/cm^2

Acero pasivo

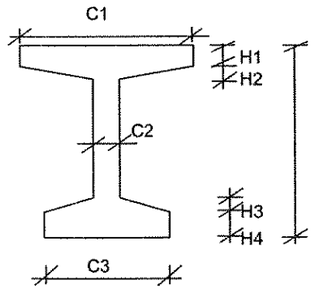
Límite elástico f_y =	5000 Kg/cm^2

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 de pulgada

Carga de rotura =	26.00 Tn.
Límite elástico al 0,2% =	22.10 Tn.
Sección =	140.00 m.m^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2,5%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	26.00	u	4.00
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	

		Activa
Recubrimiento armadura superior =	3.00 cm	5.00
Recubrimiento armadura inferior =	3.00 cm	10.00

Recubrimiento armadura de pretensado =	0.22 cm
Coeficiente de equivalencia (n-1) =	6.00

Sección real	S=	0.75 m^2
Sección resistente		0.76 m^2
Centro de gravedad		0.53 m.
Inercia prop.	I_p=	0.0200 m^4
Inercia relav	I_r=	0.0514 m^4
Inercia total	I_1=	0.0715 m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 =	7.26 m^{-2}
K_2 =	4.84 m^{-2}

Coeficientes del pretensado — Para centro viga, resulta:

$R_1 = 1/S - K \times d$ — R_1 = 0.23 m^{-2}

$R_2 = 1/S - K \times d$ — R_2 = 1.99 m^{-2}

Viga homogeneizada

S_2 = 0.78 m^2
d_2 = 0.54 m.
I_2 = 0.0744 m^4

Coeficientes de flexión para centro viga

K_3 = 7.26 m^{-2}
K_4 = 4.84 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.64 m^2
d_3 = 0.20 m.
I_3 = 0.2444 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.85 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 26 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 507.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 507.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en anclajes

N_3 = 412.00 Tn

Esfuerzo final en centro vano

N_4 = 412.00 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 0.00 m.Tn

Tensión borde superior = **119.00** Tn/m^2
Tensión borde inferior = **1007.59** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 0.00 m.Tn
M. F. Sobrecargas fijas = 0.00 m.Tn
M. F. sobrecargas de uso = 0.00 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

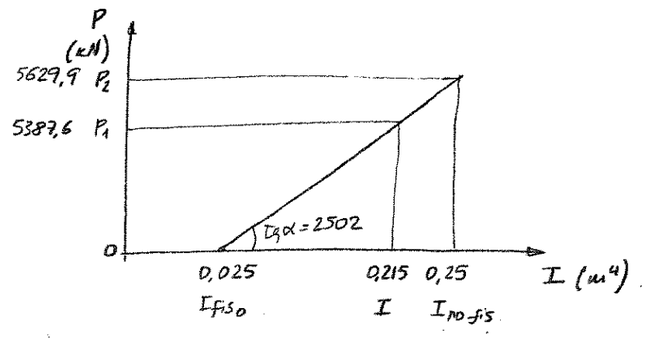
COMPROBACIÓN DEL ELS FISURACIÓN EN LA VIGA CENTRAL

1. Se supera ligeramente la resistencia media a tracción en la fibra más traccionada de la viga para la totalidad de las sobrecargas

2. La EHE permite considerar simplificadamente que para secciones pretensadas con armadura adherente y sin pasiva, $W_{max} \leq 0,2$ mm si $\Delta\sigma_p \leq 200$ MPa para las cargas exteriores

Procedimiento de análisis:

- Calcular la I_{fis_0} de la sección para $P=0$
- calcular la P_2 para evitar fisuración $\Delta\sigma_c = f_{ctm}$ (Inercia completa)
- Determinar la I para la P_1 aplicada según la proporción siguiente:



- Cálculo de la tensión en la fibra inferior de la viga con la inercia I
$\Delta\sigma_{c\,inf} = 18,87$ MPa — para todas las cargas exteriores

- Cálculo del incremento de tensión en el acero de pretensado para la totalidad de cargas exteriores

$\Delta\sigma_p = n \cdot \Delta\sigma_{c\,inf} = 135$ MPa < 200 MPa

($n = 7,13$)

El ancho de fisura es admisible $W_{max} < 0,2$ mm

CÁLCULO Ifis para P=0.

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 24/11/2003
Hora: 21:37:23

Características mecánicas de las secciones

1 Datos

- Materiales

Tipo de hormigón : HA-40
Tipo de acero : Y-1860-C
fck [MPa] = 40.00
fyk [MPa] = 1700.00
γc = 1.50
γs = 1.15

- Sección

Sección : BIGAU90

Contorno exterior

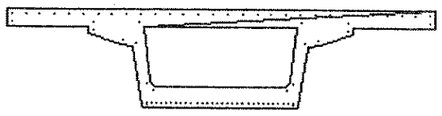
Vértice	X [m]	Y [m]	Lado	nº barras
1	2.350	1.100	1-2	30
2	-2.350	1.100	2-3	2
3	-2.350	0.900	3-4	2
4	-1.450	0.900	4-5	2
5	-1.450	0.830	5-6	2
6	-1.085	0.700	6-7	2
7	-0.968	0.680	7-8	2
8	-0.850	0.020	8-9	2
9	-0.830	0.000	9-10	30
10	0.830	0.000	10-11	2
11	0.850	0.020	11-12	2
12	0.968	0.680	12-13	2
13	1.085	0.700	13-14	2
14	1.450	0.830	14-15	2
15	1.450	0.900	15-16	2
16	2.350	0.900	16-1	2

Contorno interior

Vértice	X [m]	Y [m]	Lado	nº barras
1	-0.840	0.900	1-2	2
2	-0.758	0.290	2-3	2
3	-0.708	0.240	3-4	2
4	0.708	0.240	4-5	2
5	0.758	0.290	5-6	2
6	0.840	0.900	6-1	2

Recubrimiento exterior [m] : 0.050

Recubrimiento interior [m] : 0.050



2 Resultados

	Sección bruta	Sección homogeneizada
A [m²]	1.7000	1.756
Ix [m4]	0.2415	0.2553
Iy [m4]	2.1860	2.2527
ix [m]	0.38	0.38
iy [m]	1.13	1.13
x´g [m]	2.35	2.35
y´g [m]	0.38	0.39

→ I no fis

	Sección fisurada
Ix [m4]	0.0248
Mfis [kN·m]	1254.8
y´fis [m]	0.10

→ Ifis P=0

CÁLCULO DE P_2

O.F. 5.9.

Cálculos justificativos

CENTRO TRAMO

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	17.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0.20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE
- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

	f_{ck}	f_{ctm}	E_c	
Hormigón vigas =	400	35.09	294449	Kp/cm²
Hormigón losa =	250	25.65	275431	Kp/cm²

Acero pasivo

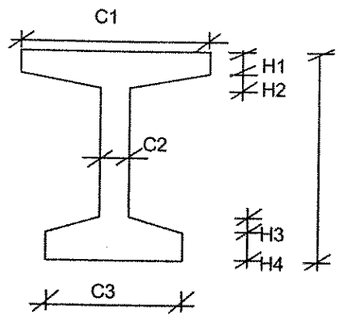
Límite elástico f_y = 5000 Kg/cm² E_s = 2100000

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura =	26.95	Tn.
Límite elástico al 0,2	22.10	Tn.
Sección =	140.00	mm²

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm
Número de tendones	1.00	u
Número de torones por tendón	34.00	u
Armadura cabeza superior	6.00	cm²
Armadura cabeza inferior	5.65	cm²

De ellos, superiores: 4.00 u

49.95 kg/m³

	Pasiva	Activa
Recubrimiento armadura superior =	3.00 cm	5.00 cm
Recubrimiento armadura inferior =	3.00 cm	10.00 cm

Recubrimiento armadura de pretensado = 0.19 m

Coeficiente de equivalencia (n-1) = 7.13 Viga-Acero

Sección real	S=	0.75 m²
Sección resistente		0.76 m²
Centro de gravedad		0.53 m.
Inercia prop.	I_p=	0.0200 m⁴
Inercia relav	I_r=	0.0517 m⁴
Inercia total	I_1=	0.0717 m⁴

Coeficientes de flexión (Viga homogeneizada)

K_1 = 7.16 m^{-2}

K_2 = 4.66 m^{-2}

Coeficientes del pretensado

Para centro viga, resulta:

$R_1 = 1/S - K \times d$ → R_1 = 0.07 m^{-2}

$R_2 = 1/S + K \times d$ → R_2 = 2.04 m^{-2}

Viga homogeneizada

S_2 = 0.79 m^2
d_2 = 0.55 m.
I_2 = 0.0761 m^4

Coeficientes de flexión para centro viga

K_3 = 7.16 m^{-2}
K_4 = 4.66 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.65 m^2
d_3 = 0.21 m.
I_3 = 0.2505 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.76 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 34 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 687.23 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 687.23 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en cabeza

N_3 = 562.99 Tn

Esfuerzo final en centro vano

N_4 = 562.99 Tn

≃ 5629,9 kN

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 67.63 m.Tn

Tensión borde superior = **533.08** Tn/m^2
Tensión borde inferior = **1087.24** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **524.25** Tn/m^2
Tensión borde inferior = **833.71** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 77.67 m.Tn
M. F. Sobrecargas fijas = 68.35 m.Tn
M. F. sobrecargas de uso = 229.28 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **1137.43** Tn/m^2
Tensión borde inferior = **283.19** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **1328.82** Tn/m^2
Tensión borde inferior = **-349.18** Tn/m^2

↳ 3,49 MPa = f_{ctm}.

Cálculo de σ_c inf. debido al pretensado.

O.F. 5.9. **Cálculos justificativos**

CENTRO TRAMO

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	17.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0.20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

	f_{ck}	f_{ctm}	E_c	
Hormigón vigas =	400	35.09	294449	Kp/cm^2
Hormigón losa =	250	25.65	275431	Kp/cm^2

Acero pasivo

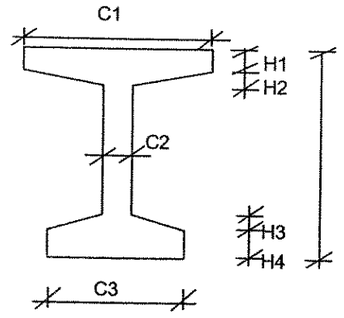
Límite elástico f_y = 5000 Kg/cm^2 E_s = 2100000

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura =	26.00	Tn.
Límite elástico al 0,2	22.10	Tn.
Sección =	140.00	mm^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm
Número de tendones	1.00	u
Número de torones por tendón	34.00	u
Armadura cabeza superior	6.00	cm^2
Armadura cabeza inferior	5.65	cm^2

De ellos, superiores: 4.00 u

49.95 kg/m^3

	Pasiva	Activa
Recubrimiento armadura superior =	3.00 cm	5.00 cm
Recubrimiento armadura inferior =	3.00 cm	10.00 cm

Recubrimiento armadura de pretensado = 0.19 m

Coeficiente de equivalencia (n-1) = 7.13 Viga-Acero

Sección real	S=	0.75 m^2
Sección resistente		0.76 m^2
Centro de gravedad		0.53 m.
Inercia prop.	I_p=	0.0200 m^4
Inercia relav	I_r=	0.0517 m^4
Inercia total	I_t=	0.0717 m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 = 7.16 m^{-2}

K_2 = 4.66 m^{-2}

Coeficientes del pretensado

Para centro viga, resulta:

$R_1 = 1/S - K \times d$ R_1 = 0.07 m^{-2}

$R_2 = 1/S + K \times d$ R_2 = 2.04 m^{-2}

Viga homogeneizada

S_2 = 0.79 m^2
d_2 = 0.55 m.
I_2 = 0.0761 m^4

Coeficientes de flexión para centro viga

K_3 = 7.16 m^{-2}
K_4 = 4.66 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.65 m^2
d_3 = 0.21 m.
I_3 = 0.2505 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.76 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 34 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 663.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 663.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en cabeza

N_3 = 538.76 Tn

Esfuerzo final en centro vano

N_4 = 538.76 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 0.00 m.Tn

Tensión borde superior = **47.13** Tn/m^2
Tensión borde inferior = **1353.00** Tn/m^2 ≃ 13,53 MPa

Viga en taller con pretensado final

Tensión borde superior = **38.30** Tn/m^2
Tensión borde inferior = **1099.47** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 77.67 m.Tn
M. F. Sobrecargas fijas = 68.35 m.Tn
M. F. sobrecargas de uso = 229.28 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **651.49** Tn/m^2
Tensión borde inferior = **548.95** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **842.88** Tn/m^2
Tensión borde inferior = **-83.41** Tn/m^2

Cálculo de $\sigma_{c\,inf}$ con I y $\Delta\sigma_{c\,inf}$.

O.F. 5.9. **Cálculos justificativos**

CENTRO TRAMO

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_C=	17.00	m.
Ancho del tablero	2b=	9.00	m.
Número de vigas	N=	2	u.
Canto de la viga	H=	0.90	m.
Canto de la losa	h=	0.20	m.
Voladizo	v=	2.15	m.
Distancia inter-eje	d_{ie}=	4.70	m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

	f_{ck}	f_{ctm}	E_c	
Hormigón vigas =	400	35.09	294449	Kp/cm^2
Hormigón losa =	250	25.65	275431	Kp/cm^2

Acero pasivo

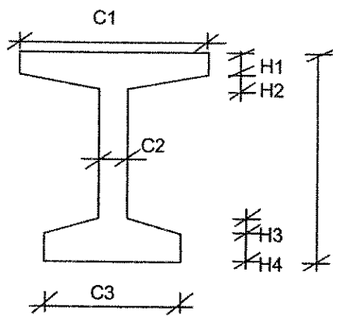
Límite elástico f_y = 5000 Kg/cm^2 E_s = 2100000

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura =	26.00	Tn.
Límite elástico al 0,2	22.10	Tn.
Sección =	140.00	mm^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores: 4.00 u
Número de torones por tendón	34.00	u	
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	49.95 kg/m^3

	Pasiva	Activa
Recubrimiento armadura superior =	3.00 cm	5.00 cm
Recubrimiento armadura inferior =	3.00 cm	10.00 cm

Recubrimiento armadura de pretensado = 0.19 m

Coeficiente de equivalencia (n-1) = 7.13 Viga-Acero

Sección real	S=	0.75	m^2
Sección resistente		0.76	m^2
Centro de gravedad		0.53	m.
Inercia prop.	I_p=	0.0200	m^4
Inercia relav	I_r=	0.0517	m^4
Inercia total	I_1=	0.0717	m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 =	7.16	m^{-2}
K_2 =	4.66	m^{-2}

Coeficientes del pretensado

Para centro viga, resulta:

$R_1 = 1/S - K \times d$ R_1 = 0.07 m^{-2}

$R_2 = 1/S + K \times d$ R_2 = 2.04 m^{-2}

Viga homogeneizada

S_2 = 0.79 m^2
d_2 = 0.55 m.
I_2 = 0.0761 m^4

Coeficientes de flexión para centro viga

K_3 = 7.16 m^{-2}
K_4 = 4.66 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.65 m^2
d_3 = 0.21 m.
I_3 = 0.2150 m^4

Coeficientes de flexión para centro viga

K_5 = 0.97 m^{-2}
K_6 = 3.21 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 34 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 663.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 663.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en cabeza

N_3 = 538.76 Tn

Esfuerzo final en centro vano

N_4 = 538.76 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 67.63 m.Tn

Tensión borde superior = **531.35** Tn/m^2
Tensión borde inferior = **1037.80** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **522.52** Tn/m^2
Tensión borde inferior = **784.27** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 77.67 m.Tn
M. F. Sobrecargas fijas = 68.35 m.Tn
M. F. sobrecargas de uso = 229.28 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **1145.13** Tn/m^2
Tensión borde inferior = **202.63** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **1368.12** Tn/m^2
Tensión borde inferior = **-534.15** Tn/m^2

$\simeq 5{,}34$ MPa.

$13{,}53 + 5{,}34 = 18{,}87$ MPa.

Obra: ARMAT
Fecha: 20/11/2003
Hora: 20:24:26

Características reológicas del hormigón

1 Datos

- Hormigón

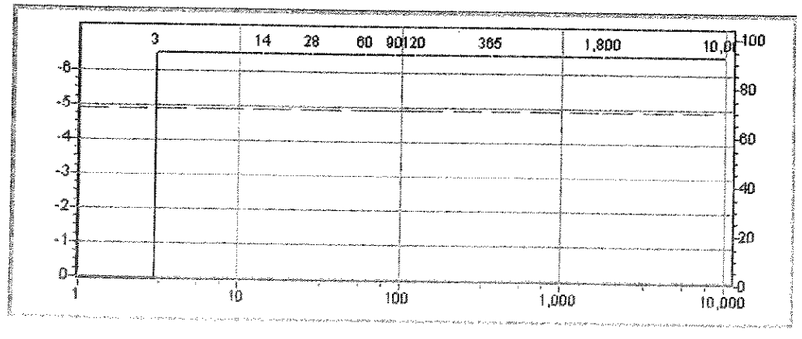
Tipo de hormigón : HA-40
fck [MPa] = 40.00
γc = 1.50

- Sección

Ac [m²] = .75
u [m] = 9
e [mm] = 166.67

- Historia de tensiones y humedades relativas

Tensiones		Humedad relativa	
t0 [días]	σ [MPa]	t [días]	HR [%]
1	0.0	1	70
3	6.5	7	70
14	6.5	14	70
28	6.5	28	70
60	6.5	60	70
90	6.5	90	70
120	6.5	120	70
365	6.5	365	70
1800	6.5	1800	70
10000	6.5	10000	70



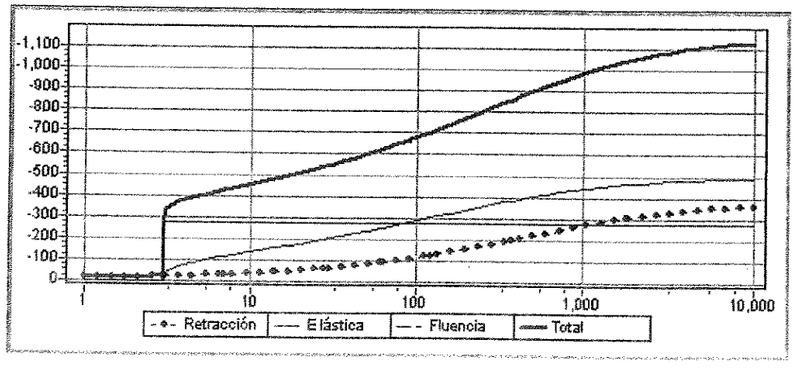
2 Resultados

- Coeficientes de fluencia

	φ(t,t0)									
	t0 [días]									
t [días]	1	3	14	28	60	90	120	365	1800	10000
1	--	--	--	--	--	--	--	--	--	--
7	0.9	0.7	--	--	--	--	--	--	--	--
14	1.1	0.9	--	--	--	--	--	--	--	--
28	1.4	1.1	0.7	--	--	--	--	--	--	--
60	1.7	1.4	1.0	0.8	--	--	--	--	--	--
90	1.9	1.6	1.1	0.9	0.7	--	--	--	--	--
120	2.1	1.7	1.2	1.0	0.8	0.6	--	--	--	--
365	2.6	2.1	1.6	1.4	1.2	1.1	1.0	--	--	--
1800	3.2	2.6	1.9	1.7	1.5	1.4	1.3	1.0	--	--
10000	3.4	2.8	2.1	1.8	1.6	1.4	1.4	1.1	0.8	--

- Deformaciones de fluencia, retracción, instantáneas y totales

t [días]	εcr [·1.E-6]	εcs [·1.E-6]	ε0 [·1.E-6]	εtot [·1.E-6]
1	0	-12	0	-12
7	-125	-32	-278	-435
14	-161	-45	-278	-484
28	-197	-63	-278	-538
60	-250	-91	-278	-619
90	-286	-110	-278	-674
120	-304	-125	-278	-707
365	-376	-197	-278	-851
1800	-465	-304	-278	-1047
10000	-501	-360	-278	-1139



Pérdidas de Pretensado.

- Relajación

$\rho = 2,5\%$

$P = 663\ Tn$

$A_p = 4760\ mm^2$

$$\Delta\sigma_{pr} = \rho \frac{P}{A_p} = 0,025 \frac{663}{4760} = 3,48\ Kg/mm^2$$

$$\Delta\sigma_{rel} = 0,8 \cdot \Delta\sigma_{pr} = 0,8 \cdot 3,48 = 2,79\ Kg/mm^2$$

- fluencia + def. elástica

$\Delta\sigma_{f+e} = E \cdot \varepsilon_{f+e}$

$\varepsilon_{f+e} = \varepsilon_{cr} + \varepsilon_0 = 501 + 278 = 779 \cdot 10^{-6}\ mm^2$

$E = 190.000\ MPa$

$\Rightarrow \Delta\sigma_{f+e} = 14,80\ Kg/mm^2$

- Retracción

$\Delta\sigma_{ret} = E\,\varepsilon_{ret} = 190.000 \cdot 360 \cdot 10^{-6} = 6,84\ Kg/mm^2$

Total pérdidas $= 24,43\ Kg/mm^2$

Pérdidas consideradas $= 2,7 + 5,4 + 18 = 26,1\ Kg/mm^2$

Estamos del lado de la seguridad

9. Dimensionamiento en ELU. Cortante y flexión

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 14/11/2003
Hora: 16:40:18

Cálculo de secciones a cortante

1 Datos

- Materiales

Tipo de hormigón : HA-40
Tipo de acero : B-500-S
fck [MPa] = 40.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 30X90H40
b0 [m] = 0.30
h [m] = 0.90



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.15
φ [mm] = 12
nº ramas: 4
Area [cm²/m] = 30.2
ρ [*1.E-3] = 0

Inclinación de las bielas θ[°] = 30.0
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 1766.7
Vu2 [kN] = 1608.9
Vcu [kN] = 0.0
Vsu [kN] = 1608.9

- Resistencia a cortante:

Vu [kN] = 1608.9 > $V_d = 669{,}02\,kN \times 2 = 1338{,}04\,KN$

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 14/11/2003
Hora: 16:40:51

Cálculo de secciones a cortante

1 Datos

- Materiales

Tipo de hormigón : HA-40
Tipo de acero : B-500-S
fck [MPa] = 40.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 30X90H40
b0 [m] = 0.30
h [m] = 0.90



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.3
φ [mm] = 12
nº ramas: 4
Area [cm²/m] = 15.1
p [·1.E-3] = 0

Inclinación de las bielas θ[°] = 26.0
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 1607.5
Vu2 [kN] = 952.3
Vcu [kN] = -0.0
Vsu [kN] = 952.3

- Resistencia a cortante:

Vu [kN] = 952.3 > Vd = 917,5 kN.

P R O G R A M A S E C C I O N

SECCIONES DE HORMIGON ARMADO Y PRETENSADO

VERSION N° 2 FECHA : 11/03/1995

Copyright : J.Díaz del Valle, 1989

E.T.S. de I.C.C. y P. de Santander

DATOS DEL PROYECTO DE LA SECCION

PROYECTO : AVE VILAFRANCA

REFERENCIA : OF_5.9

FECHA DEL CALCULO : nov 03

PROGRAMA DE SECCIONES DE HORMIGON ARMADO Y/O PRETRENSADO

D A T O S D E E N T R A D A

VERTICES CONTORNO EXTER. : 1 2 3 4 5 6 7 8 9 1
11 12 13 14 15 16

VERTICES DEL HUECO Nº 1 : 17 18 19 20 21 22

C O O R D E N A D A S D E L O S V E R T I C E S

VERT	X	Y	VERT	X	Y	VERT	X	Y
1	145.000	110.000	2	145.000	90.000	3	145.000	90.000
4	145.000	83.000	5	108.500	70.000	6	96.800	68.000
7	85.000	2.000	8	83.000	0.000	9	-83.000	0.000
10	-85.000	2.000	11	-96.500	68.000	12	-108.500	70.000
13	-145.000	83.000	14	-145.000	90.000	15	-145.000	90.000
16	-145.000	110.000	17	-84.000	90.000	18	-75.800	29.000
19	-70.800	24.000	20	70.800	24.000	21	75.800	29.000
22	84.000	90.000						

Area de la sección de hormigon ..... = 13375.51 cm²
Centro de gravedad de la sección de hormigón .. = 45.80 cm.
Resistencia de cálculo del hormigon ..... fcd = 266.67 Kp/cm²

ARMADURA PASIVA			ARMADURA ACTIVA			
Capa N°	Profund. cm.	Area cm²	Capa N°	Profund. cm.	Area cm²	Defor. neutra.
1	106.0	10.17	1	25.0	5.60	0.0050
			2	100.0	42.00	0.0050

Resistencia de cálculo del acero de armar.. fcd = 4340.0 Kp/cm²
Resist.de cálculo del acero de pretensar....fpd =15454.0 Kp/cm²

FLEXION POSITIVA (DISTANCIAS RESPECTO A LA FIBRA SUPERIOR)

TENSIONES Y DEFORMACIONES

Contribución del hormigón :

Uc = 795.3 t. Mc = 310.0 m.t.

Deformación y tension máxima en el hormigón :

εc = 1.98417E-03 σc = 226.66 kp/cm²

Deformaciones y tensiones de las 1 capas de armadura pasiva :

εs(1) = -9.56421E-03 σs(1) = -4340.00 kp/cm²

Deformaciones y tensiones de las 2 capas de armadura activa :

εp(1) = -7.39502E-04 σp(1) =-10905.05 kp/cm²
εp(2) = -8.91053E-03 σp(2) =-16430.32 kp/cm²

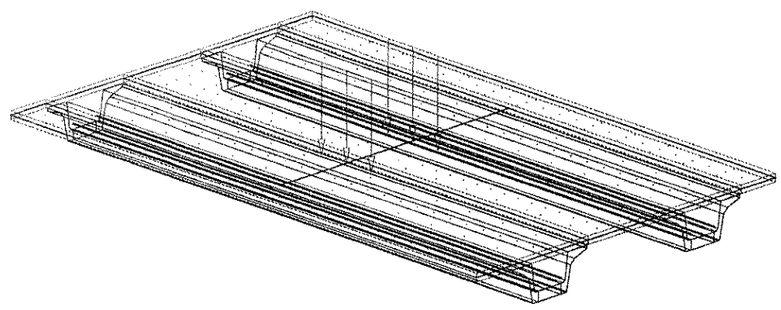
Esfuerzo axíl = 0.00 t. , Momento flector = 697.81 m.t.

Fibra neutra = 18.21 cm. , Curvatura = 1.0895E-02(1/m.)

$M_\mu = 6978,1\ kN > M_d = 6375,2\ kN$

10. Flexión transversal del tablero

Vista - Esquema de analisis



casos: 9 (Carro) Componente 3/7
kN

Geometria

Barras: Valores: 1

Filtrar	Barra	Elemento
Lista compl	1A6	101A196
Selección	2A5	101A196
Número tot	4	96
Número sel	4	96

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
2	6	56	mbig 90x1	HA - 40	18.00	51.0	Barra
3	10	52	mbig 90x1	HA - 40	18.00	51.0	Barra
4	14	48	mbig 90x1	HA - 40	18.00	51.0	Barra
5	44	18	mbig 90x1	HA - 40	18.00	51.0	Barra

Características: Barras: 1

	Nombre de la sección	Lista de barras	SX (cm^2)	SY (cm^2)	SZ (cm^2)	IX (cm^4)	IY (cm^4)	IZ (cm^4)
	mbig 90x145x90	2A5	3638.350	0.0	0.0	0.0	7534242.90	785039.715

Características: Paneles: 1

	Nombre de espesor	Lista de paneles	Material	Tipo de espesor	Espesor (cm)	G1 (cm)	G2 (cm)	G3 (cm)	KZ (kN/m^3)
	ESP20	1	HA - 25	constante	20.00	No existe	No existe	No existe	0.0

Apoyos: Valores: 1

	Nombre del apoyo	Lista de nudos	Condiciones de apoyo
	Apoyo_2	6A18CA4 44A56CA4	UZ

Excentricidades: Valores: 1

Filtrar	
Lista Sele	1A8
Núm	4
Núm	1

	nombre de la excentricidad	Lista de barras	Inicio UX (m)	Inicio UY (m)	Inicio UZ (m)	Extremidad UX (m)	Extremidad UY (m)	Extremidad UZ (m)	Sistema de coordenadas
	EXC_UZ_10	2A5	0.0	0.0	0.10	0.0	0.0	0.10	local

Cargas: Info: 1

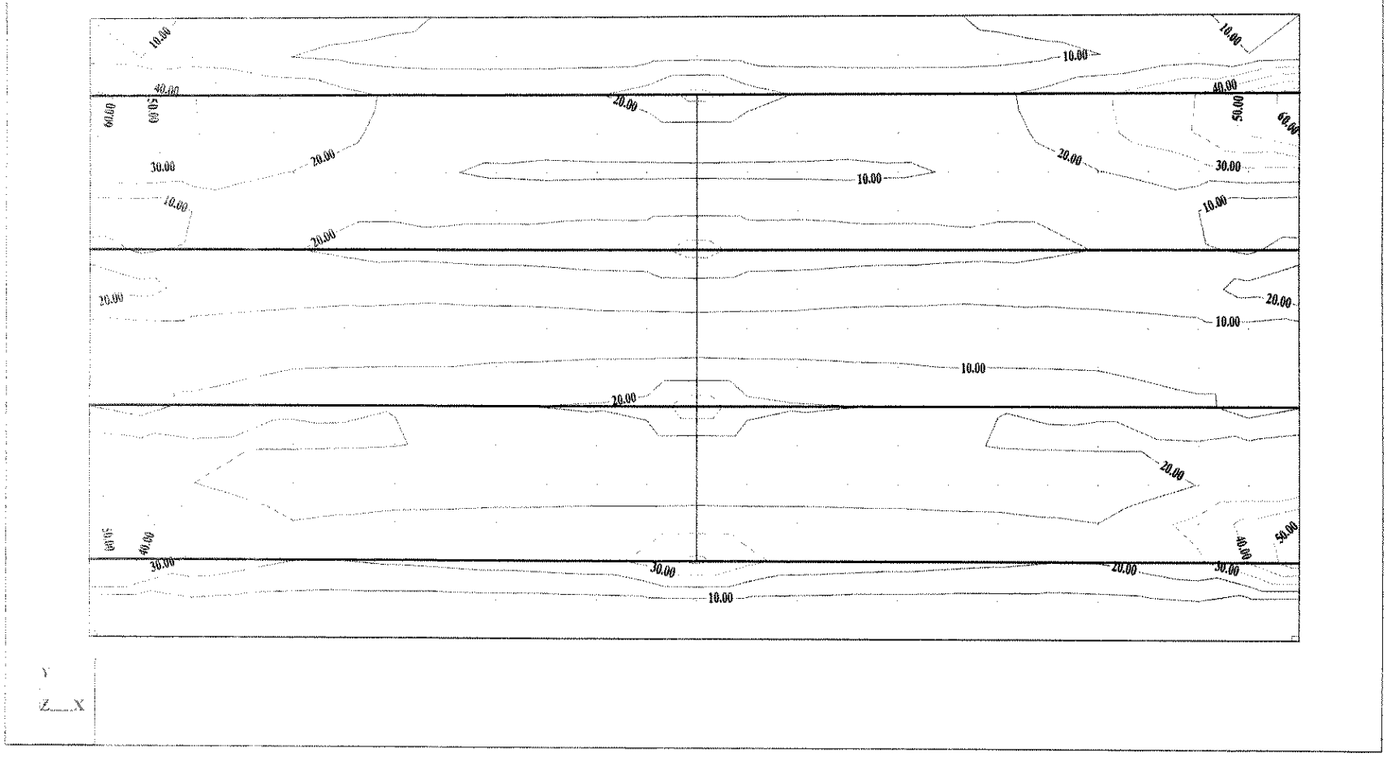
Caso	Nombre del caso	Naturaleza	tipo de análisis
1	CM	permanente	Estático lineal
3	SC1	explotación	Estático lineal
4	SC2	explotación	Estático lineal
6	ELU		Ponderación
7	ELU+		Ponderación
8	ELU-		Ponderación
9	Carro		Análisis de casos de

Cargas - Casos: 1 3 4 6A9 : Valores: 1

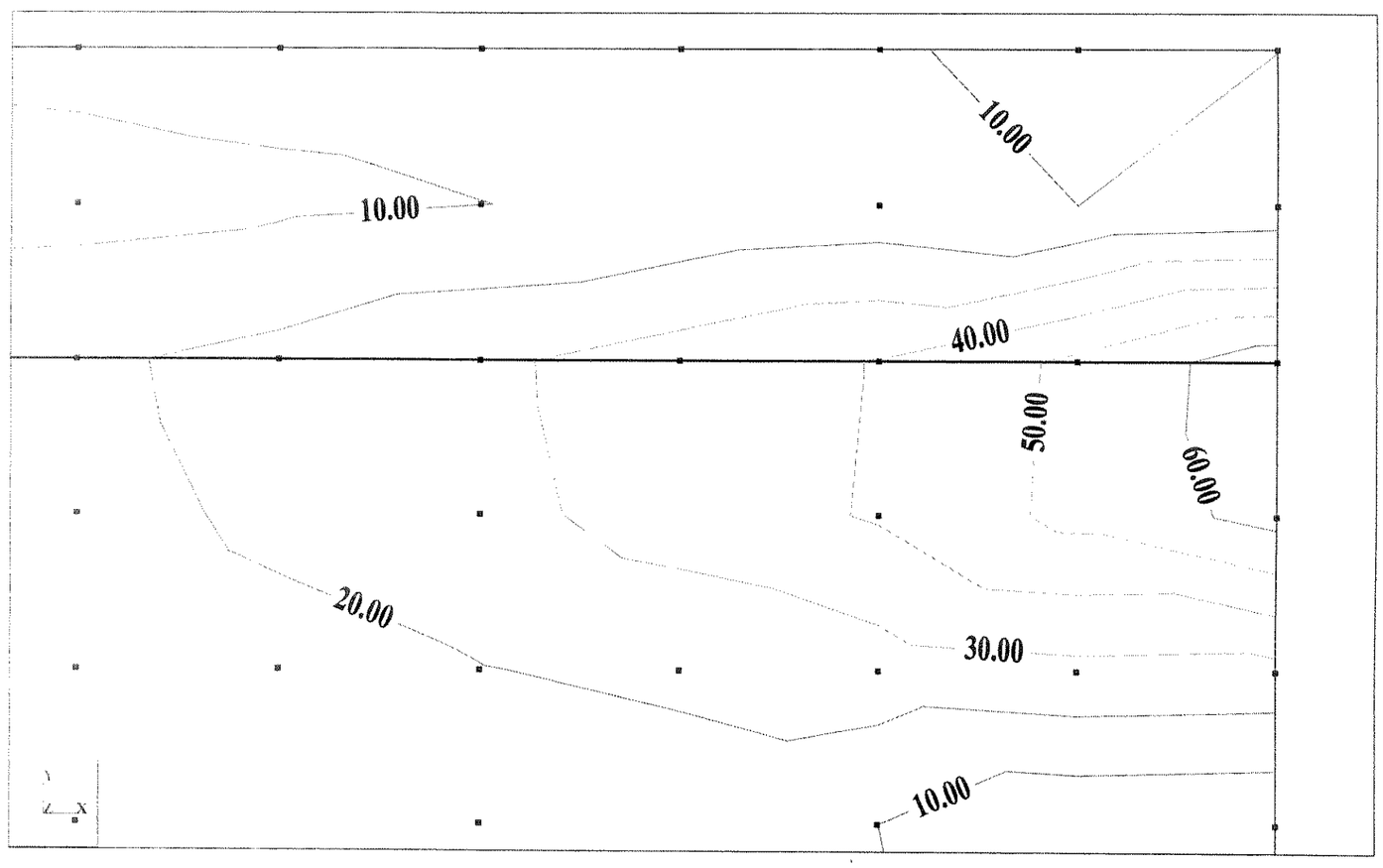
Caso	Nombre del caso	Naturaleza	tipo de análisis
1	CM	permanente	Estático lineal
3	SC1	explotación	Estático lineal
4	SC2	explotación	Estático lineal
6	ELU		Ponderación
7	ELU+		Ponderación
8	ELU-		Ponderación
9	Carro		Análisis de casos de

	Caso	Tipo de carga	Lista	Valores de carga
	1	peso propio	1A5	PZ Menos
	1	(EF) superficial 3p (conto	1	PZ1=-10.00(kPa) P1(-9, 4.6, 0) P2(-9, 3.45, 0) P3(9, 3.45, 0) P
	1	(EF) superficial 3p (conto	1	PZ1=-10.00(kPa) P1(-9, -3.45, 0) P2(9, -3.45, 0) P3(9, -4.6, 0)
	1	(EF) superficial 3p (conto	1	PZ1=-8.34(kPa) P1(-9, 3.45, 0) P2(9, 3.45, 0) P3(9, -3.45, 0) P
	3	(EF) superficial 3p (conto	1	PZ1=-4.00(kPa) P1(-9, 4.6, 0) P2(-9, 3.45, 0) P3(9, 3.45, 0) P4
	3	(EF) superficial 3p (conto	1	PZ1=-4.00(kPa) P1(9, 1.15, 0) P2(-9, 1.15, 0) P3(-9, -1.15, 0)
	3	(EF) superficial 3p (conto	1	PZ1=-4.00(kPa) P1(-9, -3.45, 0) P2(-9, -4.6, 0) P3(9, -4.6, 0) P
	4	(EF) superficial 3p (conto	1	PZ1=-4.00(kPa) P1(-9, 3.45, 0) P2(9, 3.45, 0) P3(9, 1.15, 0) P
	4	(EF) superficial 3p (conto	1	PZ1=-4.00(kPa) P1(-9, -1.15, 0) P2(9, -1.15, 0) P3(9, -3.45, 0)

Vista - MYY+ (W&A) casos: 7 (ELU+) 1



Vista - MYY+ (W&A) casos: 7 (ELU+) 2



Obra: ARMAT
Fecha: 14/11/2003
Hora: 18:12:34

Dimensionamiento de secciones a flexión simple

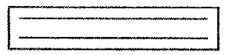
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

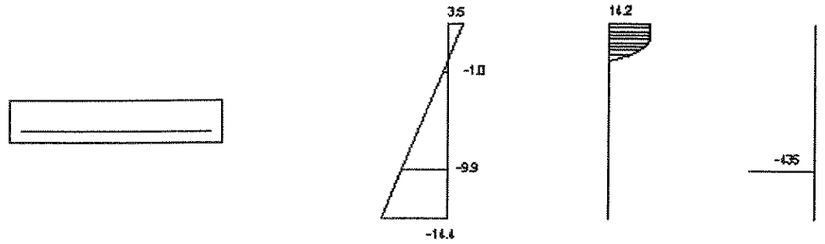
- Sección

Sección : 100X20H25
b [m] = 1.00
h [m] = 0.20
ri [m] = 0.050
rs [m] = 0.050



2 Dimensionamiento

Md [kN·m] = 60



Plano de deformación de agotamiento

x [m] = 0.039

1/r [1/m]·1.E-3 = 89.3

εs ·1.E-3 = 3.5

εi ·1.E-3 = -14.4

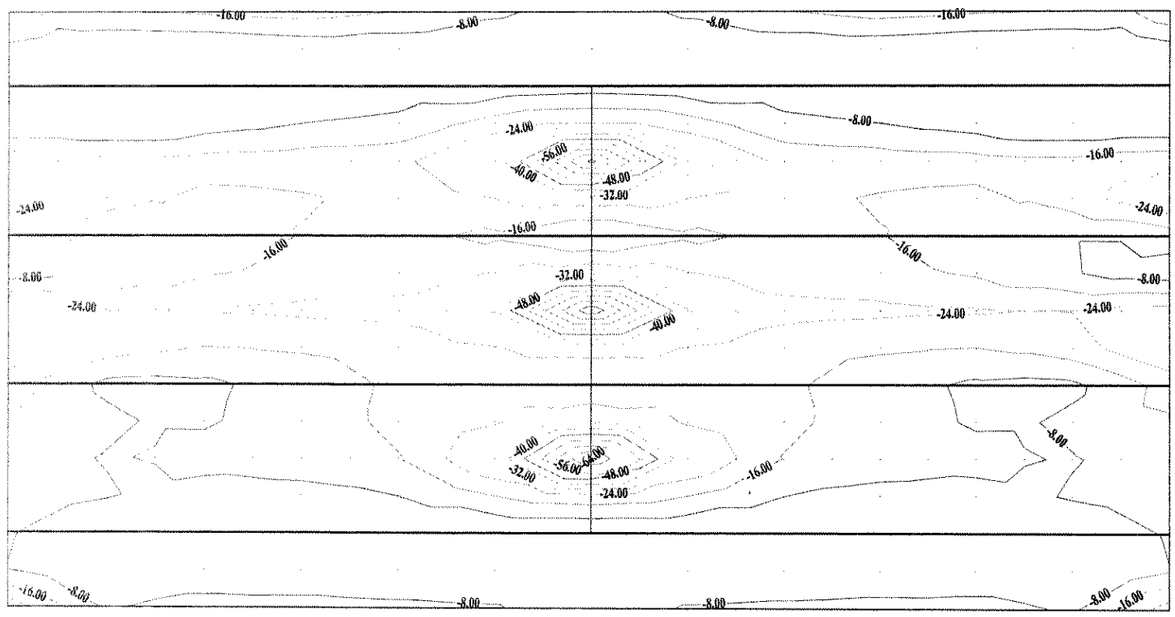
Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	-1.0	0.0
0.150	10.3	-9.9	434.8

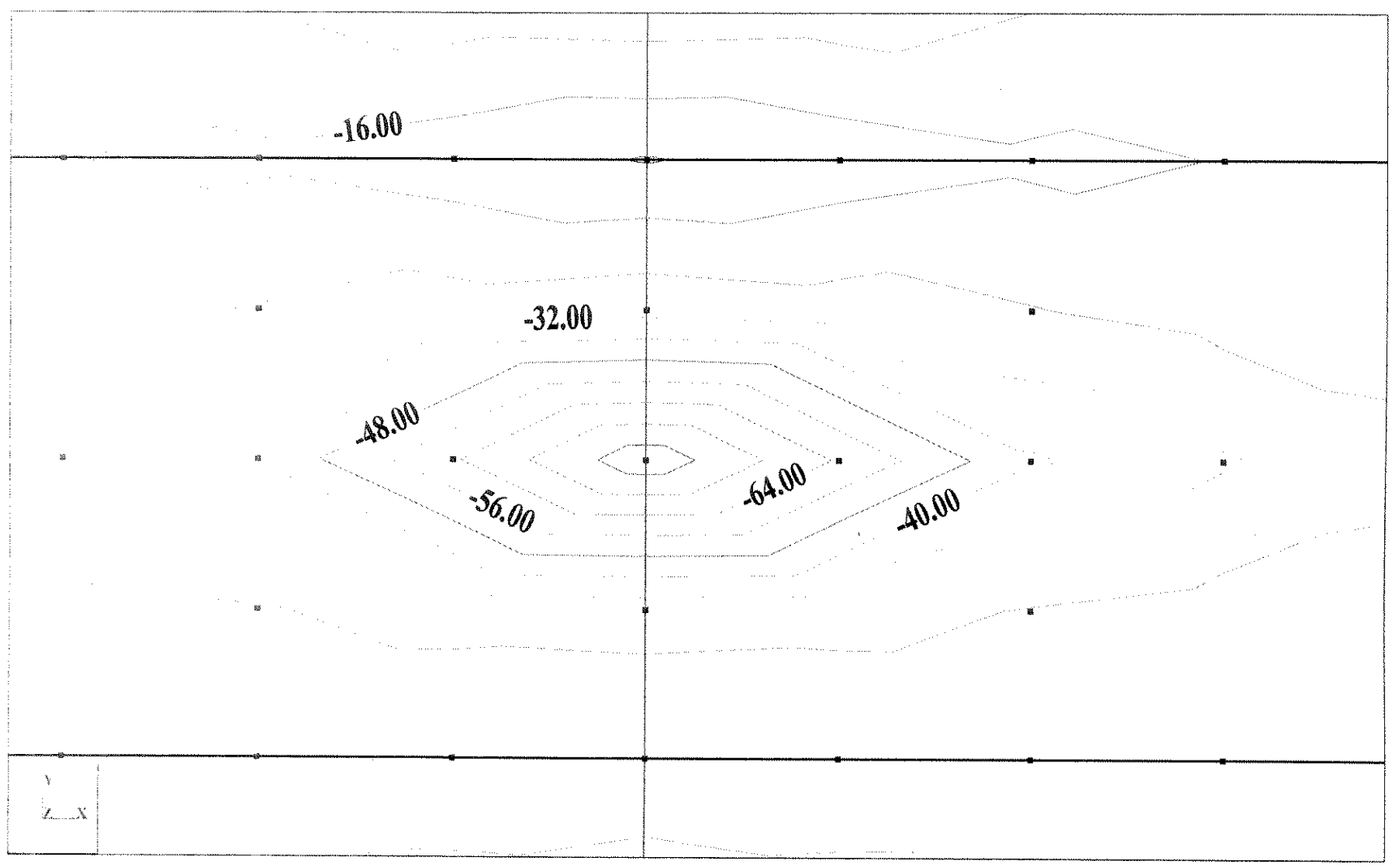
At_est [cm²] = 10.3

ϕ [mm]	12	14	16	20	25
nºϕ	10	7	6	4	3
nº capas	1	1	1	1	1
At [cm²]	11.3	10.8	12.1	12.6	14.7
wk [mm]	0.26	0.31	0.29	0.34	0.34

Vista - MYY- (W&A) casos: 8 (ELU-)



Vista - MYY- (W&A) casos: 8 (ELU-) 1



Obra: ARMAT
Fecha: 14/11/2003
Hora: 18:13:39

Dimensionamiento de secciones a flexión simple

1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

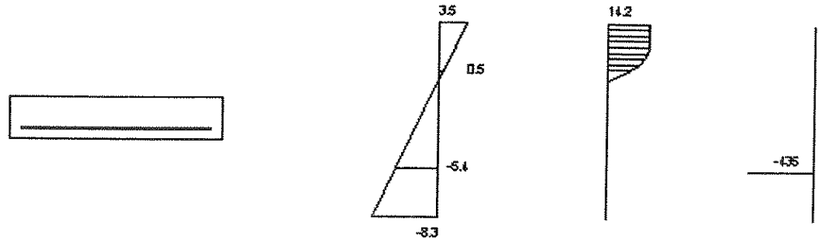
- Sección

Sección : 100X20H25
b [m] = 1.00
h [m] = 0.20
ri [m] = 0.050
rs [m] = 0.050



2 Dimensionamiento

Md [kN·m] = 85



Plano de deformación de agotamiento

x [m] = 0.059

1/r [1/m]·1.E-3 = 59.1

εs ·1.E-3 = 3.5

εi ·1.E-3 = -8.3

Deformación y tensión de armaduras

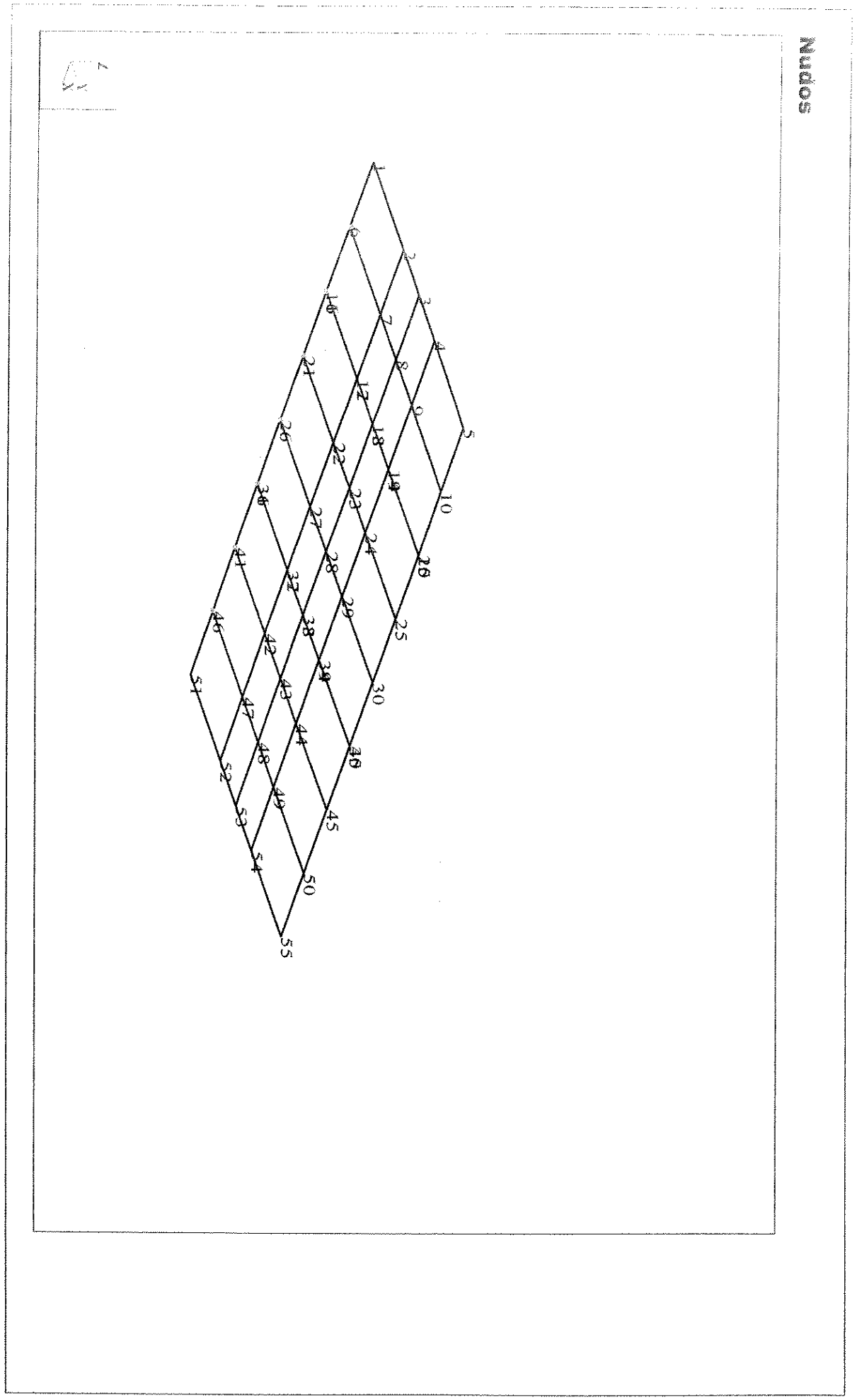
Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	0.5	0.0
0.150	15.6	-5.4	434.8

At_est [cm²] = 15.6

ϕ [mm]	12	14	16	20	25
n°ϕ	14	11	8	5	4
n° capas	1	1	1	1	1
At [cm²]	15.8	16.9	16.1	15.7	19.6
wk [mm]	0.26	0.25	0.29	0.36	0.31

A2. Tableros extremos

1. Definición de la geometría del emparrillado


Nudos

Nudos: Valores: 1

Filtrar	Nudo
Lista compl	1A15 21A3
Selección	1A15 21A3
Numero tot	45
Número sel	45

Nudo	X (m)	Y (m)	Apoyo - código	Apoyo
1	1.70	1.00	fil	Rotula
2	1.70	3.30	fil	Rotula
3	1.70	4.50		
4	1.70	5.70	fil	Rotula
5	1.70	8.00	fil	Rotula
6	3.40	1.00		
7	3.40	3.30		
8	3.40	4.50		
9	3.40	5.70		
10	3.40	8.00		
11	5.10	1.00		
12	5.10	3.30		
13	5.10	4.50		
14	5.10	5.70		
15	5.10	8.00		
21	6.80	1.00		
22	6.80	3.30		
23	6.80	4.50		
24	6.80	5.70		
25	6.80	8.00		
26	8.50	1.00		
27	8.50	3.30		

Nudo	X (m)	Y (m)	Apoyo - código	Apoyo
28	8.50	4.50		
29	8.50	5.70		
30	8.50	8.00		
31	10.20	1.00		
32	10.20	3.30		
33	10.20	4.50		
34	10.20	5.70		
35	10.20	8.00		
41	11.90	1.00		
42	11.90	3.30		
43	11.90	4.50		
44	11.90	5.70		
45	11.90	8.00		
46	13.60	1.00		
47	13.60	3.30		
48	13.60	4.50		
49	13.60	5.70		
50	13.60	8.00		
51	15.30	1.00	fil	Rotula
52	15.30	3.30	fil	Rotula
53	15.30	4.50		
54	15.30	5.70	fil	Rotula
55	15.30	8.00	fil	Rotula

Barras

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Y
X

Barras: Valores: 1

Filtrar	Barra	Elemento
Lista compl	1 2 4A6 8A	1 2 4A6 8A
Selección	1 2 4A6 8A	1 2 4A6 8A
Número tot	76	76
Numero sel	76	76

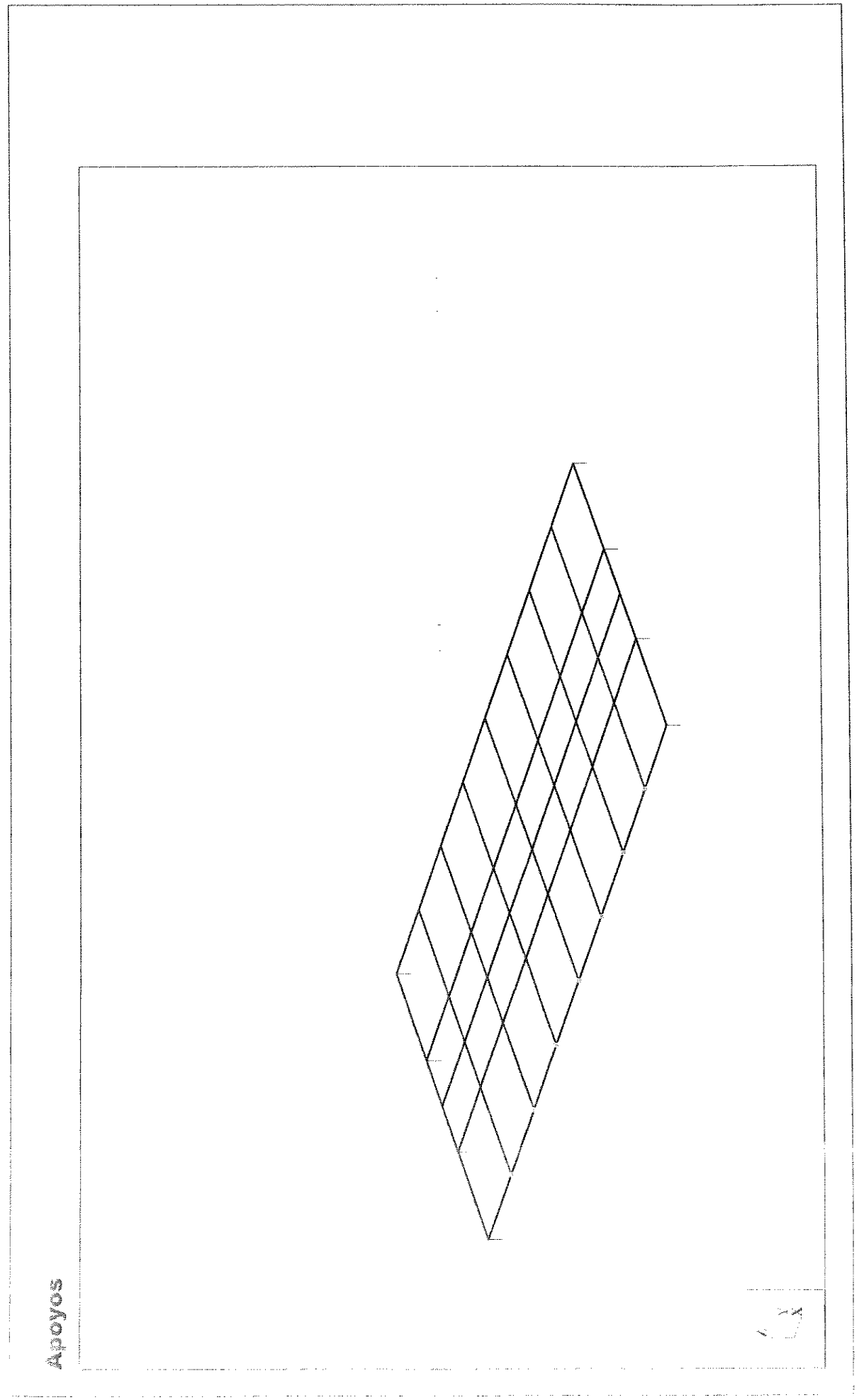
Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
1	1	6	biga1	HA - 40	1.70	0.0	Barra
2	6	11	biga1	HA - 40	1.70	0.0	Barra
4	11	21	biga1	HA - 40	1.70	0.0	Barra
5	21	26	biga1	HA - 40	1.70	0.0	Barra
6	26	31	biga1	HA - 40	1.70	0.0	Barra
8	31	41	biga1	HA - 40	1.70	0.0	Barra
9	41	46	biga1	HA - 40	1.70	0.0	Barra
10	46	51	biga1	HA - 40	1.70	0.0	Barra
11	2	7	biga1	HA - 40	1.70	0.0	Barra
12	7	12	biga1	HA - 40	1.70	0.0	Barra
14	12	22	biga1	HA - 40	1.70	0.0	Barra
15	22	27	biga1	HA - 40	1.70	0.0	Barra
16	27	32	biga1	HA - 40	1.70	0.0	Barra
18	32	42	biga1	HA - 40	1.70	0.0	Barra
19	42	47	biga1	HA - 40	1.70	0.0	Barra
20	47	52	biga1	HA - 40	1.70	0.0	Barra
21	4	9	biga1	HA - 40	1.70	0.0	Barra
22	9	14	biga1	HA - 40	1.70	0.0	Barra
24	14	24	biga1	HA - 40	1.70	0.0	Barra
25	24	29	biga1	HA - 40	1.70	0.0	Barra
26	29	34	biga1	HA - 40	1.70	0.0	Barra
28	34	44	biga1	HA - 40	1.70	0.0	Barra

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
29	44	49	biga1	HA - 40	1.70	0.0	Barra
30	49	54	biga1	HA - 40	1.70	0.0	Barra
31	5	10	biga1	HA - 40	1.70	0.0	Barra
32	10	15	biga1	HA - 40	1.70	0.0	Barra
34	15	25	biga1	HA - 40	1.70	0.0	Barra
35	25	30	biga1	HA - 40	1.70	0.0	Barra
36	30	35	biga1	HA - 40	1.70	0.0	Barra
38	35	45	biga1	HA - 40	1.70	0.0	Barra
39	45	50	biga1	HA - 40	1.70	0.0	Barra
40	50	55	biga1	HA - 40	1.70	0.0	Barra
41	3	8	biga2	HA - 25	1.70	0.0	Barra
42	8	13	biga2	HA - 25	1.70	0.0	Barra
44	13	23	biga2	HA - 25	1.70	0.0	Barra
45	23	28	biga2	HA - 25	1.70	0.0	Barra
46	28	33	biga2	HA - 25	1.70	0.0	Barra
48	33	43	biga2	HA - 25	1.70	0.0	Barra
49	43	48	biga2	HA - 25	1.70	0.0	Barra
50	48	53	biga2	HA - 25	1.70	0.0	Barra
51	1	2	travessa1	HA - 25	2.30	-0.0	Barra
52	2	3	travessa1	HA - 25	1.20	-0.0	Barra
53	3	4	travessa1	HA - 25	1.20	-0.0	Barra
54	4	5	travessa1	HA - 25	2.30	-0.0	Barra
55	51	52	travessa1	HA - 25	2.30	0.0	Barra
56	52	53	travessa1	HA - 25	1.20	0.0	Barra
57	53	54	travessa1	HA - 25	1.20	0.0	Barra
58	54	55	travessa1	HA - 25	2.30	0.0	Barra
59	6	7	travessa2	HA - 25	2.30	0.0	Barra
60	7	8	travessa2	HA - 25	1.20	0.0	Barra
61	8	9	travessa2	HA - 25	1.20	0.0	Barra
62	9	10	travessa2	HA - 25	2.30	0.0	Barra
63	11	12	travessa2	HA - 25	2.30	0.0	Barra
64	12	13	travessa2	HA - 25	1.20	0.0	Barra

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
65	13	14	travessa2	*HA - 25*	1.20	0.0	Barra
66	14	15	travessa2	*HA - 25*	2.30	0.0	Barra
71	21	22	travessa2	*HA - 25*	2.30	0.0	Barra
72	22	23	travessa2	*HA - 25*	1.20	0.0	Barra
73	23	24	travessa2	*HA - 25*	1.20	0.0	Barra
74	24	25	travessa2	*HA - 25*	2.30	0.0	Barra
75	26	27	travessa2	*HA - 25*	2.30	0.0	Barra
76	27	28	travessa2	*HA - 25*	1.20	0.0	Barra
77	28	29	travessa2	*HA - 25*	1.20	0.0	Barra
78	29	30	travessa2	*HA - 25*	2.30	0.0	Barra
79	31	32	travessa2	*HA - 25*	2.30	0.0	Barra
80	32	33	travessa2	*HA - 25*	1.20	0.0	Barra
81	33	34	travessa2	*HA - 25*	1.20	0.0	Barra
82	34	35	travessa2	*HA - 25*	2.30	0.0	Barra
87	41	42	travessa2	*HA - 25*	2.30	0.0	Barra
88	42	43	travessa2	*HA - 25*	1.20	0.0	Barra
89	43	44	travessa2	*HA - 25*	1.20	0.0	Barra
90	44	45	travessa2	*HA - 25*	2.30	0.0	Barra
91	46	47	travessa2	*HA - 25*	2.30	0.0	Barra
92	47	48	travessa2	*HA - 25*	1.20	0.0	Barra
93	48	49	travessa2	*HA - 25*	1.20	0.0	Barra
94	49	50	travessa2	*HA - 25*	2.30	0.0	Barra

Características: Barras: 1

Nombre de la sección	Lista de barras	SX (cm^2)	SY (cm^2)	SZ (cm^2)	IX (cm^4)	IY (cm^4)	IZ (cm^4)
biga1	1 2 4A6 8A12 14A16 1	1.000	0.0	0.0	56857033.6	13054958.3	0.0
biga2	41 42 44A46 48A50	1.000	0.0	0.0	213333.330	26666.670	0.0
travessa1	51A58	1.000	0.0	0.0	1023541.67	13810.080	0.0
travessa2	59A66 71A82 87A94	1.000	0.0	0.0	8188333.33	27620.160	0.0


Apoyos

Apoyos: Valores: 1

	Nombre del apoyo	Lista de nudos	Condiciones de apoyo
	Rotula	1 2 4 5 51 52 54 55	UZ

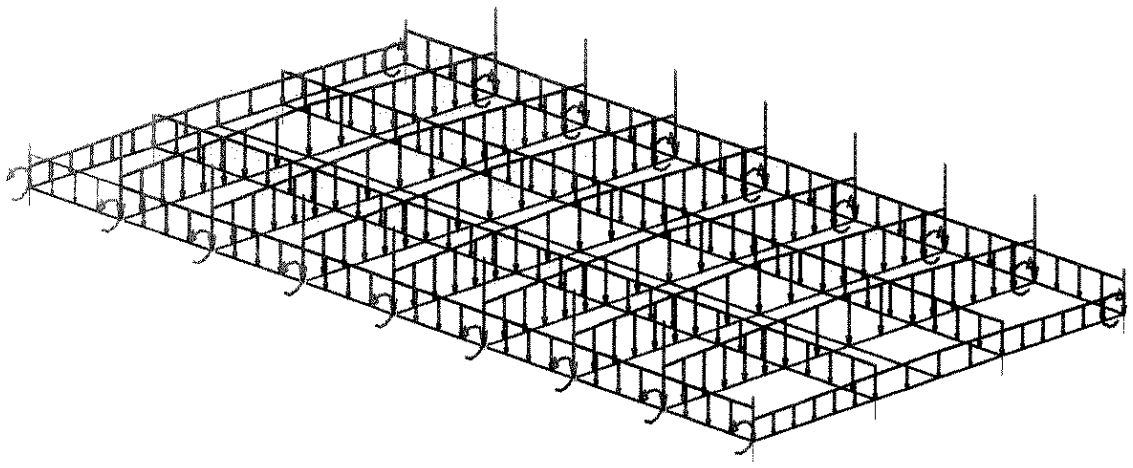
Cargas - Caso: 4 (SC+Carro descentrado en apoyos): Valores: 1

Caso	Nombre del caso	Naturaleza	tipo de análisis
1	PP+CM	permanente	Estático lineal
2	SC+Carro centrado en centro luz	explotación	Estático lineal
3	SC+Carro descentrado en centro luz	explotación	Estático lineal
4	SC+Carro descentrado en apoyos	explotación	Estático lineal
5	ELU		Ponderación
6	ELU+		Ponderación
7	ELU-		Ponderación
8	ELS		Ponderación
9	ELS+		Ponderación
10	ELS-		Ponderación

	Caso	Tipo de carga	Lista	Valores de carga
	1	carga trapezoidal	61 65A89CA8	PZ2=-14.21(kN/m) PZ1=-15.15(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	60 64A88CA8	PZ2=-15.15(kN/m) PZ1=-14.21(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	53 57	PZ2=-7.11(kN/m) PZ1=-7.57(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	52 56	PZ2=-7.57(kN/m) PZ1=-7.11(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	62 66A90CA8	PZ2=-12.41(kN/m) PZ1=-14.21(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	59 63A87CA8	PZ2=-14.21(kN/m) PZ1=-12.41(kN/m) X2=1.00 X1=0.0 global no
	1	carga trapezoidal	54 58	PZ2=-6.21(kN/m) PZ1=-7.11(kN/m) X2=1.00 X1=0.0 global no pr
	1	carga trapezoidal	51 55	PZ2=-7.11(kN/m) PZ1=-6.21(kN/m) X2=1.00 X1=0.0 global no pr
	1	fuerza nodal	10 15A45CA1	FZ=-18.70(kN) CX=-10.37(kNm)
	1	fuerza nodal	6 11A41CA10	FZ=-18.70(kN) CX=10.37(kNm)
	1	fuerza nodal	5 55	FZ=-9.35(kN) CX=-5.19(kNm)
	1	fuerza nodal	1 51	FZ=-9.35(kN) CX=5.19(kNm)
	1	sobrecarga uniforme	1 2 4A6 8A12	PZ=-9.66(kN/m)
	2	fuerza nodal	22 24 32 34	FZ=-73.53(kN)
	2	fuerza nodal	23 33	FZ=-29.41(kN)
	2	fuerza nodal	27 29	FZ=-102.94(kN)
	2	fuerza nodal	28	FZ=-41.18(kN)

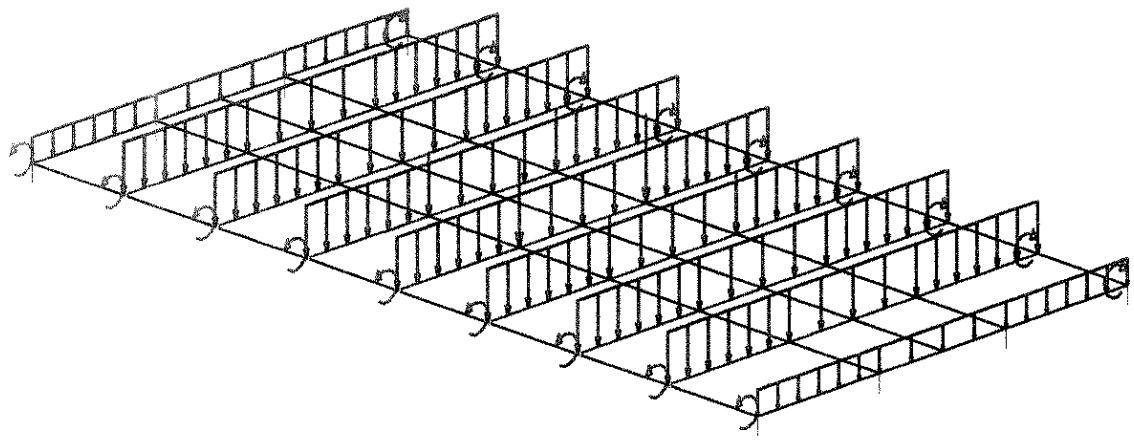
	Caso	Tipo de carga	Lista	Valores de carga
	2	sobrecarga uniforme	59A66 71A82	PZ=-6.80(kN/m)
	2	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	2	fuerza nodal	10 15A45CA1	FZ=-8.16(kN) CX=-4.90(kNm)
	2	fuerza nodal	6 11A41CA10	FZ=-8.16(kN) CX=4.90(kNm)
	2	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	2	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)
	3	fuerza nodal	28	FZ=-20.58(kN)
	3	fuerza nodal	23 33	FZ=-14.71(kN)
	3	fuerza nodal	29	FZ=-129.80(kN)
	3	fuerza nodal	24 34	FZ=-92.71(kN)
	3	fuerza nodal	30	FZ=-96.68(kN)
	3	fuerza nodal	25 35	FZ=-69.05(kN)
	3	sobrecarga uniforme	59A66 71A82	PZ=-6.80(kN/m)
	3	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	3	fuerza nodal	10 15A45CA1	FZ=-8.16(kN) CX=-4.90(kNm)
	3	fuerza nodal	6 11A41CA10	FZ=-8.16(kN) CX=4.90(kNm)
	3	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	3	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)
	4	fuerza nodal	43	FZ=-12.74(kN)
	4	fuerza nodal	44	FZ=-80.35(kN)
	4	fuerza nodal	45	FZ=-59.85(kN)
	4	fuerza nodal	48 53	FZ=-18.63(kN)
	4	fuerza nodal	49 54	FZ=-117.43(kN)
	4	fuerza nodal	50 55	FZ=-87.47(kN)
	4	sobrecarga uniforme	59A66 71A82	PZ=-6.80(kN/m)
	4	sobrecarga uniforme	51A58	PZ=-3.40(kN/m)
	4	fuerza nodal	10 15A45CA1	FZ=-8.16(kN) CX=-4.90(kNm)
	4	fuerza nodal	6 11A41CA10	FZ=-8.16(kN) CX=4.90(kNm)
	4	fuerza nodal	5 55	FZ=-4.08(kN) CX=-2.45(kNm)
	4	fuerza nodal	1 51	FZ=-4.08(kN) CX=2.45(kNm)

Vista - casos: 1 (PP+CM) 1



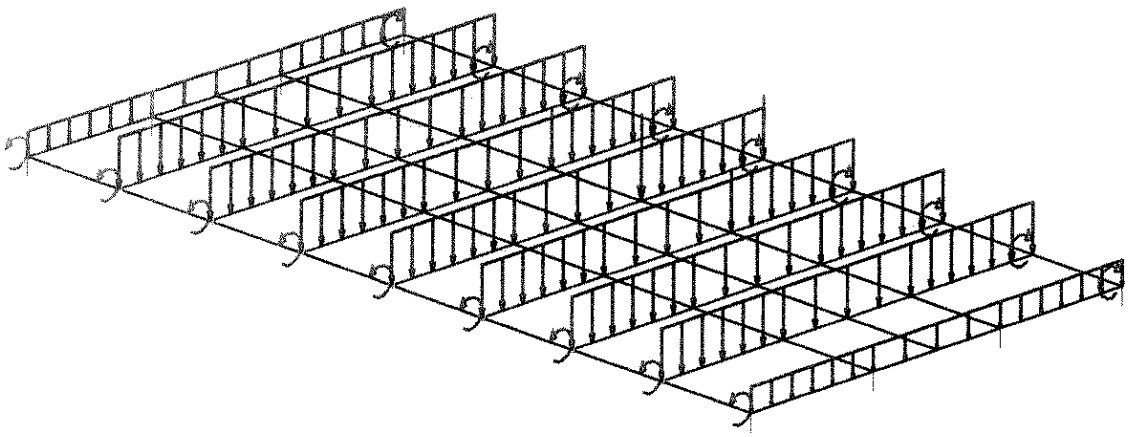
casos: 1 (PP+CM)
kN/m
kN*m
kN

Vista - casos: 2 (SC+Carro centrado en centro luz)



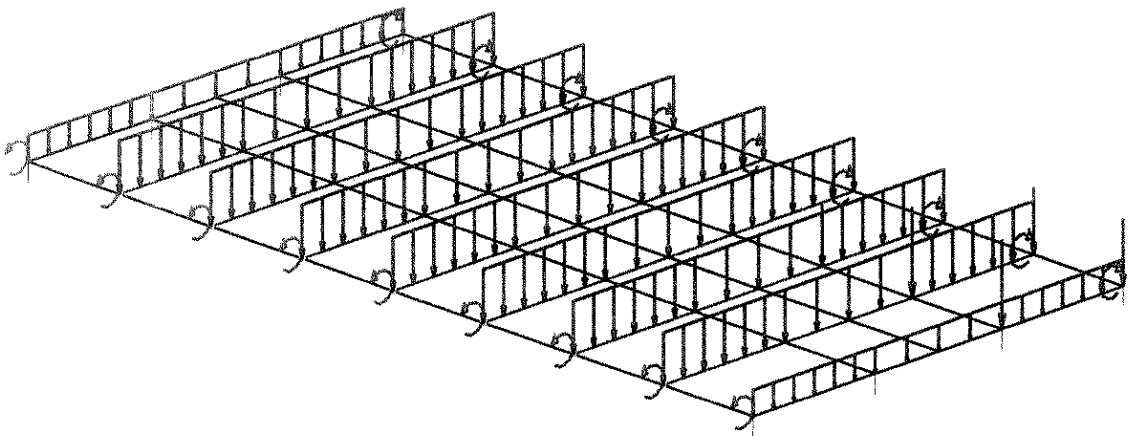
casos: 2 (SC+Carro centrado en centro luz)
kN/m
kN*m
kN

Vista - casos: 3 (SC+Carro descentrado en centro luz)



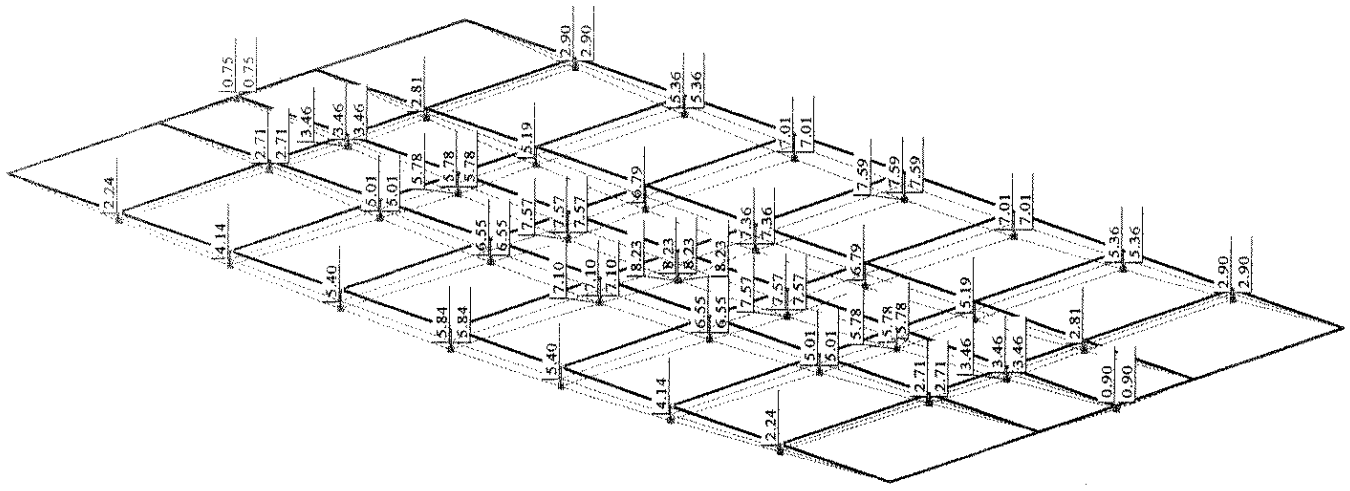
casos: 3 (SC+Carro descentrado en centro luz)
kN/m
kN*m
kN

Vista - casos: 4 (SC+Carro descentrado en apoyos)



casos: 4 (SC+Carro descentrado en apoyos)
kN/m
kN*m
kN

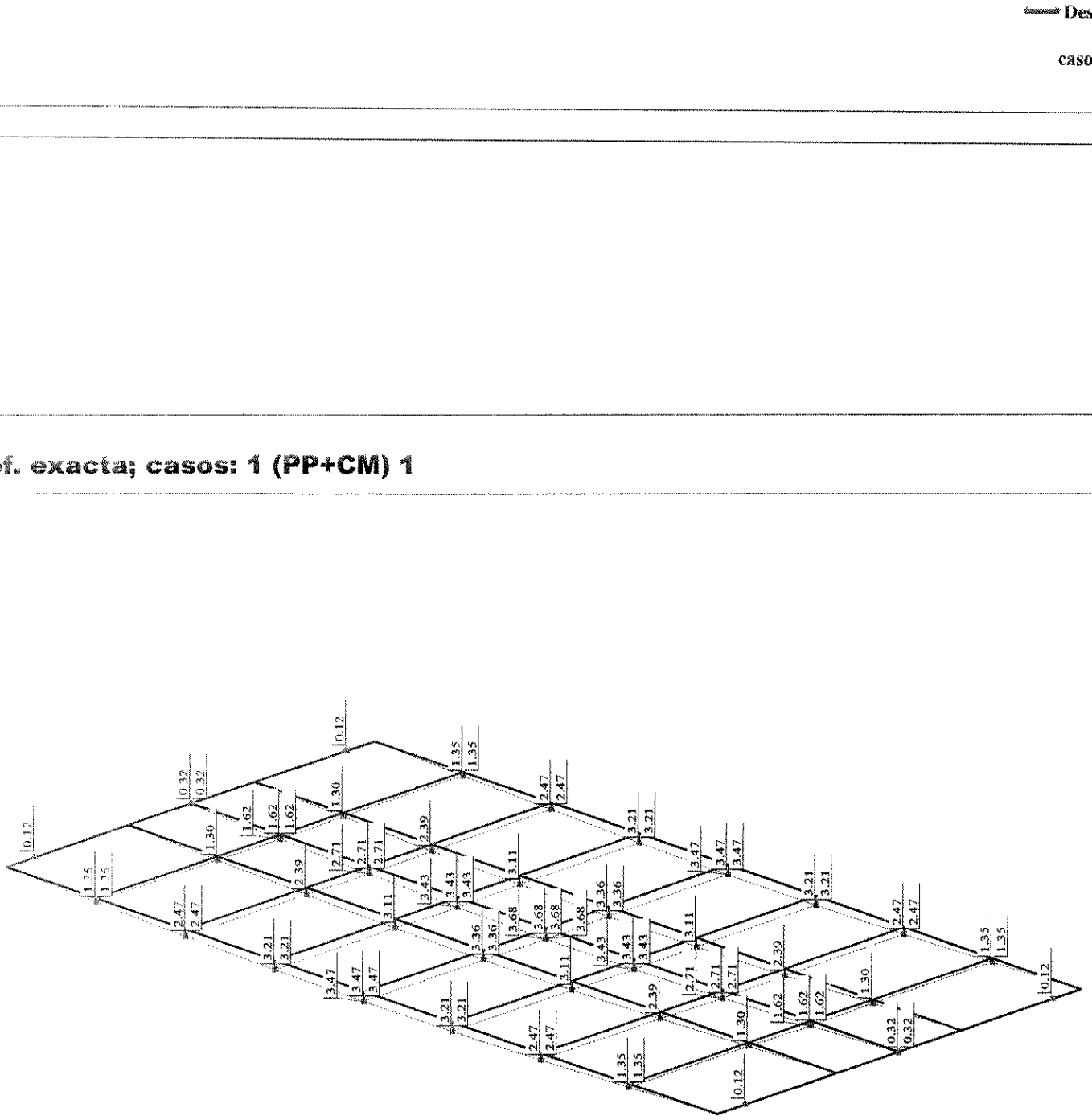
Vista - Def. exacta; casos: 9 (ELS+) 1



Despl 10mm

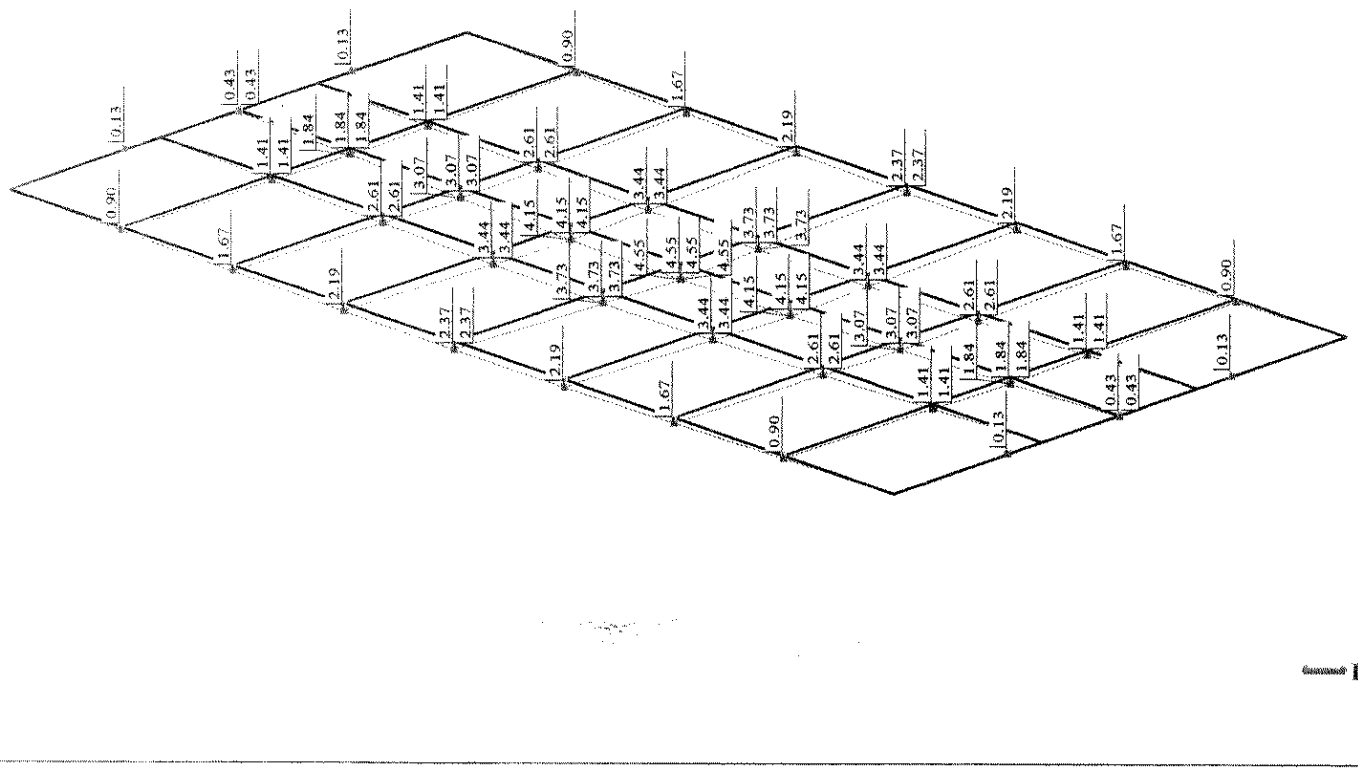
casos: 9 (ELS+)

Vista - Def. exacta; casos: 1 (PP+CM) 1

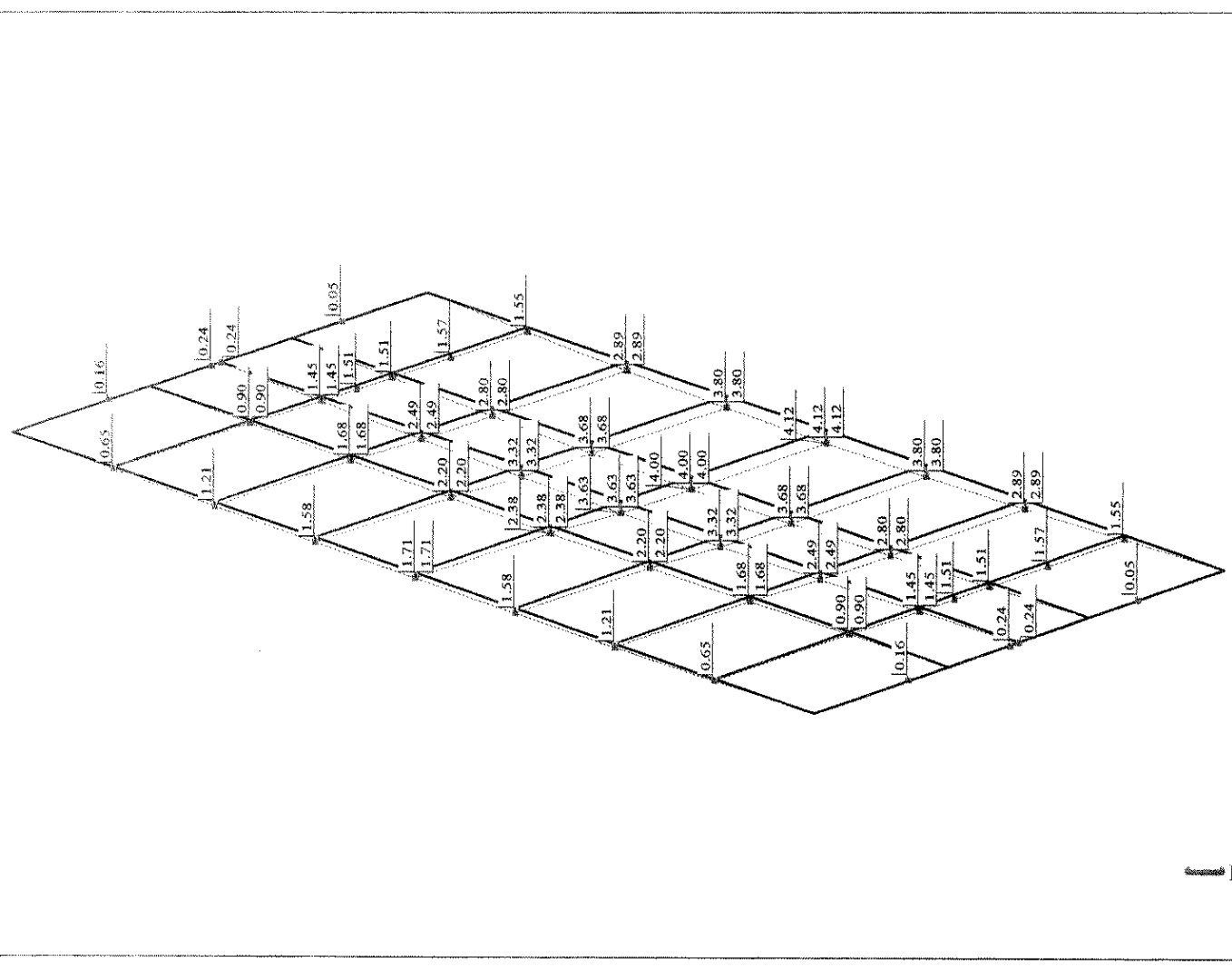


Despl 10mm

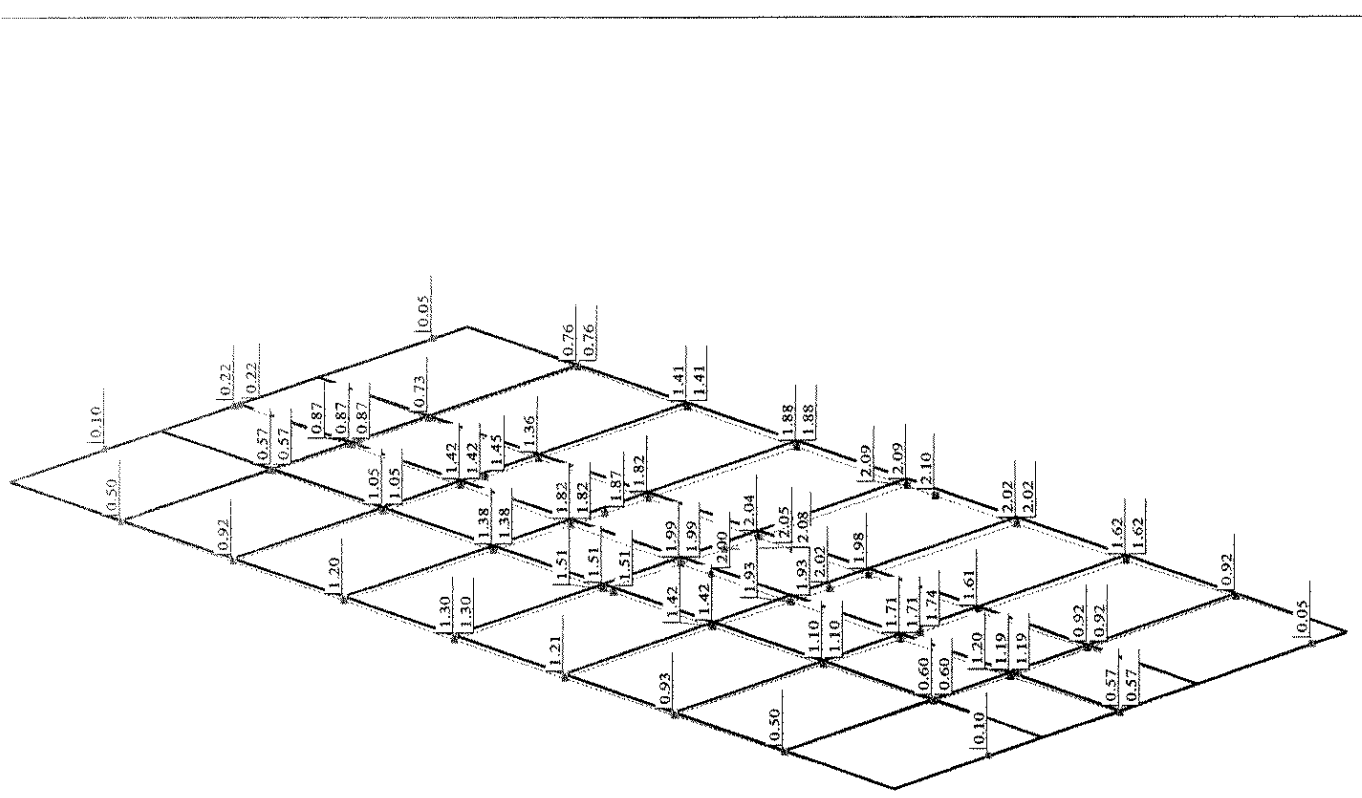
Vista - Def. exacta; casos: 2 (SC+Carro centrado en centro luz)



Vista - Def. exacta; casos: 3 (SC+Carro descentrado en centro luz)



Vista - Def. exacta; casos: 4 (SC+Carro descentrado en apoyos)



Desplazamientos - Caso: 8 (ELS): Valores: 1

- Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A15 21A35 41A	1A10
Selección	1A15 21A35 41A	8
Número total	45	10
Número seleccionado	45	1

- Caso: 8 (ELS)

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
1/ ELS/ 1	0.0	0.001	0.001	1*1.00
1/ ELS/ 2	0.0	0.000	0.001	1*1.00 + 2*1.00
1/ ELS/ 3	0.0	0.001	0.001	1*1.00 + 3*1.00
1/ ELS/ 4	0.0	0.001	0.001	1*1.00 + 4*1.00
1/ ELS/ 5	0.0	0.000	0.001	1*1.00 + 2*0.80
1/ ELS/ 6	0.0	0.001	0.001	1*1.00 + 3*0.80
1/ ELS/ 7	0.0	0.001	0.001	1*1.00 + 4*0.80
1/ ELS/ 8	0.0	0.000	0.001	1*1.00 + 2*0.50
1/ ELS/ 9	0.0	0.001	0.001	1*1.00 + 3*0.50
1/ ELS/ 10	0.0	0.001	0.001	1*1.00 + 4*0.50
2/ ELS/ 1	0.0	-0.000	0.001	1*1.00
2/ ELS/ 2	0.0	-0.001	0.002	1*1.00 + 2*1.00
2/ ELS/ 3	0.0	-0.001	0.001	1*1.00 + 3*1.00
2/ ELS/ 4	0.0	-0.001	0.001	1*1.00 + 4*1.00
2/ ELS/ 5	0.0	-0.001	0.001	1*1.00 + 2*0.80
2/ ELS/ 6	0.0	-0.001	0.001	1*1.00 + 3*0.80
2/ ELS/ 7	0.0	-0.000	0.001	1*1.00 + 4*0.80
2/ ELS/ 8	0.0	-0.000	0.001	1*1.00 + 2*0.50
2/ ELS/ 9	0.0	-0.000	0.001	1*1.00 + 3*0.50
2/ ELS/ 10	0.0	-0.000	0.001	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
3/ ELS/ 1	-0.32	0.000	0.001	1*1.00
3/ ELS/ 2	-0.75	-0.000	0.002	1*1.00 + 2*1.00
3/ ELS/ 3	-0.56	0.000	0.002	1*1.00 + 3*1.00
3/ ELS/ 4	-0.54	0.000	0.001	1*1.00 + 4*1.00
3/ ELS/ 5	-0.66	-0.000	0.001	1*1.00 + 2*0.80
3/ ELS/ 6	-0.52	0.000	0.001	1*1.00 + 3*0.80
3/ ELS/ 7	-0.50	0.000	0.001	1*1.00 + 4*0.80
3/ ELS/ 8	-0.54	-0.000	0.001	1*1.00 + 2*0.50
3/ ELS/ 9	-0.44	0.000	0.001	1*1.00 + 3*0.50
3/ ELS/ 10	-0.43	0.000	0.001	1*1.00 + 4*0.50
4/ ELS/ 1	0.0	0.000	0.001	1*1.00
4/ ELS/ 2	0.0	0.001	0.002	1*1.00 + 2*1.00
4/ ELS/ 3	0.0	0.000	0.002	1*1.00 + 3*1.00
4/ ELS/ 4	0.0	0.000	0.001	1*1.00 + 4*1.00
4/ ELS/ 5	0.0	0.001	0.001	1*1.00 + 2*0.80
4/ ELS/ 6	0.0	0.000	0.002	1*1.00 + 3*0.80
4/ ELS/ 7	0.0	0.000	0.001	1*1.00 + 4*0.80
4/ ELS/ 8	0.0	0.000	0.001	1*1.00 + 2*0.50
4/ ELS/ 9	0.0	0.000	0.001	1*1.00 + 3*0.50
4/ ELS/ 10	0.0	0.000	0.001	1*1.00 + 4*0.50
5/ ELS/ 1	0.0	-0.001	0.001	1*1.00
5/ ELS/ 2	0.0	-0.000	0.001	1*1.00 + 2*1.00
5/ ELS/ 3	0.0	-0.001	0.002	1*1.00 + 3*1.00
5/ ELS/ 4	0.0	-0.001	0.001	1*1.00 + 4*1.00
5/ ELS/ 5	0.0	-0.000	0.001	1*1.00 + 2*0.80
5/ ELS/ 6	0.0	-0.001	0.002	1*1.00 + 3*0.80
5/ ELS/ 7	0.0	-0.001	0.001	1*1.00 + 4*0.80
5/ ELS/ 8	0.0	-0.000	0.001	1*1.00 + 2*0.50
5/ ELS/ 9	0.0	-0.001	0.001	1*1.00 + 3*0.50
5/ ELS/ 10	0.0	-0.001	0.001	1*1.00 + 4*0.50
6/ ELS/ 1	-1.35	0.001	0.001	1*1.00
6/ ELS/ 2	-2.24	0.000	0.001	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
6/ ELS/ 3	-2.00	0.001	0.001	1*1.00 + 3*1.00
6/ ELS/ 4	-1.84	0.001	0.001	1*1.00 + 4*1.00
6/ ELS/ 5	-2.06	0.000	0.001	1*1.00 + 2*0.80
6/ ELS/ 6	-1.87	0.001	0.001	1*1.00 + 3*0.80
6/ ELS/ 7	-1.74	0.001	0.001	1*1.00 + 4*0.80
6/ ELS/ 8	-1.79	0.000	0.001	1*1.00 + 2*0.50
6/ ELS/ 9	-1.67	0.001	0.001	1*1.00 + 3*0.50
6/ ELS/ 10	-1.59	0.001	0.001	1*1.00 + 4*0.50
7/ ELS/ 1	-1.30	-0.000	0.001	1*1.00
7/ ELS/ 2	-2.71	-0.001	0.002	1*1.00 + 2*1.00
7/ ELS/ 3	-2.21	-0.001	0.001	1*1.00 + 3*1.00
7/ ELS/ 4	-1.87	-0.001	0.001	1*1.00 + 4*1.00
7/ ELS/ 5	-2.43	-0.001	0.001	1*1.00 + 2*0.80
7/ ELS/ 6	-2.02	-0.001	0.001	1*1.00 + 3*0.80
7/ ELS/ 7	-1.76	-0.000	0.001	1*1.00 + 4*0.80
7/ ELS/ 8	-2.01	-0.000	0.001	1*1.00 + 2*0.50
7/ ELS/ 9	-1.75	-0.000	0.001	1*1.00 + 3*0.50
7/ ELS/ 10	-1.59	-0.000	0.001	1*1.00 + 4*0.50
8/ ELS/ 1	-1.62	-0.000	0.001	1*1.00
8/ ELS/ 2	-3.46	-0.000	0.002	1*1.00 + 2*1.00
8/ ELS/ 3	-3.07	-0.000	0.001	1*1.00 + 3*1.00
8/ ELS/ 4	-2.49	-0.000	0.001	1*1.00 + 4*1.00
8/ ELS/ 5	-3.09	-0.000	0.001	1*1.00 + 2*0.80
8/ ELS/ 6	-2.78	-0.000	0.001	1*1.00 + 3*0.80
8/ ELS/ 7	-2.31	-0.000	0.001	1*1.00 + 4*0.80
8/ ELS/ 8	-2.54	-0.000	0.001	1*1.00 + 2*0.50
8/ ELS/ 9	-2.34	-0.000	0.001	1*1.00 + 3*0.50
8/ ELS/ 10	-2.05	-0.000	0.001	1*1.00 + 4*0.50
9/ ELS/ 1	-1.30	0.000	0.001	1*1.00
9/ ELS/ 2	-2.71	0.001	0.002	1*1.00 + 2*1.00
9/ ELS/ 3	-2.81	0.000	0.002	1*1.00 + 3*1.00
9/ ELS/ 4	-2.03	0.000	0.001	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
9/ ELS/ 5	-2.43	0.001	0.001	1*1.00 + 2*0.80
9/ ELS/ 6	-2.51	0.000	0.001	1*1.00 + 3*0.80
9/ ELS/ 7	-1.89	0.000	0.001	1*1.00 + 4*0.80
9/ ELS/ 8	-2.01	0.000	0.001	1*1.00 + 2*0.50
9/ ELS/ 9	-2.06	0.000	0.001	1*1.00 + 3*0.50
9/ ELS/ 10	-1.67	0.000	0.001	1*1.00 + 4*0.50
10/ ELS/ 1	-1.35	-0.001	0.001	1*1.00
10/ ELS/ 2	-2.24	-0.000	0.001	1*1.00 + 2*1.00
10/ ELS/ 3	-2.90	-0.001	0.002	1*1.00 + 3*1.00
10/ ELS/ 4	-2.10	-0.001	0.001	1*1.00 + 4*1.00
10/ ELS/ 5	-2.06	-0.000	0.001	1*1.00 + 2*0.80
10/ ELS/ 6	-2.59	-0.001	0.001	1*1.00 + 3*0.80
10/ ELS/ 7	-1.95	-0.001	0.001	1*1.00 + 4*0.80
10/ ELS/ 8	-1.79	-0.000	0.001	1*1.00 + 2*0.50
10/ ELS/ 9	-2.12	-0.001	0.001	1*1.00 + 3*0.50
10/ ELS/ 10	-1.72	-0.001	0.001	1*1.00 + 4*0.50
11/ ELS/ 1	-2.47	0.001	0.001	1*1.00
11/ ELS/ 2	-4.14	0.000	0.001	1*1.00 + 2*1.00
11/ ELS/ 3	-3.68	0.001	0.001	1*1.00 + 3*1.00
11/ ELS/ 4	-3.39	0.001	0.001	1*1.00 + 4*1.00
11/ ELS/ 5	-3.81	0.000	0.001	1*1.00 + 2*0.80
11/ ELS/ 6	-3.44	0.001	0.001	1*1.00 + 3*0.80
11/ ELS/ 7	-3.20	0.001	0.001	1*1.00 + 4*0.80
11/ ELS/ 8	-3.30	0.000	0.001	1*1.00 + 2*0.50
11/ ELS/ 9	-3.07	0.001	0.001	1*1.00 + 3*0.50
11/ ELS/ 10	-2.93	0.001	0.001	1*1.00 + 4*0.50
12/ ELS/ 1	-2.39	-0.000	0.001	1*1.00
12/ ELS/ 2	-5.01	-0.001	0.001	1*1.00 + 2*1.00
12/ ELS/ 3	-4.07	-0.001	0.001	1*1.00 + 3*1.00
12/ ELS/ 4	-3.44	-0.001	0.001	1*1.00 + 4*1.00
12/ ELS/ 5	-4.48	-0.001	0.001	1*1.00 + 2*0.80
12/ ELS/ 6	-3.73	-0.001	0.001	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
12/ ELS/ 7	-3.23	-0.000	0.001	1*1.00 + 4*0.80
12/ ELS/ 8	-3.70	-0.000	0.001	1*1.00 + 2*0.50
12/ ELS/ 9	-3.23	-0.001	0.001	1*1.00 + 3*0.50
12/ ELS/ 10	-2.92	-0.000	0.001	1*1.00 + 4*0.50
13/ ELS/ 1	-2.71	-0.000	0.001	1*1.00
13/ ELS/ 2	-5.78	-0.000	0.001	1*1.00 + 2*1.00
13/ ELS/ 3	-5.20	-0.001	0.001	1*1.00 + 3*1.00
13/ ELS/ 4	-4.13	-0.000	0.001	1*1.00 + 4*1.00
13/ ELS/ 5	-5.17	-0.000	0.001	1*1.00 + 2*0.80
13/ ELS/ 6	-4.70	-0.000	0.001	1*1.00 + 3*0.80
13/ ELS/ 7	-3.85	-0.000	0.001	1*1.00 + 4*0.80
13/ ELS/ 8	-4.25	-0.000	0.001	1*1.00 + 2*0.50
13/ ELS/ 9	-3.96	-0.000	0.001	1*1.00 + 3*0.50
13/ ELS/ 10	-3.42	-0.000	0.001	1*1.00 + 4*0.50
14/ ELS/ 1	-2.39	0.000	0.001	1*1.00
14/ ELS/ 2	-5.01	0.001	0.001	1*1.00 + 2*1.00
14/ ELS/ 3	-5.19	0.000	0.001	1*1.00 + 3*1.00
14/ ELS/ 4	-3.75	0.000	0.001	1*1.00 + 4*1.00
14/ ELS/ 5	-4.48	0.001	0.001	1*1.00 + 2*0.80
14/ ELS/ 6	-4.63	0.000	0.001	1*1.00 + 3*0.80
14/ ELS/ 7	-3.48	0.000	0.001	1*1.00 + 4*0.80
14/ ELS/ 8	-3.70	0.000	0.001	1*1.00 + 2*0.50
14/ ELS/ 9	-3.79	0.000	0.001	1*1.00 + 3*0.50
14/ ELS/ 10	-3.07	0.000	0.001	1*1.00 + 4*0.50
15/ ELS/ 1	-2.47	-0.001	0.001	1*1.00
15/ ELS/ 2	-4.14	-0.000	0.001	1*1.00 + 2*1.00
15/ ELS/ 3	-5.36	-0.001	0.001	1*1.00 + 3*1.00
15/ ELS/ 4	-3.88	-0.001	0.001	1*1.00 + 4*1.00
15/ ELS/ 5	-3.81	-0.000	0.001	1*1.00 + 2*0.80
15/ ELS/ 6	-4.78	-0.001	0.001	1*1.00 + 3*0.80
15/ ELS/ 7	-3.60	-0.001	0.001	1*1.00 + 4*0.80
15/ ELS/ 8	-3.30	-0.000	0.001	1*1.00 + 2*0.50
15/ ELS/ 9	-3.91	-0.001	0.001	1*1.00 + 3*0.50
15/ ELS/ 10	-3.17	-0.001	0.001	1*1.00 + 4*0.50
21/ ELS/ 1	-3.21	0.001	0.000	1*1.00
21/ ELS/ 2	-5.40	0.000	0.001	1*1.00 + 2*1.00
21/ ELS/ 3	-4.79	0.001	0.000	1*1.00 + 3*1.00
21/ ELS/ 4	-4.41	0.001	0.000	1*1.00 + 4*1.00
21/ ELS/ 5	-4.96	0.000	0.000	1*1.00 + 2*0.80
21/ ELS/ 6	-4.47	0.001	0.000	1*1.00 + 3*0.80
21/ ELS/ 7	-4.17	0.001	0.000	1*1.00 + 4*0.80
21/ ELS/ 8	-4.30	0.000	0.000	1*1.00 + 2*0.50
21/ ELS/ 9	-4.00	0.001	0.000	1*1.00 + 3*0.50
21/ ELS/ 10	-3.81	0.001	0.000	1*1.00 + 4*0.50
22/ ELS/ 1	-3.11	-0.000	0.000	1*1.00
22/ ELS/ 2	-6.55	-0.001	0.001	1*1.00 + 2*1.00
22/ ELS/ 3	-5.31	-0.001	0.001	1*1.00 + 3*1.00
22/ ELS/ 4	-4.49	-0.001	0.000	1*1.00 + 4*1.00
22/ ELS/ 5	-5.86	-0.001	0.001	1*1.00 + 2*0.80
22/ ELS/ 6	-4.87	-0.001	0.000	1*1.00 + 3*0.80
22/ ELS/ 7	-4.21	-0.000	0.000	1*1.00 + 4*0.80
22/ ELS/ 8	-4.83	-0.000	0.000	1*1.00 + 2*0.50
22/ ELS/ 9	-4.21	-0.001	0.000	1*1.00 + 3*0.50
22/ ELS/ 10	-3.80	-0.000	0.000	1*1.00 + 4*0.50
23/ ELS/ 1	-3.43	-0.000	0.000	1*1.00
23/ ELS/ 2	-7.57	-0.000	0.001	1*1.00 + 2*1.00
23/ ELS/ 3	-6.75	-0.001	0.001	1*1.00 + 3*1.00
23/ ELS/ 4	-5.24	-0.000	0.000	1*1.00 + 4*1.00
23/ ELS/ 5	-6.75	-0.000	0.001	1*1.00 + 2*0.80
23/ ELS/ 6	-6.09	-0.001	0.001	1*1.00 + 3*0.80
23/ ELS/ 7	-4.88	-0.000	0.000	1*1.00 + 4*0.80
23/ ELS/ 8	-5.50	-0.000	0.000	1*1.00 + 2*0.50
23/ ELS/ 9	-5.09	-0.000	0.000	1*1.00 + 3*0.50
23/ ELS/ 10	-4.34	-0.000	0.000	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
24/ ELS/ 1	-3.11	0.000	0.000	1*1.00
24/ ELS/ 2	-6.55	0.001	0.001	1*1.00 + 2*1.00
24/ ELS/ 3	-6.79	0.000	0.001	1*1.00 + 3*1.00
24/ ELS/ 4	-4.93	0.000	0.000	1*1.00 + 4*1.00
24/ ELS/ 5	-5.86	0.001	0.001	1*1.00 + 2*0.80
24/ ELS/ 6	-6.06	0.000	0.001	1*1.00 + 3*0.80
24/ ELS/ 7	-4.56	0.000	0.000	1*1.00 + 4*0.80
24/ ELS/ 8	-4.83	0.000	0.000	1*1.00 + 2*0.50
24/ ELS/ 9	-4.95	0.000	0.000	1*1.00 + 3*0.50
24/ ELS/ 10	-4.02	0.000	0.000	1*1.00 + 4*0.50
25/ ELS/ 1	-3.21	-0.001	0.000	1*1.00
25/ ELS/ 2	-5.40	-0.000	0.001	1*1.00 + 2*1.00
25/ ELS/ 3	-7.01	-0.001	0.001	1*1.00 + 3*1.00
25/ ELS/ 4	-5.08	-0.001	0.001	1*1.00 + 4*1.00
25/ ELS/ 5	-4.96	-0.000	0.000	1*1.00 + 2*0.80
25/ ELS/ 6	-6.25	-0.001	0.001	1*1.00 + 3*0.80
25/ ELS/ 7	-4.71	-0.001	0.000	1*1.00 + 4*0.80
25/ ELS/ 8	-4.30	-0.000	0.000	1*1.00 + 2*0.50
25/ ELS/ 9	-5.11	-0.001	0.000	1*1.00 + 3*0.50
25/ ELS/ 10	-4.15	-0.001	0.000	1*1.00 + 4*0.50
26/ ELS/ 1	-3.47	0.001	-0.000	1*1.00
26/ ELS/ 2	-5.84	0.000	-0.000	1*1.00 + 2*1.00
26/ ELS/ 3	-5.18	0.001	-0.000	1*1.00 + 3*1.00
26/ ELS/ 4	-4.77	0.001	0.000	1*1.00 + 4*1.00
26/ ELS/ 5	-5.37	0.000	-0.000	1*1.00 + 2*0.80
26/ ELS/ 6	-4.84	0.001	-0.000	1*1.00 + 3*0.80
26/ ELS/ 7	-4.51	0.001	0.000	1*1.00 + 4*0.80
26/ ELS/ 8	-4.65	0.000	-0.000	1*1.00 + 2*0.50
26/ ELS/ 9	-4.32	0.001	-0.000	1*1.00 + 3*0.50
26/ ELS/ 10	-4.12	0.001	0.000	1*1.00 + 4*0.50
27/ ELS/ 1	-3.36	-0.000	0.000	1*1.00
27/ ELS/ 2	-7.10	-0.001	0.000	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
27/ ELS/ 3	-5.74	-0.001	0.000	1*1.00 + 3*1.00
27/ ELS/ 4	-4.87	-0.001	0.000	1*1.00 + 4*1.00
27/ ELS/ 5	-6.35	-0.001	0.000	1*1.00 + 2*0.80
27/ ELS/ 6	-5.27	-0.001	0.000	1*1.00 + 3*0.80
27/ ELS/ 7	-4.57	-0.000	0.000	1*1.00 + 4*0.80
27/ ELS/ 8	-5.23	-0.001	0.000	1*1.00 + 2*0.50
27/ ELS/ 9	-4.55	-0.001	0.000	1*1.00 + 3*0.50
27/ ELS/ 10	-4.12	-0.000	0.000	1*1.00 + 4*0.50
28/ ELS/ 1	-3.68	-0.000	0.000	1*1.00
28/ ELS/ 2	-8.23	-0.000	0.000	1*1.00 + 2*1.00
28/ ELS/ 3	-7.31	-0.001	0.000	1*1.00 + 3*1.00
28/ ELS/ 4	-5.67	-0.000	0.000	1*1.00 + 4*1.00
28/ ELS/ 5	-7.32	-0.000	0.000	1*1.00 + 2*0.80
28/ ELS/ 6	-6.58	-0.001	0.000	1*1.00 + 3*0.80
28/ ELS/ 7	-5.27	-0.000	0.000	1*1.00 + 4*0.80
28/ ELS/ 8	-5.95	-0.000	0.000	1*1.00 + 2*0.50
28/ ELS/ 9	-5.49	-0.000	0.000	1*1.00 + 3*0.50
28/ ELS/ 10	-4.68	-0.000	0.000	1*1.00 + 4*0.50
29/ ELS/ 1	-3.36	0.000	0.000	1*1.00
29/ ELS/ 2	-7.10	0.001	0.000	1*1.00 + 2*1.00
29/ ELS/ 3	-7.36	0.000	0.000	1*1.00 + 3*1.00
29/ ELS/ 4	-5.40	0.000	0.000	1*1.00 + 4*1.00
29/ ELS/ 5	-6.35	0.001	0.000	1*1.00 + 2*0.80
29/ ELS/ 6	-6.56	0.000	0.000	1*1.00 + 3*0.80
29/ ELS/ 7	-4.99	0.000	0.000	1*1.00 + 4*0.80
29/ ELS/ 8	-5.23	0.001	0.000	1*1.00 + 2*0.50
29/ ELS/ 9	-5.36	0.000	0.000	1*1.00 + 3*0.50
29/ ELS/ 10	-4.38	0.000	0.000	1*1.00 + 4*0.50
30/ ELS/ 1	-3.47	-0.001	0.000	1*1.00
30/ ELS/ 2	-5.84	-0.000	0.000	1*1.00 + 2*1.00
30/ ELS/ 3	-7.59	-0.001	0.000	1*1.00 + 3*1.00
30/ ELS/ 4	-5.56	-0.001	0.000	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
30/ ELS/ 5	-5.37	-0.000	0.000	1*1.00 + 2*0.80
30/ ELS/ 6	-6.76	-0.001	0.000	1*1.00 + 3*0.80
30/ ELS/ 7	-5.14	-0.001	0.000	1*1.00 + 4*0.80
30/ ELS/ 8	-4.65	-0.000	0.000	1*1.00 + 2*0.50
30/ ELS/ 9	-5.53	-0.001	0.000	1*1.00 + 3*0.50
30/ ELS/ 10	-4.51	-0.001	0.000	1*1.00 + 4*0.50
31/ ELS/ 1	-3.21	0.001	-0.000	1*1.00
31/ ELS/ 2	-5.40	0.000	-0.001	1*1.00 + 2*1.00
31/ ELS/ 3	-4.79	0.001	-0.000	1*1.00 + 3*1.00
31/ ELS/ 4	-4.42	0.001	-0.000	1*1.00 + 4*1.00
31/ ELS/ 5	-4.96	0.000	-0.000	1*1.00 + 2*0.80
31/ ELS/ 6	-4.47	0.001	-0.000	1*1.00 + 3*0.80
31/ ELS/ 7	-4.17	0.001	-0.000	1*1.00 + 4*0.80
31/ ELS/ 8	-4.30	0.000	-0.000	1*1.00 + 2*0.50
31/ ELS/ 9	-4.00	0.001	-0.000	1*1.00 + 3*0.50
31/ ELS/ 10	-3.81	0.001	-0.000	1*1.00 + 4*0.50
32/ ELS/ 1	-3.11	-0.000	-0.000	1*1.00
32/ ELS/ 2	-6.55	-0.001	-0.001	1*1.00 + 2*1.00
32/ ELS/ 3	-5.31	-0.001	-0.001	1*1.00 + 3*1.00
32/ ELS/ 4	-4.53	-0.001	-0.000	1*1.00 + 4*1.00
32/ ELS/ 5	-5.86	-0.001	-0.001	1*1.00 + 2*0.80
32/ ELS/ 6	-4.87	-0.001	-0.000	1*1.00 + 3*0.80
32/ ELS/ 7	-4.25	-0.000	-0.000	1*1.00 + 4*0.80
32/ ELS/ 8	-4.83	-0.000	-0.000	1*1.00 + 2*0.50
32/ ELS/ 9	-4.21	-0.001	-0.000	1*1.00 + 3*0.50
32/ ELS/ 10	-3.82	-0.000	-0.000	1*1.00 + 4*0.50
33/ ELS/ 1	-3.43	-0.000	-0.000	1*1.00
33/ ELS/ 2	-7.57	-0.000	-0.001	1*1.00 + 2*1.00
33/ ELS/ 3	-6.75	-0.001	-0.001	1*1.00 + 3*1.00
33/ ELS/ 4	-5.36	-0.000	-0.000	1*1.00 + 4*1.00
33/ ELS/ 5	-6.75	-0.000	-0.001	1*1.00 + 2*0.80
33/ ELS/ 6	-6.09	-0.001	-0.001	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
33/ ELS/ 7	-4.98	-0.000	-0.000	1*1.00 + 4*0.80
33/ ELS/ 8	-5.50	-0.000	-0.000	1*1.00 + 2*0.50
33/ ELS/ 9	-5.09	-0.000	-0.000	1*1.00 + 3*0.50
33/ ELS/ 10	-4.40	-0.000	-0.000	1*1.00 + 4*0.50
34/ ELS/ 1	-3.11	0.000	-0.000	1*1.00
34/ ELS/ 2	-6.55	0.001	-0.001	1*1.00 + 2*1.00
34/ ELS/ 3	-6.79	0.000	-0.001	1*1.00 + 3*1.00
34/ ELS/ 4	-5.09	0.000	-0.000	1*1.00 + 4*1.00
34/ ELS/ 5	-5.86	0.001	-0.001	1*1.00 + 2*0.80
34/ ELS/ 6	-6.06	0.000	-0.001	1*1.00 + 3*0.80
34/ ELS/ 7	-4.69	0.000	-0.000	1*1.00 + 4*0.80
34/ ELS/ 8	-4.83	0.000	-0.000	1*1.00 + 2*0.50
34/ ELS/ 9	-4.95	0.000	-0.000	1*1.00 + 3*0.50
34/ ELS/ 10	-4.10	0.000	-0.000	1*1.00 + 4*0.50
35/ ELS/ 1	-3.21	-0.001	-0.000	1*1.00
35/ ELS/ 2	-5.40	-0.000	-0.001	1*1.00 + 2*1.00
35/ ELS/ 3	-7.01	-0.001	-0.001	1*1.00 + 3*1.00
35/ ELS/ 4	-5.23	-0.001	-0.000	1*1.00 + 4*1.00
35/ ELS/ 5	-4.96	-0.000	-0.000	1*1.00 + 2*0.80
35/ ELS/ 6	-6.25	-0.001	-0.001	1*1.00 + 3*0.80
35/ ELS/ 7	-4.82	-0.001	-0.000	1*1.00 + 4*0.80
35/ ELS/ 8	-4.30	-0.000	-0.000	1*1.00 + 2*0.50
35/ ELS/ 9	-5.11	-0.001	-0.000	1*1.00 + 3*0.50
35/ ELS/ 10	-4.22	-0.001	-0.000	1*1.00 + 4*0.50
41/ ELS/ 1	-2.47	0.001	-0.001	1*1.00
41/ ELS/ 2	-4.14	0.000	-0.001	1*1.00 + 2*1.00
41/ ELS/ 3	-3.68	0.001	-0.001	1*1.00 + 3*1.00
41/ ELS/ 4	-3.40	0.001	-0.001	1*1.00 + 4*1.00
41/ ELS/ 5	-3.81	0.000	-0.001	1*1.00 + 2*0.80
41/ ELS/ 6	-3.44	0.001	-0.001	1*1.00 + 3*0.80
41/ ELS/ 7	-3.21	0.001	-0.001	1*1.00 + 4*0.80
41/ ELS/ 8	-3.30	0.000	-0.001	1*1.00 + 2*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
41/ ELS/ 9	-3.07	0.001	-0.001	1*1.00 + 3*0.50
41/ ELS/ 10	-2.93	0.001	-0.001	1*1.00 + 4*0.50
42/ ELS/ 1	-2.39	-0.000	-0.001	1*1.00
42/ ELS/ 2	-5.01	-0.001	-0.001	1*1.00 + 2*1.00
42/ ELS/ 3	-4.07	-0.001	-0.001	1*1.00 + 3*1.00
42/ ELS/ 4	-3.50	-0.001	-0.001	1*1.00 + 4*1.00
42/ ELS/ 5	-4.48	-0.001	-0.001	1*1.00 + 2*0.80
42/ ELS/ 6	-3.73	-0.001	-0.001	1*1.00 + 3*0.80
42/ ELS/ 7	-3.28	-0.000	-0.001	1*1.00 + 4*0.80
42/ ELS/ 8	-3.70	-0.000	-0.001	1*1.00 + 2*0.50
42/ ELS/ 9	-3.23	-0.001	-0.001	1*1.00 + 3*0.50
42/ ELS/ 10	-2.94	-0.000	-0.001	1*1.00 + 4*0.50
43/ ELS/ 1	-2.71	-0.000	-0.001	1*1.00
43/ ELS/ 2	-5.78	-0.000	-0.001	1*1.00 + 2*1.00
43/ ELS/ 3	-5.20	-0.001	-0.001	1*1.00 + 3*1.00
43/ ELS/ 4	-4.42	-0.000	-0.001	1*1.00 + 4*1.00
43/ ELS/ 5	-5.17	-0.000	-0.001	1*1.00 + 2*0.80
43/ ELS/ 6	-4.70	-0.000	-0.001	1*1.00 + 3*0.80
43/ ELS/ 7	-4.07	-0.000	-0.001	1*1.00 + 4*0.80
43/ ELS/ 8	-4.25	-0.000	-0.001	1*1.00 + 2*0.50
43/ ELS/ 9	-3.96	-0.000	-0.001	1*1.00 + 3*0.50
43/ ELS/ 10	-3.56	-0.000	-0.001	1*1.00 + 4*0.50
44/ ELS/ 1	-2.39	0.000	-0.001	1*1.00
44/ ELS/ 2	-5.01	0.001	-0.001	1*1.00 + 2*1.00
44/ ELS/ 3	-5.19	0.000	-0.001	1*1.00 + 3*1.00
44/ ELS/ 4	-4.00	0.000	-0.001	1*1.00 + 4*1.00
44/ ELS/ 5	-4.48	0.001	-0.001	1*1.00 + 2*0.80
44/ ELS/ 6	-4.63	0.000	-0.001	1*1.00 + 3*0.80
44/ ELS/ 7	-3.68	0.000	-0.001	1*1.00 + 4*0.80
44/ ELS/ 8	-3.70	0.000	-0.001	1*1.00 + 2*0.50
44/ ELS/ 9	-3.79	0.000	-0.001	1*1.00 + 3*0.50
44/ ELS/ 10	-3.20	0.000	-0.001	1*1.00 + 4*0.50

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
45/ ELS/ 1	-2.47	-0.001	-0.001	1*1.00
45/ ELS/ 2	-4.14	-0.000	-0.001	1*1.00 + 2*1.00
45/ ELS/ 3	-5.36	-0.001	-0.001	1*1.00 + 3*1.00
45/ ELS/ 4	-4.09	-0.001	-0.001	1*1.00 + 4*1.00
45/ ELS/ 5	-3.81	-0.000	-0.001	1*1.00 + 2*0.80
45/ ELS/ 6	-4.78	-0.001	-0.001	1*1.00 + 3*0.80
45/ ELS/ 7	-3.77	-0.001	-0.001	1*1.00 + 4*0.80
45/ ELS/ 8	-3.30	-0.000	-0.001	1*1.00 + 2*0.50
45/ ELS/ 9	-3.91	-0.001	-0.001	1*1.00 + 3*0.50
45/ ELS/ 10	-3.28	-0.001	-0.001	1*1.00 + 4*0.50
46/ ELS/ 1	-1.35	0.001	-0.001	1*1.00
46/ ELS/ 2	-2.24	0.000	-0.001	1*1.00 + 2*1.00
46/ ELS/ 3	-2.00	0.001	-0.001	1*1.00 + 3*1.00
46/ ELS/ 4	-1.85	0.001	-0.001	1*1.00 + 4*1.00
46/ ELS/ 5	-2.06	0.000	-0.001	1*1.00 + 2*0.80
46/ ELS/ 6	-1.87	0.001	-0.001	1*1.00 + 3*0.80
46/ ELS/ 7	-1.75	0.001	-0.001	1*1.00 + 4*0.80
46/ ELS/ 8	-1.79	0.000	-0.001	1*1.00 + 2*0.50
46/ ELS/ 9	-1.67	0.001	-0.001	1*1.00 + 3*0.50
46/ ELS/ 10	-1.60	0.001	-0.001	1*1.00 + 4*0.50
47/ ELS/ 1	-1.30	-0.000	-0.001	1*1.00
47/ ELS/ 2	-2.71	-0.001	-0.002	1*1.00 + 2*1.00
47/ ELS/ 3	-2.21	-0.001	-0.001	1*1.00 + 3*1.00
47/ ELS/ 4	-1.91	-0.001	-0.001	1*1.00 + 4*1.00
47/ ELS/ 5	-2.43	-0.001	-0.001	1*1.00 + 2*0.80
47/ ELS/ 6	-2.02	-0.001	-0.001	1*1.00 + 3*0.80
47/ ELS/ 7	-1.79	-0.000	-0.001	1*1.00 + 4*0.80
47/ ELS/ 8	-2.01	-0.000	-0.001	1*1.00 + 2*0.50
47/ ELS/ 9	-1.75	-0.000	-0.001	1*1.00 + 3*0.50
47/ ELS/ 10	-1.61	-0.000	-0.001	1*1.00 + 4*0.50
48/ ELS/ 1	-1.62	-0.000	-0.001	1*1.00
48/ ELS/ 2	-3.46	-0.000	-0.002	1*1.00 + 2*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
48/ ELS/ 3	-3.07	-0.000	-0.001	1*1.00 + 3*1.00
48/ ELS/ 4	-2.81	-0.000	-0.001	1*1.00 + 4*1.00
48/ ELS/ 5	-3.09	-0.000	-0.001	1*1.00 + 2*0.80
48/ ELS/ 6	-2.78	-0.000	-0.001	1*1.00 + 3*0.80
48/ ELS/ 7	-2.57	-0.000	-0.001	1*1.00 + 4*0.80
48/ ELS/ 8	-2.54	-0.000	-0.001	1*1.00 + 2*0.50
48/ ELS/ 9	-2.34	-0.000	-0.001	1*1.00 + 3*0.50
48/ ELS/ 10	-2.22	-0.000	-0.001	1*1.00 + 4*0.50
49/ ELS/ 1	-1.30	0.000	-0.001	1*1.00
49/ ELS/ 2	-2.71	0.001	-0.002	1*1.00 + 2*1.00
49/ ELS/ 3	-2.81	0.000	-0.002	1*1.00 + 3*1.00
49/ ELS/ 4	-2.22	0.000	-0.001	1*1.00 + 4*1.00
49/ ELS/ 5	-2.43	0.001	-0.001	1*1.00 + 2*0.80
49/ ELS/ 6	-2.51	0.000	-0.001	1*1.00 + 3*0.80
49/ ELS/ 7	-2.04	0.000	-0.001	1*1.00 + 4*0.80
49/ ELS/ 8	-2.01	0.000	-0.001	1*1.00 + 2*0.50
49/ ELS/ 9	-2.06	0.000	-0.001	1*1.00 + 3*0.50
49/ ELS/ 10	-1.76	0.000	-0.001	1*1.00 + 4*0.50
50/ ELS/ 1	-1.35	-0.001	-0.001	1*1.00
50/ ELS/ 2	-2.24	-0.000	-0.001	1*1.00 + 2*1.00
50/ ELS/ 3	-2.90	-0.001	-0.002	1*1.00 + 3*1.00
50/ ELS/ 4	-2.26	-0.001	-0.001	1*1.00 + 4*1.00
50/ ELS/ 5	-2.06	-0.000	-0.001	1*1.00 + 2*0.80
50/ ELS/ 6	-2.59	-0.001	-0.001	1*1.00 + 3*0.80
50/ ELS/ 7	-2.08	-0.001	-0.001	1*1.00 + 4*0.80
50/ ELS/ 8	-1.79	-0.000	-0.001	1*1.00 + 2*0.50
50/ ELS/ 9	-2.12	-0.001	-0.001	1*1.00 + 3*0.50
50/ ELS/ 10	-1.80	-0.001	-0.001	1*1.00 + 4*0.50
51/ ELS/ 1	0.0	0.001	-0.001	1*1.00
51/ ELS/ 2	0.0	0.000	-0.001	1*1.00 + 2*1.00
51/ ELS/ 3	0.0	0.001	-0.001	1*1.00 + 3*1.00
51/ ELS/ 4	0.0	0.001	-0.001	1*1.00 + 4*1.00

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
51/ ELS/ 5	0.0	0.000	-0.001	1*1.00 + 2*0.80
51/ ELS/ 6	0.0	0.001	-0.001	1*1.00 + 3*0.80
51/ ELS/ 7	0.0	0.001	-0.001	1*1.00 + 4*0.80
51/ ELS/ 8	0.0	0.000	-0.001	1*1.00 + 2*0.50
51/ ELS/ 9	0.0	0.001	-0.001	1*1.00 + 3*0.50
51/ ELS/ 10	0.0	0.001	-0.001	1*1.00 + 4*0.50
52/ ELS/ 1	0.0	-0.000	-0.001	1*1.00
52/ ELS/ 2	0.0	-0.001	-0.002	1*1.00 + 2*1.00
52/ ELS/ 3	0.0	-0.001	-0.001	1*1.00 + 3*1.00
52/ ELS/ 4	0.0	-0.001	-0.001	1*1.00 + 4*1.00
52/ ELS/ 5	0.0	-0.001	-0.001	1*1.00 + 2*0.80
52/ ELS/ 6	0.0	-0.001	-0.001	1*1.00 + 3*0.80
52/ ELS/ 7	0.0	-0.000	-0.001	1*1.00 + 4*0.80
52/ ELS/ 8	0.0	-0.000	-0.001	1*1.00 + 2*0.50
52/ ELS/ 9	0.0	-0.000	-0.001	1*1.00 + 3*0.50
52/ ELS/ 10	0.0	-0.000	-0.001	1*1.00 + 4*0.50
53/ ELS/ 1	-0.32	-0.000	-0.001	1*1.00
53/ ELS/ 2	-0.75	-0.000	-0.002	1*1.00 + 2*1.00
53/ ELS/ 3	-0.56	0.000	-0.002	1*1.00 + 3*1.00
53/ ELS/ 4	-0.90	-0.000	-0.001	1*1.00 + 4*1.00
53/ ELS/ 5	-0.66	-0.000	-0.001	1*1.00 + 2*0.80
53/ ELS/ 6	-0.52	0.000	-0.001	1*1.00 + 3*0.80
53/ ELS/ 7	-0.78	-0.000	-0.001	1*1.00 + 4*0.80
53/ ELS/ 8	-0.54	-0.000	-0.001	1*1.00 + 2*0.50
53/ ELS/ 9	-0.44	0.000	-0.001	1*1.00 + 3*0.50
53/ ELS/ 10	-0.61	-0.000	-0.001	1*1.00 + 4*0.50
54/ ELS/ 1	0.0	0.000	-0.001	1*1.00
54/ ELS/ 2	0.0	0.001	-0.002	1*1.00 + 2*1.00
54/ ELS/ 3	0.0	0.000	-0.002	1*1.00 + 3*1.00
54/ ELS/ 4	0.0	0.000	-0.001	1*1.00 + 4*1.00
54/ ELS/ 5	0.0	0.001	-0.001	1*1.00 + 2*0.80
54/ ELS/ 6	0.0	0.000	-0.002	1*1.00 + 3*0.80

Nudo/Caso/Componente	UZ (mm)	RX (Rad)	RY (Rad)	Definición
54/ ELS/ 7	0.0	0.000	-0.001	1*1.00 + 4*0.80
54/ ELS/ 8	0.0	0.000	-0.001	1*1.00 + 2*0.50
54/ ELS/ 9	0.0	0.000	-0.001	1*1.00 + 3*0.50
54/ ELS/ 10	0.0	0.000	-0.001	1*1.00 + 4*0.50
55/ ELS/ 1	0.0	-0.001	-0.001	1*1.00
55/ ELS/ 2	0.0	-0.000	-0.001	1*1.00 + 2*1.00
55/ ELS/ 3	0.0	-0.001	-0.002	1*1.00 + 3*1.00
55/ ELS/ 4	0.0	-0.001	-0.001	1*1.00 + 4*1.00
55/ ELS/ 5	0.0	-0.000	-0.001	1*1.00 + 2*0.80
55/ ELS/ 6	0.0	-0.001	-0.002	1*1.00 + 3*0.80
55/ ELS/ 7	0.0	-0.001	-0.001	1*1.00 + 4*0.80
55/ ELS/ 8	0.0	-0.000	-0.001	1*1.00 + 2*0.50
55/ ELS/ 9	0.0	-0.001	-0.001	1*1.00 + 3*0.50
55/ ELS/ 10	0.0	-0.001	-0.001	1*1.00 + 4*0.50

Desplazamientos - Casos: 9 10 : Envolvente: 1

- Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A15 21A35 41A	1A10
Seleccion	1A15 21A35 41A	8
Número total	45	10
Número seleccionado	45	1

- Casos: 9 10

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
1/	ELS/1	0.0>>	0.001	0.001	1*1.00
1/	ELS/1	0.0<<	0.001	0.001	1*1.00
1/	ELS/4	0.0	0.001>>	0.001	1*1.00 + 4*1.00
1/	ELS/2	0.0	0.000<<	0.001	1*1.00 + 2*1.00
1/	ELS/2	0.0	0.000	0.001>>	1*1.00 + 2*1.00
1/	ELS/1	0.0	0.001	0.001<<	1*1.00
2/	ELS/1	0.0>>	-0.000	0.001	1*1.00
2/	ELS/1	0.0<<	-0.000	0.001	1*1.00
2/	ELS/1	0.0	-0.000>>	0.001	1*1.00
2/	ELS/3	0.0	-0.001<<	0.001	1*1.00 + 3*1.00
2/	ELS/2	0.0	-0.001	0.002>>	1*1.00 + 2*1.00
2/	ELS/1	0.0	-0.000	0.001<<	1*1.00
3/	ELS/1	-0.32>>	0.000	0.001	1*1.00
3/	ELS/2	-0.75<<	-0.000	0.002	1*1.00 + 2*1.00
3/	ELS/4	-0.54	0.000>>	0.001	1*1.00 + 4*1.00
3/	ELS/2	-0.75	-0.000<<	0.002	1*1.00 + 2*1.00
3/	ELS/2	-0.75	-0.000	0.002>>	1*1.00 + 2*1.00
3/	ELS/1	-0.32	0.000	0.001<<	1*1.00
4/	ELS/1	0.0>>	0.000	0.001	1*1.00
4/	ELS/1	0.0<<	0.000	0.001	1*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
4/	ELS/2	0.0	0.001>>	0.002	1*1.00 + 2*1.00
4/	ELS/3	0.0	0.000<<	0.002	1*1.00 + 3*1.00
4/	ELS/3	0.0	0.000	0.002>>	1*1.00 + 3*1.00
4/	ELS/1	0.0	0.000	0.001<<	1*1.00
5/	ELS/1	0.0>>	-0.001	0.001	1*1.00
5/	ELS/1	0.0<<	-0.001	0.001	1*1.00
5/	ELS/2	0.0	-0.000>>	0.001	1*1.00 + 2*1.00
5/	ELS/4	0.0	-0.001<<	0.001	1*1.00 + 4*1.00
5/	ELS/3	0.0	-0.001	0.002>>	1*1.00 + 3*1.00
5/	ELS/1	0.0	-0.001	0.001<<	1*1.00
6/	ELS/1	-1.35>>	0.001	0.001	1*1.00
6/	ELS/2	-2.24<<	0.000	0.001	1*1.00 + 2*1.00
6/	ELS/4	-1.84	0.001>>	0.001	1*1.00 + 4*1.00
6/	ELS/2	-2.24	0.000<<	0.001	1*1.00 + 2*1.00
6/	ELS/2	-2.24	0.000	0.001>>	1*1.00 + 2*1.00
6/	ELS/1	-1.35	0.001	0.001<<	1*1.00
7/	ELS/1	-1.30>>	-0.000	0.001	1*1.00
7/	ELS/2	-2.71<<	-0.001	0.002	1*1.00 + 2*1.00
7/	ELS/1	-1.30	-0.000>>	0.001	1*1.00
7/	ELS/3	-2.21	-0.001<<	0.001	1*1.00 + 3*1.00
7/	ELS/2	-2.71	-0.001	0.002>>	1*1.00 + 2*1.00
7/	ELS/1	-1.30	-0.000	0.001<<	1*1.00
8/	ELS/1	-1.62>>	-0.000	0.001	1*1.00
8/	ELS/2	-3.46<<	-0.000	0.002	1*1.00 + 2*1.00
8/	ELS/1	-1.62	-0.000>>	0.001	1*1.00
8/	ELS/3	-3.07	-0.000<<	0.001	1*1.00 + 3*1.00
8/	ELS/2	-3.46	-0.000	0.002>>	1*1.00 + 2*1.00
8/	ELS/1	-1.62	-0.000	0.001<<	1*1.00
9/	ELS/1	-1.30>>	0.000	0.001	1*1.00
9/	ELS/3	-2.81<<	0.000	0.002	1*1.00 + 3*1.00
9/	ELS/2	-2.71	0.001>>	0.002	1*1.00 + 2*1.00
9/	ELS/3	-2.81	0.000<<	0.002	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
9/	ELS/3	-2.81	0.000	0.002>>	1*1.00 + 3*1.00
9/	ELS/1	-1.30	0.000	0.001<<	1*1.00
10/	ELS/1	-1.35>>	-0.001	0.001	1*1.00
10/	ELS/3	-2.90<<	-0.001	0.002	1*1.00 + 3*1.00
10/	ELS/2	-2.24	-0.000>>	0.001	1*1.00 + 2*1.00
10/	ELS/4	-2.10	-0.001<<	0.001	1*1.00 + 4*1.00
10/	ELS/3	-2.90	-0.001	0.002>>	1*1.00 + 3*1.00
10/	ELS/1	-1.35	-0.001	0.001<<	1*1.00
11/	ELS/1	-2.47>>	0.001	0.001	1*1.00
11/	ELS/2	-4.14<<	0.000	0.001	1*1.00 + 2*1.00
11/	ELS/4	-3.39	0.001>>	0.001	1*1.00 + 4*1.00
11/	ELS/2	-4.14	0.000<<	0.001	1*1.00 + 2*1.00
11/	ELS/2	-4.14	0.000	0.001>>	1*1.00 + 2*1.00
11/	ELS/1	-2.47	0.001	0.001<<	1*1.00
12/	ELS/1	-2.39>>	-0.000	0.001	1*1.00
12/	ELS/2	-5.01<<	-0.001	0.001	1*1.00 + 2*1.00
12/	ELS/1	-2.39	-0.000>>	0.001	1*1.00
12/	ELS/3	-4.07	-0.001<<	0.001	1*1.00 + 3*1.00
12/	ELS/2	-5.01	-0.001	0.001>>	1*1.00 + 2*1.00
12/	ELS/1	-2.39	-0.000	0.001<<	1*1.00
13/	ELS/1	-2.71>>	-0.000	0.001	1*1.00
13/	ELS/2	-5.78<<	-0.000	0.001	1*1.00 + 2*1.00
13/	ELS/1	-2.71	-0.000>>	0.001	1*1.00
13/	ELS/3	-5.20	-0.001<<	0.001	1*1.00 + 3*1.00
13/	ELS/2	-5.78	-0.000	0.001>>	1*1.00 + 2*1.00
13/	ELS/1	-2.71	-0.000	0.001<<	1*1.00
14/	ELS/1	-2.39>>	0.000	0.001	1*1.00
14/	ELS/3	-5.19<<	0.000	0.001	1*1.00 + 3*1.00
14/	ELS/2	-5.01	0.001>>	0.001	1*1.00 + 2*1.00
14/	ELS/3	-5.19	0.000<<	0.001	1*1.00 + 3*1.00
14/	ELS/3	-5.19	0.000	0.001>>	1*1.00 + 3*1.00
14/	ELS/1	-2.39	0.000	0.001<<	1*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
15/	ELS/1	-2.47>>	-0.001	0.001	1*1.00
15/	ELS/3	-5.36<<	-0.001	0.001	1*1.00 + 3*1.00
15/	ELS/2	-4.14	-0.000>>	0.001	1*1.00 + 2*1.00
15/	ELS/4	-3.88	-0.001<<	0.001	1*1.00 + 4*1.00
15/	ELS/3	-5.36	-0.001	0.001>>	1*1.00 + 3*1.00
15/	ELS/1	-2.47	-0.001	0.001<<	1*1.00
21/	ELS/1	-3.21>>	0.001	0.000	1*1.00
21/	ELS/2	-5.40<<	0.000	0.001	1*1.00 + 2*1.00
21/	ELS/4	-4.41	0.001>>	0.000	1*1.00 + 4*1.00
21/	ELS/2	-5.40	0.000<<	0.001	1*1.00 + 2*1.00
21/	ELS/2	-5.40	0.000	0.001>>	1*1.00 + 2*1.00
21/	ELS/1	-3.21	0.001	0.000<<	1*1.00
22/	ELS/1	-3.11>>	-0.000	0.000	1*1.00
22/	ELS/2	-6.55<<	-0.001	0.001	1*1.00 + 2*1.00
22/	ELS/1	-3.11	-0.000>>	0.000	1*1.00
22/	ELS/3	-5.31	-0.001<<	0.001	1*1.00 + 3*1.00
22/	ELS/2	-6.55	-0.001	0.001>>	1*1.00 + 2*1.00
22/	ELS/1	-3.11	-0.000	0.000<<	1*1.00
23/	ELS/1	-3.43>>	-0.000	0.000	1*1.00
23/	ELS/2	-7.57<<	-0.000	0.001	1*1.00 + 2*1.00
23/	ELS/1	-3.43	-0.000>>	0.000	1*1.00
23/	ELS/3	-6.75	-0.001<<	0.001	1*1.00 + 3*1.00
23/	ELS/2	-7.57	-0.000	0.001>>	1*1.00 + 2*1.00
23/	ELS/1	-3.43	-0.000	0.000<<	1*1.00
24/	ELS/1	-3.11>>	0.000	0.000	1*1.00
24/	ELS/3	-6.79<<	0.000	0.001	1*1.00 + 3*1.00
24/	ELS/2	-6.55	0.001>>	0.001	1*1.00 + 2*1.00
24/	ELS/3	-6.79	0.000<<	0.001	1*1.00 + 3*1.00
24/	ELS/3	-6.79	0.000	0.001>>	1*1.00 + 3*1.00
24/	ELS/1	-3.11	0.000	0.000<<	1*1.00
25/	ELS/1	-3.21>>	-0.001	0.000	1*1.00
25/	ELS/3	-7.01<<	-0.001	0.001	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
25/	ELS/2	-5.40	-0.000>>	0.001	1*1.00 + 2*1.00
25/	ELS/4	-5.08	-0.001<<	0.001	1*1.00 + 4*1.00
25/	ELS/3	-7.01	-0.001	0.001>>	1*1.00 + 3*1.00
25/	ELS/1	-3.21	-0.001	0.000<<	1*1.00
26/	ELS/1	-3.47>>	0.001	-0.000	1*1.00
26/	ELS/2	-5.84<<	0.000	-0.000	1*1.00 + 2*1.00
26/	ELS/4	-4.77	0.001>>	0.000	1*1.00 + 4*1.00
26/	ELS/2	-5.84	0.000<<	-0.000	1*1.00 + 2*1.00
26/	ELS/4	-4.77	0.001	0.000>>	1*1.00 + 4*1.00
26/	ELS/2	-5.84	0.000	-0.000<<	1*1.00 + 2*1.00
27/	ELS/1	-3.36>>	-0.000	0.000	1*1.00
27/	ELS/2	-7.10<<	-0.001	0.000	1*1.00 + 2*1.00
27/	ELS/1	-3.36	-0.000>>	0.000	1*1.00
27/	ELS/3	-5.74	-0.001<<	0.000	1*1.00 + 3*1.00
27/	ELS/4	-4.87	-0.001	0.000>>	1*1.00 + 4*1.00
27/	ELS/1	-3.36	-0.000	0.000<<	1*1.00
28/	ELS/1	-3.68>>	-0.000	0.000	1*1.00
28/	ELS/2	-8.23<<	-0.000	0.000	1*1.00 + 2*1.00
28/	ELS/1	-3.68	-0.000>>	0.000	1*1.00
28/	ELS/3	-7.31	-0.001<<	0.000	1*1.00 + 3*1.00
28/	ELS/4	-5.67	-0.000	0.000>>	1*1.00 + 4*1.00
28/	ELS/1	-3.68	-0.000	0.000<<	1*1.00
29/	ELS/1	-3.36>>	0.000	0.000	1*1.00
29/	ELS/3	-7.36<<	0.000	0.000	1*1.00 + 3*1.00
29/	ELS/2	-7.10	0.001>>	0.000	1*1.00 + 2*1.00
29/	ELS/3	-7.36	0.000<<	0.000	1*1.00 + 3*1.00
29/	ELS/4	-5.40	0.000	0.000>>	1*1.00 + 4*1.00
29/	ELS/1	-3.36	0.000	0.000<<	1*1.00
30/	ELS/1	-3.47>>	-0.001	0.000	1*1.00
30/	ELS/3	-7.59<<	-0.001	0.000	1*1.00 + 3*1.00
30/	ELS/2	-5.84	-0.000>>	0.000	1*1.00 + 2*1.00
30/	ELS/4	-5.56	-0.001<<	0.000	1*1.00 + 4*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
30/	ELS/4	-5.56	-0.001	0.000>>	1*1.00 + 4*1.00
30/	ELS/1	-3.47	-0.001	0.000<<	1*1.00
31/	ELS/1	-3.21>>	0.001	-0.000	1*1.00
31/	ELS/2	-5.40<<	0.000	-0.001	1*1.00 + 2*1.00
31/	ELS/4	-4.42	0.001>>	-0.000	1*1.00 + 4*1.00
31/	ELS/2	-5.40	0.000<<	-0.001	1*1.00 + 2*1.00
31/	ELS/1	-3.21	0.001	-0.000>>	1*1.00
31/	ELS/2	-5.40	0.000	-0.001<<	1*1.00 + 2*1.00
32/	ELS/1	-3.11>>	-0.000	-0.000	1*1.00
32/	ELS/2	-6.55<<	-0.001	-0.001	1*1.00 + 2*1.00
32/	ELS/1	-3.11	-0.000>>	-0.000	1*1.00
32/	ELS/3	-5.31	-0.001<<	-0.001	1*1.00 + 3*1.00
32/	ELS/1	-3.11	-0.000	-0.000>>	1*1.00
32/	ELS/2	-6.55	-0.001	-0.001<<	1*1.00 + 2*1.00
33/	ELS/1	-3.43>>	-0.000	-0.000	1*1.00
33/	ELS/2	-7.57<<	-0.000	-0.001	1*1.00 + 2*1.00
33/	ELS/1	-3.43	-0.000>>	-0.000	1*1.00
33/	ELS/3	-6.75	-0.001<<	-0.001	1*1.00 + 3*1.00
33/	ELS/1	-3.43	-0.000	-0.000>>	1*1.00
33/	ELS/2	-7.57	-0.000	-0.001<<	1*1.00 + 2*1.00
34/	ELS/1	-3.11>>	0.000	-0.000	1*1.00
34/	ELS/3	-6.79<<	0.000	-0.001	1*1.00 + 3*1.00
34/	ELS/2	-6.55	0.001>>	-0.001	1*1.00 + 2*1.00
34/	ELS/3	-6.79	0.000<<	-0.001	1*1.00 + 3*1.00
34/	ELS/1	-3.11	0.000	-0.000>>	1*1.00
34/	ELS/3	-6.79	0.000	-0.001<<	1*1.00 + 3*1.00
35/	ELS/1	-3.21>>	-0.001	-0.000	1*1.00
35/	ELS/3	-7.01<<	-0.001	-0.001	1*1.00 + 3*1.00
35/	ELS/2	-5.40	-0.000>>	-0.001	1*1.00 + 2*1.00
35/	ELS/4	-5.23	-0.001<<	-0.000	1*1.00 + 4*1.00
35/	ELS/1	-3.21	-0.001	-0.000>>	1*1.00
35/	ELS/3	-7.01	-0.001	-0.001<<	1*1.00 + 3*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
41/	ELS/1	-2.47>>	0.001	-0.001	1*1.00
41/	ELS/2	-4.14<<	0.000	-0.001	1*1.00 + 2*1.00
41/	ELS/4	-3.40	0.001>>	-0.001	1*1.00 + 4*1.00
41/	ELS/2	-4.14	0.000<<	-0.001	1*1.00 + 2*1.00
41/	ELS/1	-2.47	0.001	-0.001>>	1*1.00
41/	ELS/2	-4.14	0.000	-0.001<<	1*1.00 + 2*1.00
42/	ELS/1	-2.39>>	-0.000	-0.001	1*1.00
42/	ELS/2	-5.01<<	-0.001	-0.001	1*1.00 + 2*1.00
42/	ELS/1	-2.39	-0.000>>	-0.001	1*1.00
42/	ELS/3	-4.07	-0.001<<	-0.001	1*1.00 + 3*1.00
42/	ELS/1	-2.39	-0.000	-0.001>>	1*1.00
42/	ELS/2	-5.01	-0.001	-0.001<<	1*1.00 + 2*1.00
43/	ELS/1	-2.71>>	-0.000	-0.001	1*1.00
43/	ELS/2	-5.78<<	-0.000	-0.001	1*1.00 + 2*1.00
43/	ELS/1	-2.71	-0.000>>	-0.001	1*1.00
43/	ELS/3	-5.20	-0.001<<	-0.001	1*1.00 + 3*1.00
43/	ELS/1	-2.71	-0.000	-0.001>>	1*1.00
43/	ELS/2	-5.78	-0.000	-0.001<<	1*1.00 + 2*1.00
44/	ELS/1	-2.39>>	0.000	-0.001	1*1.00
44/	ELS/3	-5.19<<	0.000	-0.001	1*1.00 + 3*1.00
44/	ELS/2	-5.01	0.001>>	-0.001	1*1.00 + 2*1.00
44/	ELS/3	-5.19	0.000<<	-0.001	1*1.00 + 3*1.00
44/	ELS/1	-2.39	0.000	-0.001>>	1*1.00
44/	ELS/3	-5.19	0.000	-0.001<<	1*1.00 + 3*1.00
45/	ELS/1	-2.47>>	-0.001	-0.001	1*1.00
45/	ELS/3	-5.36<<	-0.001	-0.001	1*1.00 + 3*1.00
45/	ELS/2	-4.14	-0.000>>	-0.001	1*1.00 + 2*1.00
45/	ELS/4	-4.09	-0.001<<	-0.001	1*1.00 + 4*1.00
45/	ELS/1	-2.47	-0.001	-0.001>>	1*1.00
45/	ELS/3	-5.36	-0.001	-0.001<<	1*1.00 + 3*1.00
46/	ELS/1	-1.35>>	0.001	-0.001	1*1.00
46/	ELS/2	-2.24<<	0.000	-0.001	1*1.00 + 2*1.00
46/	ELS/4	-1.85	0.001>>	-0.001	1*1.00 + 4*1.00
46/	ELS/2	-2.24	0.000<<	-0.001	1*1.00 + 2*1.00
46/	ELS/1	-1.35	0.001	-0.001>>	1*1.00
46/	ELS/2	-2.24	0.000	-0.001<<	1*1.00 + 2*1.00
47/	ELS/1	-1.30>>	-0.000	-0.001	1*1.00
47/	ELS/2	-2.71<<	-0.001	-0.002	1*1.00 + 2*1.00
47/	ELS/1	-1.30	-0.000>>	-0.001	1*1.00
47/	ELS/3	-2.21	-0.001<<	-0.001	1*1.00 + 3*1.00
47/	ELS/1	-1.30	-0.000	-0.001>>	1*1.00
47/	ELS/2	-2.71	-0.001	-0.002<<	1*1.00 + 2*1.00
48/	ELS/1	-1.62>>	-0.000	-0.001	1*1.00
48/	ELS/2	-3.46<<	-0.000	-0.002	1*1.00 + 2*1.00
48/	ELS/1	-1.62	-0.000>>	-0.001	1*1.00
48/	ELS/3	-3.07	-0.000<<	-0.001	1*1.00 + 3*1.00
48/	ELS/1	-1.62	-0.000	-0.001>>	1*1.00
48/	ELS/2	-3.46	-0.000	-0.002<<	1*1.00 + 2*1.00
49/	ELS/1	-1.30>>	0.000	-0.001	1*1.00
49/	ELS/3	-2.81<<	0.000	-0.002	1*1.00 + 3*1.00
49/	ELS/2	-2.71	0.001>>	-0.002	1*1.00 + 2*1.00
49/	ELS/3	-2.81	0.000<<	-0.002	1*1.00 + 3*1.00
49/	ELS/1	-1.30	0.000	-0.001>>	1*1.00
49/	ELS/3	-2.81	0.000	-0.002<<	1*1.00 + 3*1.00
50/	ELS/1	-1.35>>	-0.001	-0.001	1*1.00
50/	ELS/3	-2.90<<	-0.001	-0.002	1*1.00 + 3*1.00
50/	ELS/2	-2.24	-0.000>>	-0.001	1*1.00 + 2*1.00
50/	ELS/4	-2.26	-0.001<<	-0.001	1*1.00 + 4*1.00
50/	ELS/1	-1.35	-0.001	-0.001>>	1*1.00
50/	ELS/3	-2.90	-0.001	-0.002<<	1*1.00 + 3*1.00
51/	ELS/1	0.0>>	0.001	-0.001	1*1.00
51/	ELS/1	0.0<<	0.001	-0.001	1*1.00
51/	ELS/4	0.0	0.001>>	-0.001	1*1.00 + 4*1.00
51/	ELS/2	0.0	0.000<<	-0.001	1*1.00 + 2*1.00

Nudo/Caso		UZ (mm)	RX (Rad)	RY (Rad)	Definición
51/	ELS/1	0.0	0.001	-0.001>>	1*1.00
51/	ELS/2	0.0	0.000	-0.001<<	1*1.00 + 2*1.00
52/	ELS/1	0.0>>	-0.000	-0.001	1*1.00
52/	ELS/1	0.0<<	-0.000	-0.001	1*1.00
52/	ELS/1	0.0	-0.000>>	-0.001	1*1.00
52/	ELS/3	0.0	-0.001<<	-0.001	1*1.00 + 3*1.00
52/	ELS/1	0.0	-0.000	-0.001>>	1*1.00
52/	ELS/2	0.0	-0.001	-0.002<<	1*1.00 + 2*1.00
53/	ELS/1	-0.32>>	-0.000	-0.001	1*1.00
53/	ELS/4	-0.90<<	-0.000	-0.001	1*1.00 + 4*1.00
53/	ELS/3	-0.56	0.000>>	-0.002	1*1.00 + 3*1.00
53/	ELS/4	-0.90	-0.000<<	-0.001	1*1.00 + 4*1.00
53/	ELS/1	-0.32	-0.000	-0.001>>	1*1.00
53/	ELS/2	-0.75	-0.000	-0.002<<	1*1.00 + 2*1.00
54/	ELS/1	0.0>>	0.000	-0.001	1*1.00
54/	ELS/1	0.0<<	0.000	-0.001	1*1.00
54/	ELS/2	0.0	0.001>>	-0.002	1*1.00 + 2*1.00
54/	ELS/3	0.0	0.000<<	-0.002	1*1.00 + 3*1.00
54/	ELS/1	0.0	0.000	-0.001>>	1*1.00
54/	ELS/3	0.0	0.000	-0.002<<	1*1.00 + 3*1.00
55/	ELS/1	0.0>>	-0.001	-0.001	1*1.00
55/	ELS/1	0.0<<	-0.001	-0.001	1*1.00
55/	ELS/2	0.0	-0.000>>	-0.001	1*1.00 + 2*1.00
55/	ELS/4	0.0	-0.001<<	-0.001	1*1.00 + 4*1.00
55/	ELS/1	0.0	-0.001	-0.001>>	1*1.00
55/	ELS/3	0.0	-0.001	-0.002<<	1*1.00 + 3*1.00

Desplazamientos - Casos: 9 10 : Extremos globales: 1

- Caso: 8 (ELS)

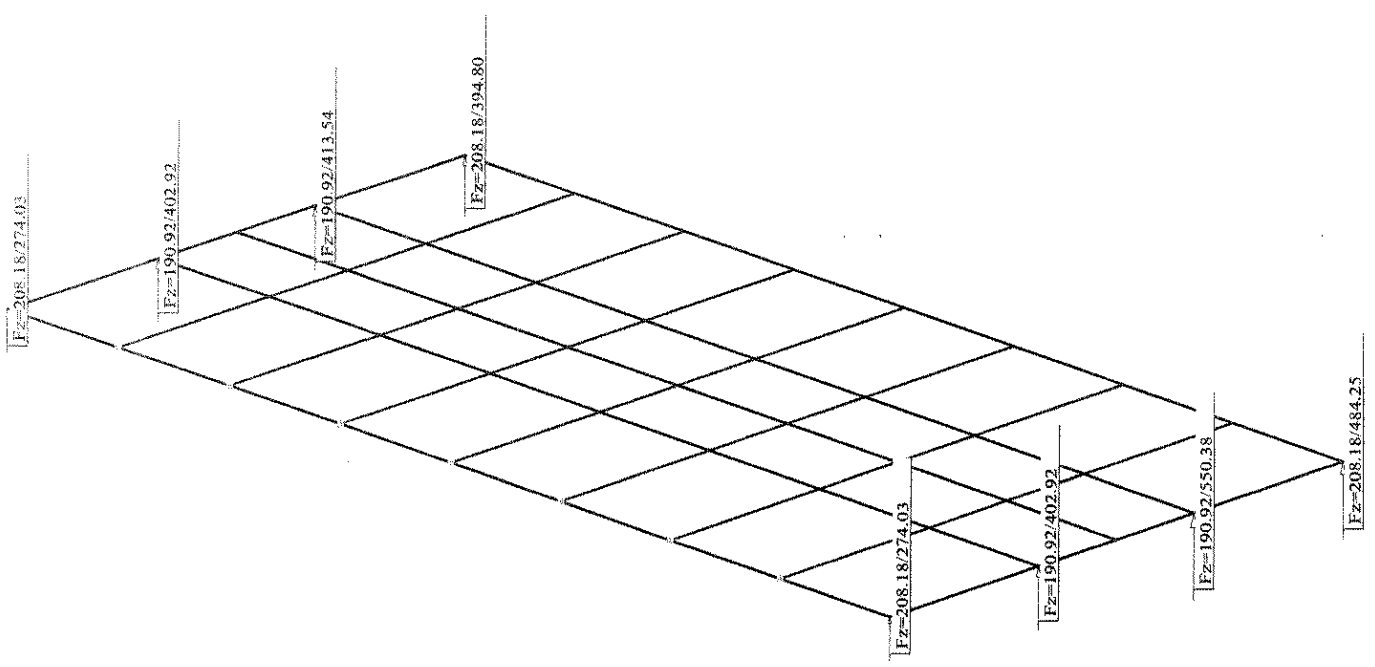
Filtrar	Nudo	Caso
Lista completa	1A15 21A35 41A	1A10
Selección	1A15 21A35 41A	8
Número total	45	10
Número seleccionado	45	1

- Casos: 9 10

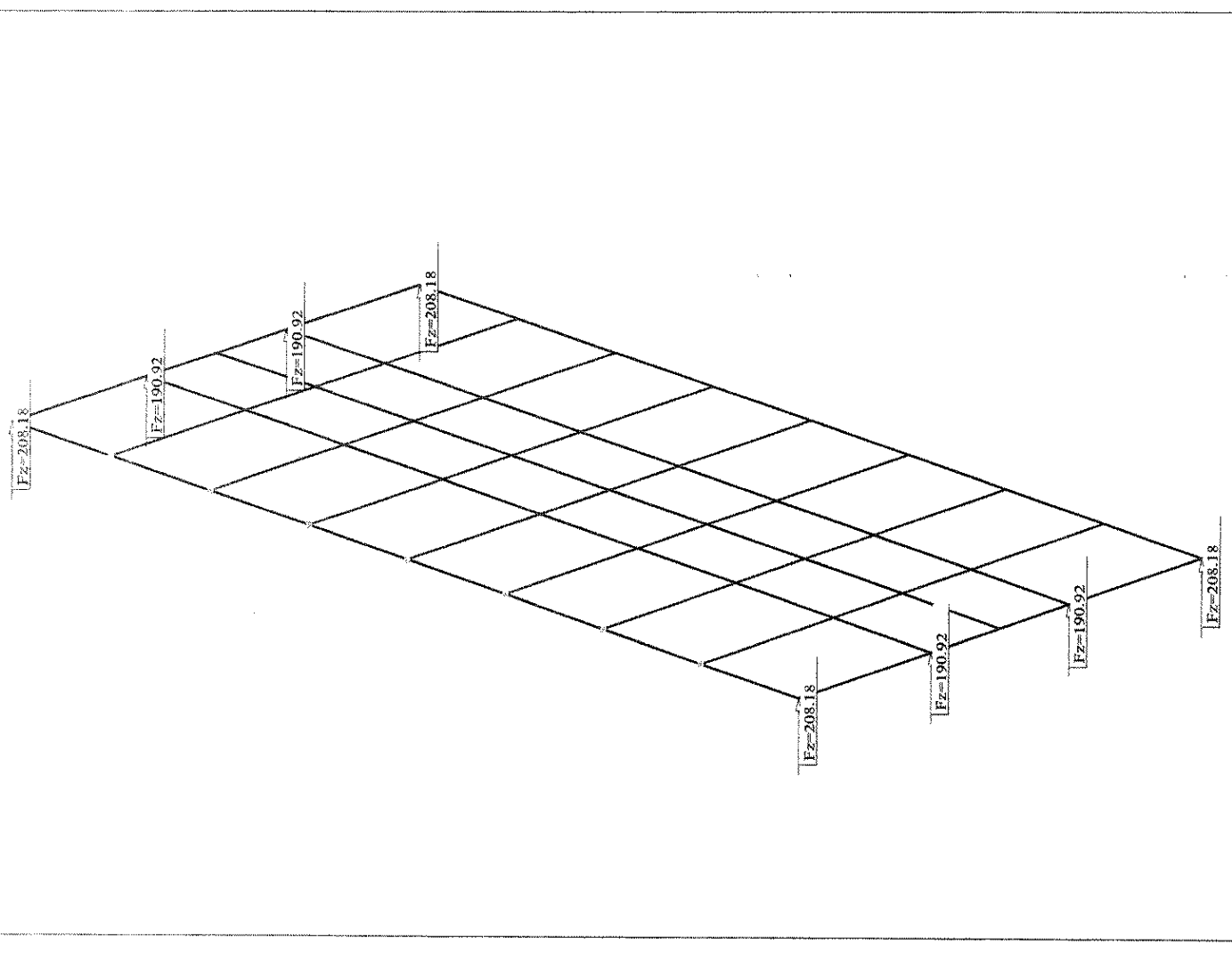
	UZ (mm)	RX (Rad)	RY (Rad)
MAX	0.0	0.001	0.002
Nudo	1	29	5
Caso	ELS/1	ELS/2	ELS/3
MIN	-8.23	-0.001	-0.002
Nudo	28	28	55
Caso	ELS/2	ELS/3	ELS/3

6. Reacciones

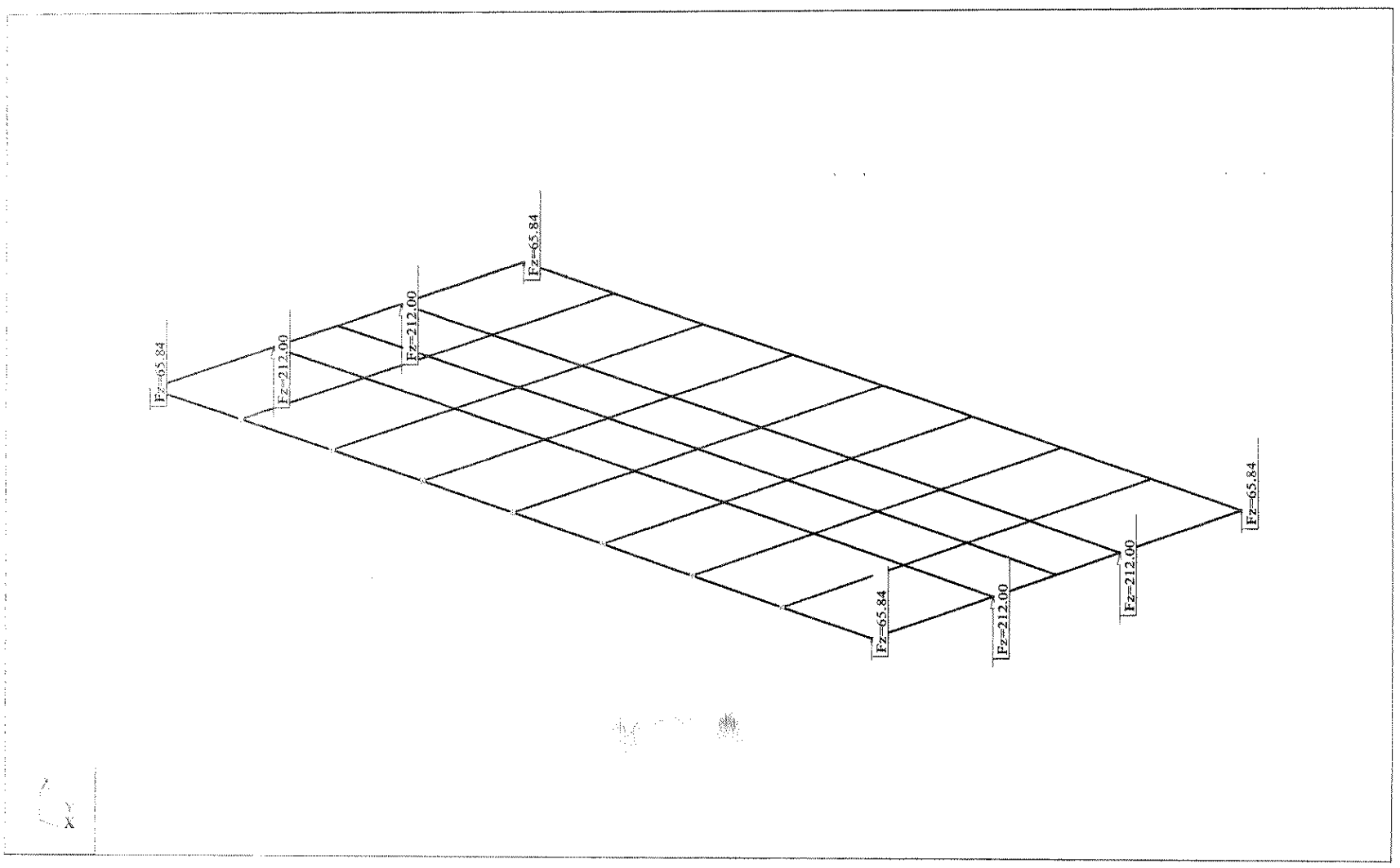
Vista - Fuerzas de reacción; casos: 9 (ELS+)



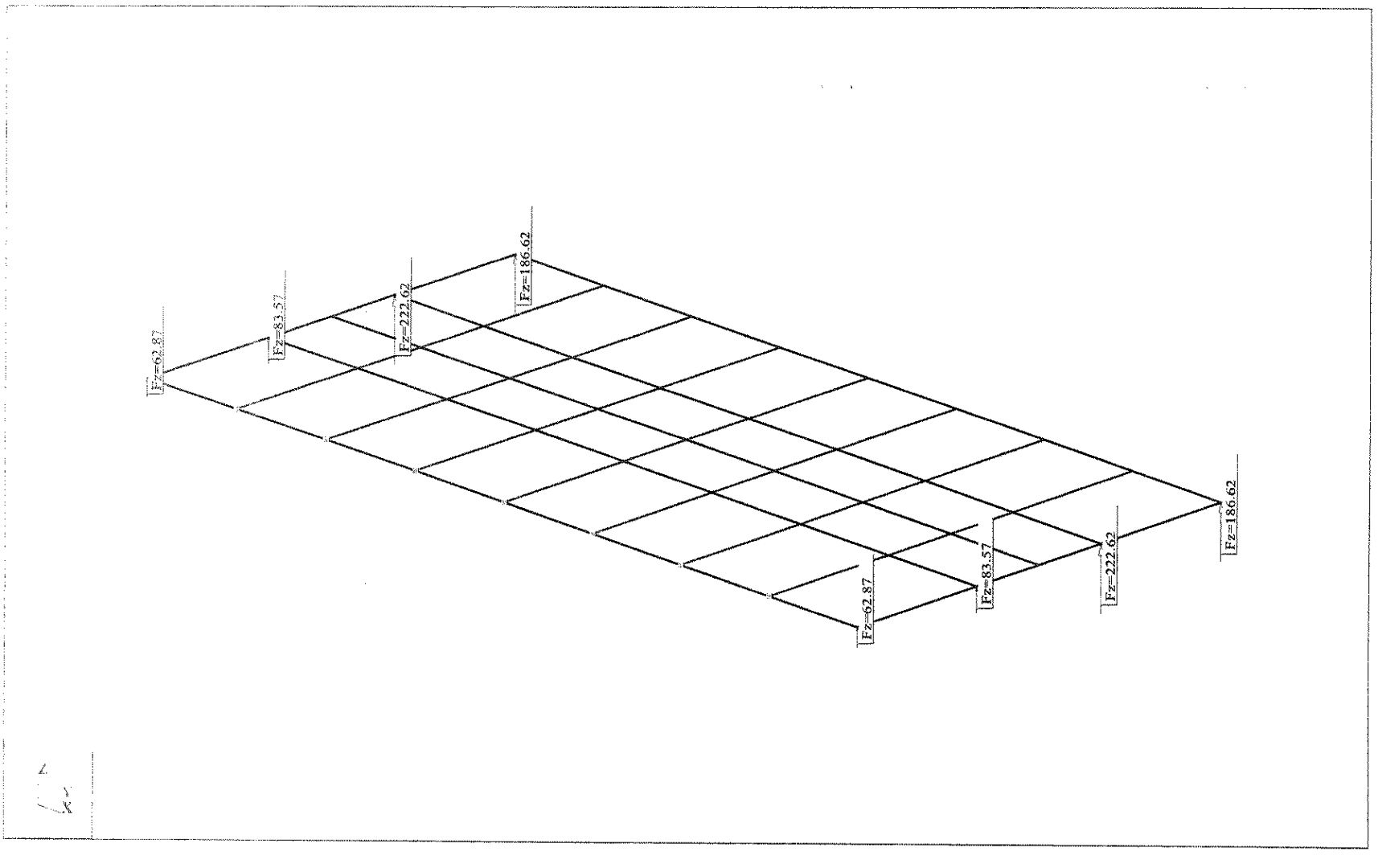
Vista - Fuerzas de reacción; casos: 1 (PP+CM) 1



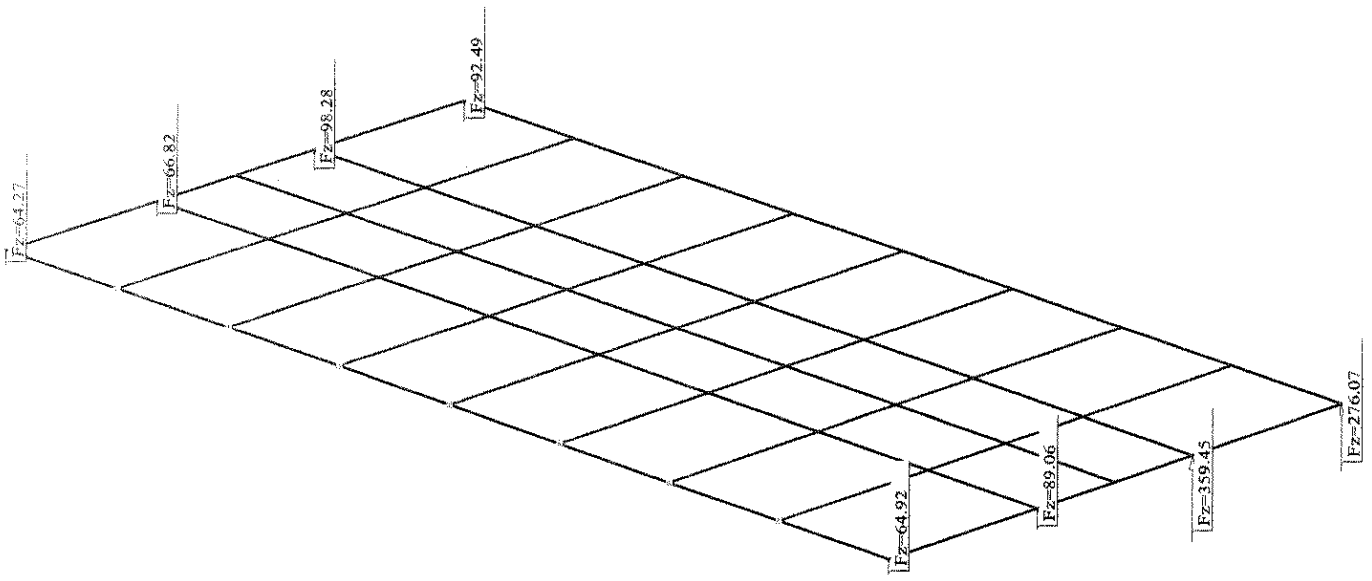
Vista - Fuerzas de reacción; casos: 2 (SC+Carro centrado en centro luz)



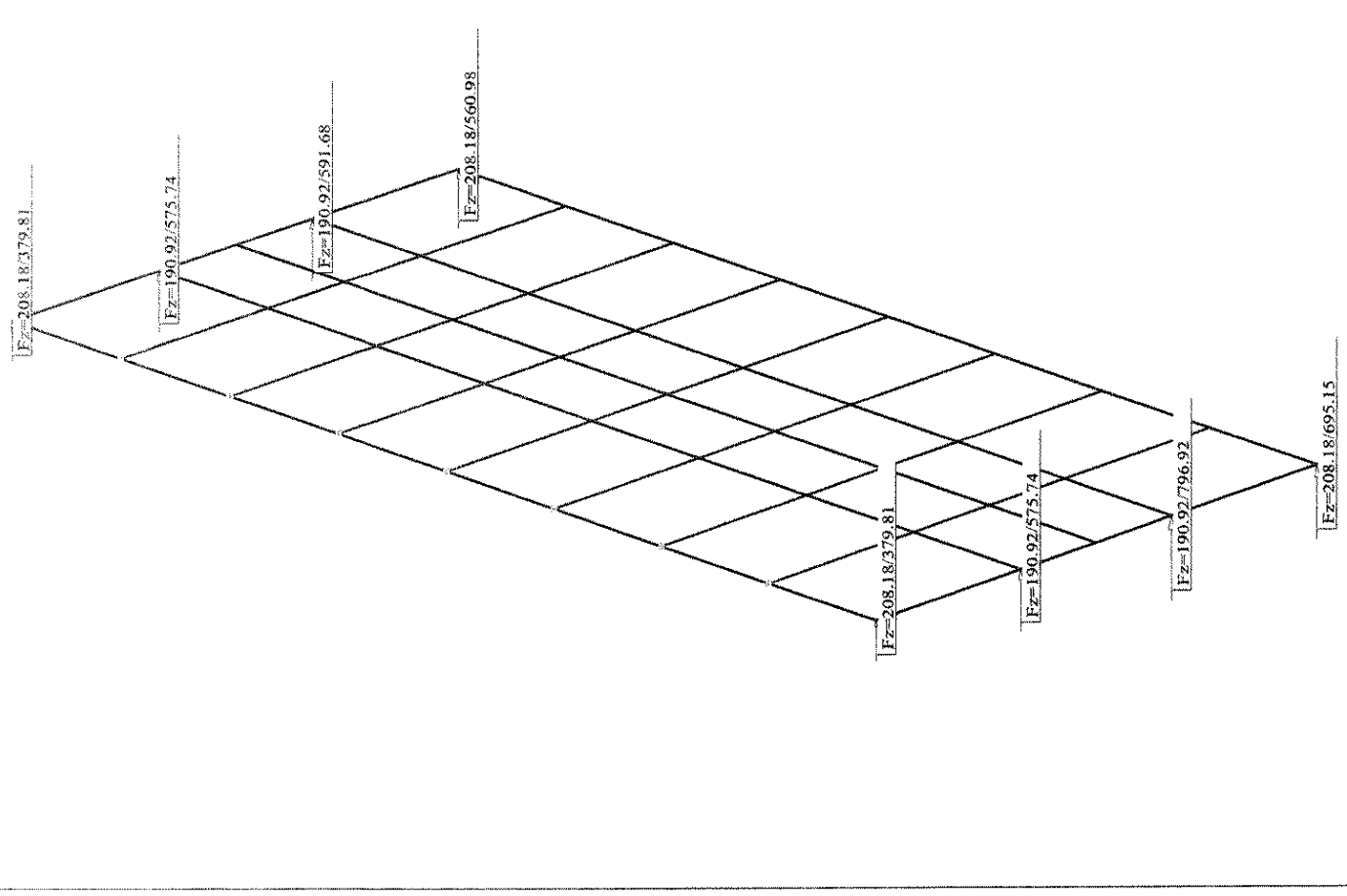
Vista - Fuerzas de reacción; casos: 3 (SC+Carro descentrado en centro luz)



Vista - Fuerzas de reacción; casos: 4 (SC+Carro descentrado en apoyos)



Vista - Fuerzas de reacción; casos: 6 (ELU+) 1



Reacciones sistema de coordenadas global - Casos: 1A4 6 7 9 10 : Valores: 1

sistema de coordenadas global - Casos: 1A4

Filtrar	Nudo	Caso
Lista completa	1A15 21A35 41A	1A10
Selección	1 2 4 5 51 52 54	1A4 6 7 9 10
Número total	45	10
Número seleccion	8	8

sistema de coordenadas global - Casos: 1A4 6 7 9 10

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
1/	1	208.18	0.00	-0.00
1/	2	65.84	-0.00	0.00
1/	3	62.87	0.00	-0.00
1/	4	64.27	-0.00	0.00
1/	ELU+	379.81	0.00	0.00
1/	ELU-	208.18	0.00	-0.00
1/	ELS+	274.03	0.00	0.00
1/	ELS-	208.18	0.00	-0.00
2/	1	190.92	0.00	0.00
2/	2	212.00	0.00	-0.00
2/	3	83.57	0.00	0.00
2/	4	66.82	-0.00	0.00
2/	ELU+	575.74	0.00	0.00
2/	ELU-	190.92	-0.00	-0.00
2/	ELS+	402.92	0.00	0.00
2/	ELS-	190.92	0.00	-0.00
4/	1	190.92	-0.00	-0.00
4/	2	212.00	0.00	-0.00
4/	3	222.62	-0.00	0.00
4/	4	98.28	-0.00	0.00
4/	ELU+	591.68	-0.00	0.00
4/	ELU-	190.92	-0.00	-0.00
4/	ELS+	413.54	-0.00	-0.00
4/	ELS-	190.92	-0.00	-0.00
5/	1	208.18	-0.00	-0.00
5/	2	65.84	0.00	-0.00
5/	3	186.62	0.00	-0.00
5/	4	92.49	0.00	-0.00
5/	ELU+	560.98	-0.00	-0.00
5/	ELU-	208.18	-0.00	-0.00
5/	ELS+	394.80	-0.00	-0.00
5/	ELS-	208.18	-0.00	-0.00
51/	1	208.18	-0.00	0.00
51/	2	65.84	-0.00	0.00
51/	3	62.87	-0.00	0.00
51/	4	64.92	-0.00	-0.00
51/	ELU+	379.81	-0.00	0.00
51/	ELU-	208.18	-0.00	0.00
51/	ELS+	274.03	-0.00	0.00
51/	ELS-	208.18	-0.00	0.00
52/	1	190.92	-0.00	0.00
52/	2	212.00	0.00	0.00
52/	3	83.57	-0.00	0.00
52/	4	89.06	-0.00	0.00
52/	ELU+	575.74	0.00	0.00
52/	ELU-	190.92	-0.00	0.00
52/	ELS+	402.92	0.00	0.00
52/	ELS-	190.92	-0.00	0.00
54/	1	190.92	0.00	0.00
54/	2	212.00	-0.00	-0.00
54/	3	222.62	0.00	0.00
54/	4	359.45	0.00	0.00

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
54/	ELU+	796.92	0.00	0.00
54/	ELU-	190.92	0.00	0.00
54/	ELS+	550.38	0.00	0.00
54/	ELS-	190.92	0.00	0.00
55/	1	208.18	-0.00	0.00
55/	2	65.84	0.00	0.00
55/	3	186.62	0.00	0.00
55/	4	276.07	-0.00	0.00
55/	ELU+	695.15	-0.00	0.00
55/	ELU-	208.18	-0.00	0.00
55/	ELS+	484.25	-0.00	0.00
55/	ELS-	208.18	-0.00	0.00
Caso 1		PP+CM		
Suma final		1596.41	-0.00	0.00
Suma de reaccion		1596.41	7183.86	-13569.52
Suma de esfuerzo		-1596.41	-7183.86	13569.52
Verificación		-0.00	-0.00	0.00
Precisión:		2.89332e-012	2.37291e-027	
Caso 2		SC+Carro centrado en centro luz		
Suma final		1111.36	0.00	-0.00
Suma de reaccion		1111.36	5001.12	-9446.56
Suma de esfuerzo		-1111.36	-5001.12	9446.56
Verificación		-0.00	-0.00	0.00
Precisión:		9.64245e-013	7.63208e-027	
Caso 3		SC+Carro descentrado en centro luz		
Suma final		1111.36	-0.00	0.00
Suma de reaccion		1111.36	6201.11	-9446.56
Suma de esfuerzo		-1111.36	-6201.11	9446.56
Verificación		-0.00	-0.00	0.00

Nudo/Caso		FZ (kN)	MX (kNm)	MY (kNm)
Precisión:		5.50950e-012	5.10363e-027	
Caso 4		SC+Carro descentrado en apoyos		
Suma final		1111.36	-0.00	0.00
Suma de reaccion		1111.36	6201.14	-12626.56
Suma de esfuerzo		-1111.36	-6201.14	12626.56
Verificación		-0.00	-0.00	0.00
Precisión:		3.84197e-012	1.40630e-027	
Caso ELU+		ELU+		
Suma final		4555.83	-0.00	0.00
Suma de reaccion		3263.45	16485.57	-32509.36
Suma de esfuerzo		-3263.45	-16485.57	32509.36
Verificación		-0.00	-0.00	0.00
Precisión:		8.65628e-012	4.48236e-027	
Caso ELU-		ELU-		
Suma final		1596.41	-0.00	0.00
Suma de reaccion		3263.45	16485.57	-32509.36
Suma de esfuerzo		-3263.45	-16485.57	32509.36
Verificación		-0.00	-0.00	0.00
Precisión:		8.65628e-012	4.48236e-027	
Caso ELS+		ELS+		
Suma final		3196.86	-0.00	0.00
Suma de reaccion		2152.09	10284.43	-19882.80
Suma de esfuerzo		-2152.09	-10284.43	19882.80
Verificación		-0.00	-0.00	0.00
Precisión:		4.81431e-012	3.07606e-027	
Caso ELS-		ELS-		
Suma final		1596.41	-0.00	0.00

Nudo/Caso	FZ (kN)	MX (kNm)	MY (kNm)
Suma de reaccion	2152.09	10284.43	-19882.80
Suma de esfuerzo	-2152.09	-10284.43	19882.80
Verificación	-0.00	-0.00	0.00
Precisión:	4.81431e-012	3.07606e-027	

Reacciones sistema de coordenadas global - Casos: 9 10 : Extremos globales: 1

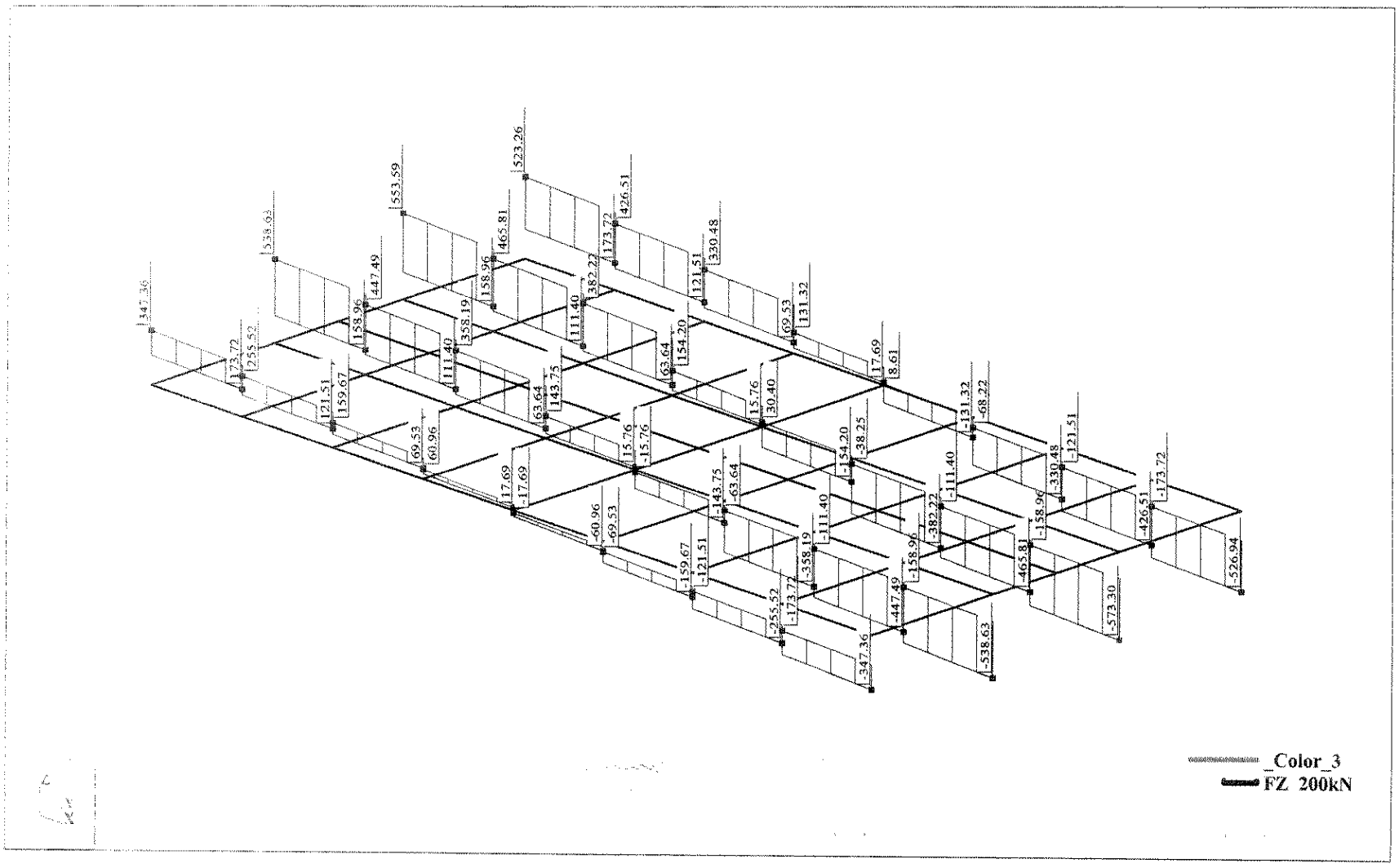
sistema de coordenadas global - Caso: 8 (ELS)

Filtrar	Nudo	Caso
Lista completa	1A15 21A35 41A	1A10
Selección	1 2 4 5 51 52 54	8
Número total	45	10
Número seleccionado	8	1

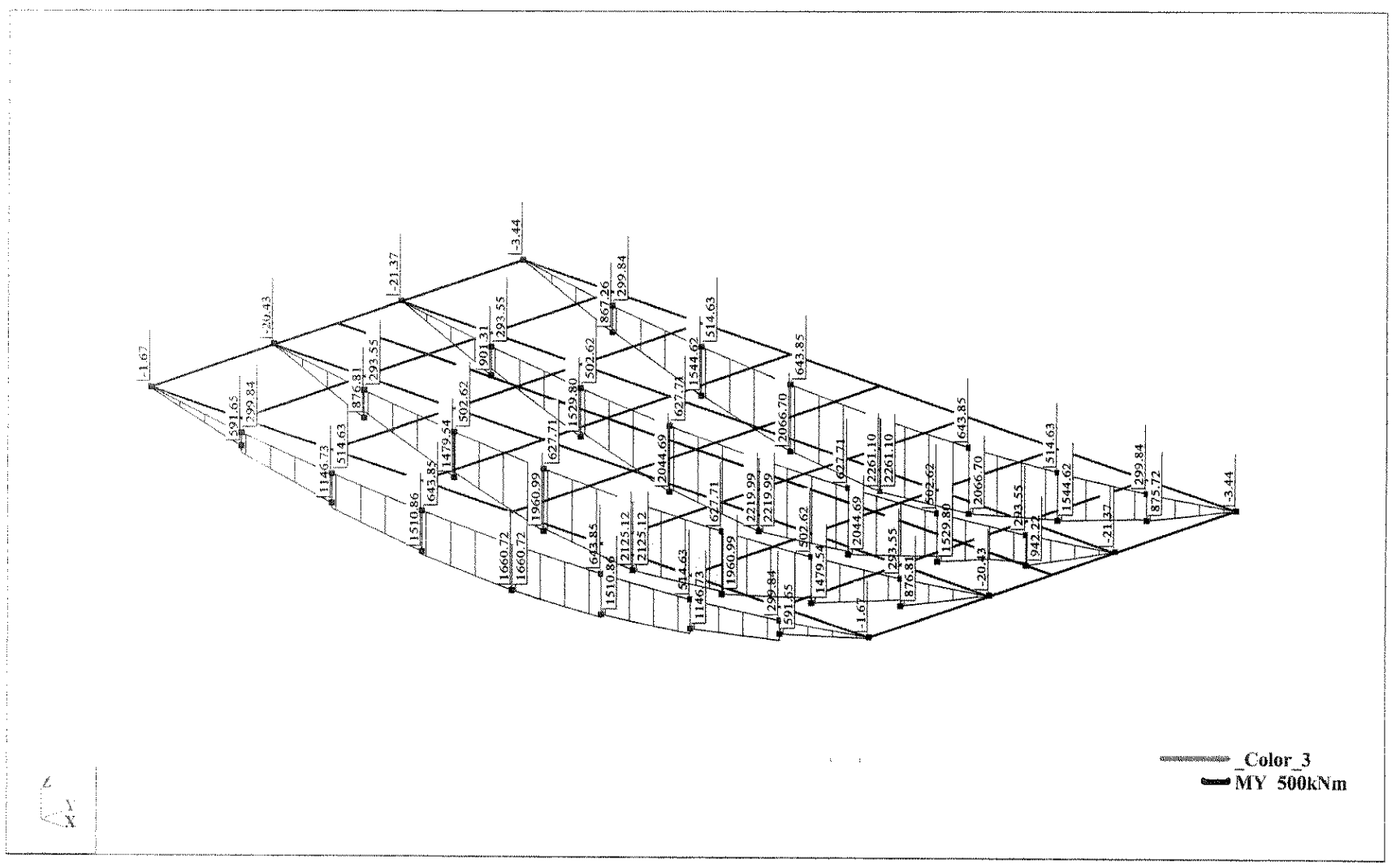
sistema de coordenadas global - Casos: 9 10

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	550.38	0.00	0.00
Nudo	54	52	55
Caso	ELS/4	ELS/2	ELS/3
MIN	190.92	-0.00	-0.00
Nudo	2	51	5
Caso	ELS/1	ELS/3	ELS/2

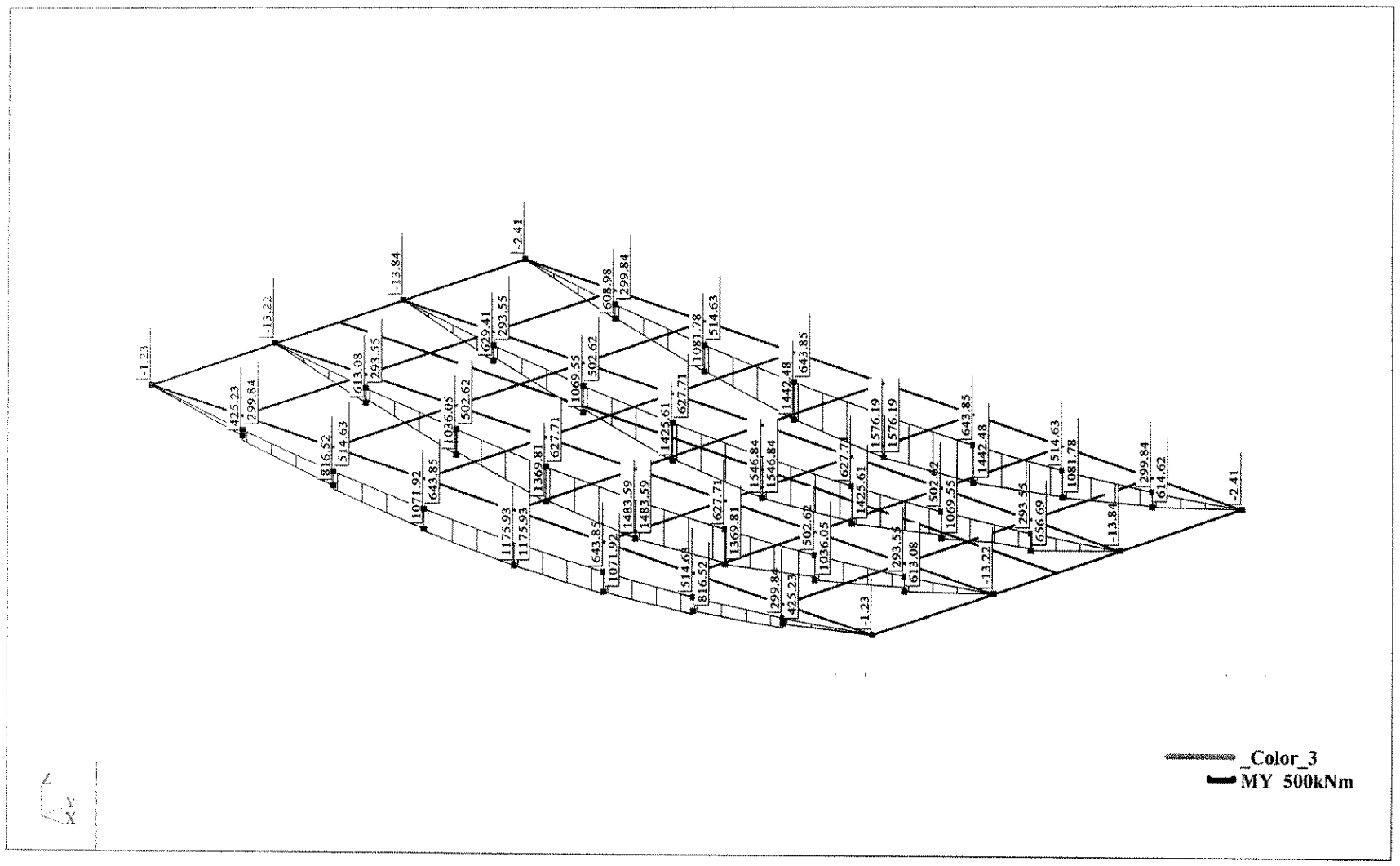
Vista - FZ; casos: 6 (ELU+) 1



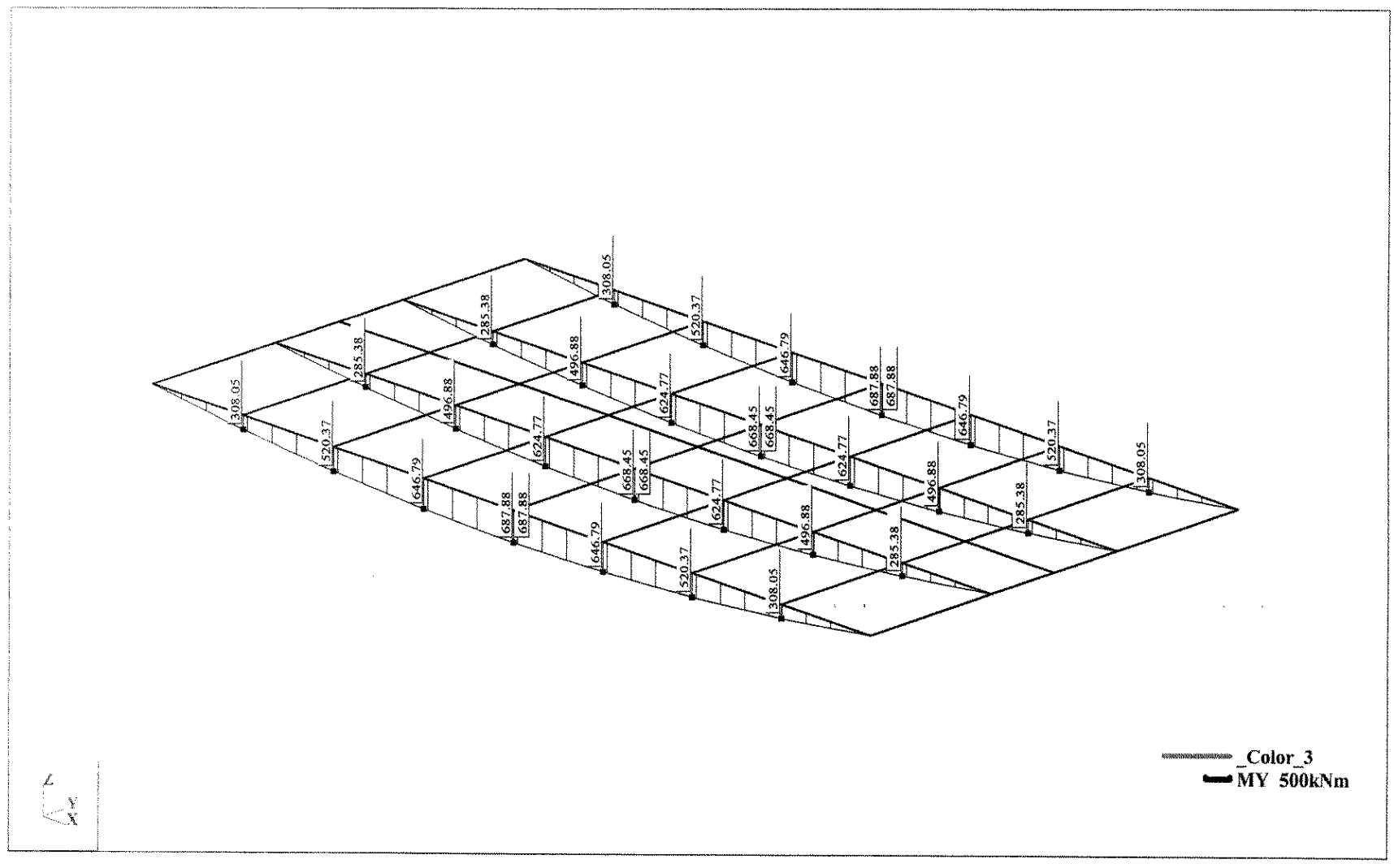
Vista - MY; casos: 6 (ELU+) 3



Vista - MY; casos: 9 (ELS+)



Vista - MY; casos: 1 (PP+CM) 1



Esfuerzos - Casos: 1A4 6 7 9 10 : Valores: 1

- Casos: 1A4 6 7 9 10

Filtrar	Barra	Caso
Lista completa	1 2 4A6 8A12 14	1A10
Selección	1 2 4A6 8A12 14	1A4 6 7 9 10
Número total	76	10
Número seleccionado	76	8

- Casos: 1A4 6 7 9 10

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
1/	1/	1	190.14	-0.26	-1.23
1/	1/	2	60.45	3.27	14.43
1/	1/	3	56.40	1.61	6.95
1/	1/	4	56.62	0.50	1.86
1/	1/	ELU+	347.36	4.64	20.41
1/	1/	ELU-	190.14	-0.35	-1.67
1/	1/	ELS+	250.59	3.01	13.19
1/	1/	ELS-	190.14	-0.26	-1.23
1/	6/	1	173.72	-0.26	308.05
1/	6/	2	60.45	3.27	117.19
1/	6/	3	56.40	1.61	102.84
1/	6/	4	56.62	0.50	98.12
1/	6/	ELU+	325.19	4.64	591.65
1/	6/	ELU-	173.72	-0.35	308.05
1/	6/	ELS+	234.17	3.01	425.23
1/	6/	ELS-	173.72	-0.26	308.05
2/	6/	1	137.93	-0.44	299.84
2/	6/	2	46.21	5.82	217.60
2/	6/	3	41.78	2.88	155.03
2/	6/	4	40.87	0.97	112.48

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
2/	6/	ELU+	255.52	8.29	731.19
2/	6/	ELU-	137.93	-0.60	299.84
2/	6/	ELS+	184.14	5.38	517.44
2/	6/	ELS-	137.93	-0.44	299.84
2/	11/	1	121.51	-0.44	520.37
2/	11/	2	46.21	5.82	296.15
2/	11/	3	41.78	2.88	226.06
2/	11/	4	40.87	0.97	181.96
2/	11/	ELU+	233.35	8.29	1146.73
2/	11/	ELU-	121.51	-0.60	520.37
2/	11/	ELS+	167.72	5.38	816.52
2/	11/	ELS-	121.51	-0.44	520.37
4/	11/	1	85.95	-0.37	514.63
4/	11/	2	29.09	5.07	375.68
4/	11/	3	25.73	2.49	267.07
4/	11/	4	24.71	0.97	194.32
4/	11/	ELU+	159.67	7.23	1258.26
4/	11/	ELU-	85.95	-0.50	514.63
4/	11/	ELS+	115.04	4.69	890.30
4/	11/	ELS-	85.95	-0.37	514.63
4/	21/	1	69.53	-0.37	646.79
4/	21/	2	29.09	5.07	425.13
4/	21/	3	25.73	2.49	310.81
4/	21/	4	24.71	0.97	236.32
4/	21/	ELU+	137.50	7.23	1510.86
4/	21/	ELU-	69.53	-0.50	646.79
4/	21/	ELS+	98.62	4.69	1071.92
4/	21/	ELS-	69.53	-0.37	646.79
5/	21/	1	34.11	-0.14	643.85
5/	21/	2	9.94	1.98	471.15
5/	21/	3	8.69	0.96	333.65
5/	21/	4	8.24	0.61	245.17

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
5/	21/	ELU+	60.96	2.82	1575.92
5/	21/	ELU-	34.11	-0.19	643.85
5/	21/	ELS+	44.05	1.83	1115.00
5/	21/	ELS-	34.11	-0.14	643.85
5/	26/	1	17.69	-0.14	687.88
5/	26/	2	9.94	1.98	488.05
5/	26/	3	8.69	0.96	348.43
5/	26/	4	8.24	0.61	259.18
5/	26/	ELU+	38.79	2.82	1660.72
5/	26/	ELU-	17.69	-0.19	687.88
5/	26/	ELS+	27.63	1.83	1175.93
5/	26/	ELS-	17.69	-0.14	687.88
6/	26/	1	-17.69	0.14	687.88
6/	26/	2	-9.94	-1.98	488.05
6/	26/	3	-8.69	-0.96	348.43
6/	26/	4	-8.42	0.03	262.85
6/	26/	ELU+	-17.69	0.23	1660.72
6/	26/	ELU-	-38.79	-2.82	687.88
6/	26/	ELS+	-17.69	0.17	1175.93
6/	26/	ELS-	-27.63	-1.83	687.88
6/	31/	1	-34.11	0.14	643.85
6/	31/	2	-9.94	-1.98	471.15
6/	31/	3	-8.69	-0.96	333.65
6/	31/	4	-8.42	0.03	248.54
6/	31/	ELU+	-34.11	0.23	1575.92
6/	31/	ELU-	-60.96	-2.82	643.85
6/	31/	ELS+	-34.11	0.17	1115.00
6/	31/	ELS-	-44.05	-1.83	643.85
8/	31/	1	-69.53	0.37	646.79
8/	31/	2	-29.09	-5.07	425.13
8/	31/	3	-25.73	-2.49	310.81
8/	31/	4	-25.06	-0.54	245.21

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
8/	31/	ELU+	-69.53	0.50	1510.86
8/	31/	ELU-	-137.50	-7.23	646.79
8/	31/	ELS+	-69.53	0.37	1071.92
8/	31/	ELS-	-98.62	-4.69	646.79
8/	41/	1	-85.95	0.37	514.63
8/	41/	2	-29.09	-5.07	375.68
8/	41/	3	-25.73	-2.49	267.07
8/	41/	4	-25.06	-0.54	202.61
8/	41/	ELU+	-85.95	0.50	1258.26
8/	41/	ELU-	-159.67	-7.23	514.63
8/	41/	ELS+	-85.95	0.37	890.30
8/	41/	ELS-	-115.04	-4.69	514.63
9/	41/	1	-121.51	0.44	520.37
9/	41/	2	-46.21	-5.82	296.15
9/	41/	3	-41.78	-2.88	226.06
9/	41/	4	-41.44	-0.83	190.67
9/	41/	ELU+	-121.51	0.60	1146.73
9/	41/	ELU-	-233.35	-8.29	520.37
9/	41/	ELS+	-121.51	0.44	816.52
9/	41/	ELS-	-167.72	-5.38	520.37
9/	46/	1	-137.93	0.44	299.84
9/	46/	2	-46.21	-5.82	217.60
9/	46/	3	-41.78	-2.88	155.03
9/	46/	4	-41.44	-0.83	120.21
9/	46/	ELU+	-137.93	0.60	731.19
9/	46/	ELU-	-255.52	-8.29	299.84
9/	46/	ELS+	-137.93	0.44	517.44
9/	46/	ELS-	-184.14	-5.38	299.84
10/	46/	1	-173.72	0.26	308.05
10/	46/	2	-60.45	-3.27	117.19
10/	46/	3	-56.40	-1.61	102.84
10/	46/	4	-57.32	-0.54	100.28

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
10/	46/	ELU+	-173.72	0.35	591.65
10/	46/	ELU-	-325.19	-4.64	308.05
10/	46/	ELS+	-173.72	0.26	425.23
10/	46/	ELS-	-234.17	-3.01	308.05
10/	51/	1	-190.14	0.26	-1.23
10/	51/	2	-60.45	-3.27	14.43
10/	51/	3	-56.40	-1.61	6.95
10/	51/	4	-57.32	-0.54	2.83
10/	51/	ELU+	-190.14	0.35	20.41
10/	51/	ELU-	-347.36	-4.64	-1.67
10/	51/	ELS+	-190.14	0.26	13.19
10/	51/	ELS-	-250.59	-3.01	-1.23
11/	2/	1	175.38	-0.32	1.20
11/	2/	2	201.25	5.02	-14.42
11/	2/	3	78.16	6.83	9.25
11/	2/	4	59.76	2.84	2.51
11/	2/	ELU+	538.63	9.92	15.50
11/	2/	ELU-	175.38	-0.44	-20.43
11/	2/	ELS+	376.62	6.51	10.45
11/	2/	ELS-	175.38	-0.32	-13.22
11/	7/	1	158.96	-0.32	285.38
11/	7/	2	201.25	5.02	327.70
11/	7/	3	78.16	6.83	142.13
11/	7/	4	59.76	2.84	104.10
11/	7/	ELU+	516.46	9.92	876.81
11/	7/	ELU-	158.96	-0.44	285.38
11/	7/	ELS+	360.20	6.51	613.08
11/	7/	ELS-	158.96	-0.32	285.38
12/	7/	1	127.82	-0.50	293.55
12/	7/	2	183.29	11.16	227.57
12/	7/	3	61.85	12.84	205.72
12/	7/	4	44.23	6.50	121.77

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
12/	7/	ELU+	447.49	18.75	737.65
12/	7/	ELU-	127.82	-0.68	293.55
12/	7/	ELS+	311.11	12.33	521.12
12/	7/	ELS-	127.82	-0.50	293.55
12/	12/	1	111.40	-0.50	496.88
12/	12/	2	183.29	11.16	539.17
12/	12/	3	61.85	12.84	310.87
12/	12/	4	44.23	6.50	196.97
12/	12/	ELU+	425.32	18.75	1479.54
12/	12/	ELU-	111.40	-0.68	496.88
12/	12/	ELS+	294.69	12.33	1036.05
12/	12/	ELS-	111.40	-0.50	496.88
14/	12/	1	80.07	-0.41	502.62
14/	12/	2	166.73	13.12	461.59
14/	12/	3	42.27	12.74	363.03
14/	12/	4	28.04	8.59	212.72
14/	12/	ELU+	358.19	19.27	1370.92
14/	12/	ELU-	80.07	-0.55	502.62
14/	12/	ELS+	246.80	12.71	964.21
14/	12/	ELS-	80.07	-0.41	502.62
14/	22/	1	63.64	-0.41	624.77
14/	22/	2	166.73	13.12	745.03
14/	22/	3	42.27	12.74	434.89
14/	22/	4	28.04	8.59	260.39
14/	22/	ELU+	336.02	19.27	1960.99
14/	22/	ELU-	63.64	-0.55	624.77
14/	22/	ELS+	230.38	12.71	1369.81
14/	22/	ELS-	63.64	-0.41	624.77
15/	22/	1	32.18	-0.15	627.71
15/	22/	2	66.87	5.70	701.46
15/	22/	3	15.16	5.24	466.47
15/	22/	4	11.33	9.40	273.92

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
15/	22/	ELU+	143.75	13.94	1899.59
15/	22/	ELU-	32.18	-0.21	627.71
15/	22/	ELS+	99.05	9.24	1329.17
15/	22/	ELS-	32.18	-0.15	627.71
15/	27/	1	15.76	-0.15	668.45
15/	27/	2	66.87	5.70	815.14
15/	27/	3	15.16	5.24	492.25
15/	27/	4	11.33	9.40	293.18
15/	27/	ELU+	121.58	13.94	2125.12
15/	27/	ELU-	15.76	-0.21	668.45
15/	27/	ELS+	82.63	9.24	1483.59
15/	27/	ELS-	15.76	-0.15	668.45
16/	27/	1	-15.76	0.15	668.45
16/	27/	2	-66.87	-5.70	815.14
16/	27/	3	-15.16	-5.24	492.25
16/	27/	4	-5.92	9.30	303.16
16/	27/	ELU+	-15.76	14.15	2125.12
16/	27/	ELU-	-121.58	-8.40	668.45
16/	27/	ELS+	-15.76	9.45	1483.59
16/	27/	ELS-	-82.63	-5.55	668.45
16/	32/	1	-32.18	0.15	627.71
16/	32/	2	-66.87	-5.70	701.46
16/	32/	3	-15.16	-5.24	466.47
16/	32/	4	-5.92	9.30	293.09
16/	32/	ELU+	-32.18	14.15	1899.59
16/	32/	ELU-	-143.75	-8.40	627.71
16/	32/	ELS+	-32.18	9.45	1329.17
16/	32/	ELS-	-99.05	-5.55	627.71
18/	32/	1	-63.64	0.41	624.77
18/	32/	2	-166.73	-13.12	745.03
18/	32/	3	-42.27	-12.74	434.89
18/	32/	4	-24.22	8.52	296.62

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
18/	32/	ELU+	-63.64	13.32	1960.99
18/	32/	ELU-	-336.02	-19.27	624.77
18/	32/	ELS+	-63.64	8.92	1369.81
18/	32/	ELS-	-230.38	-12.71	624.77
18/	42/	1	-80.07	0.41	502.62
18/	42/	2	-166.73	-13.12	461.59
18/	42/	3	-42.27	-12.74	363.03
18/	42/	4	-24.22	8.52	255.45
18/	42/	ELU+	-80.07	13.32	1370.92
18/	42/	ELU-	-358.19	-19.27	502.62
18/	42/	ELS+	-80.07	8.92	964.21
18/	42/	ELS-	-246.80	-12.71	502.62
19/	42/	1	-111.40	0.50	496.88
19/	42/	2	-183.29	-11.16	539.17
19/	42/	3	-61.85	-12.84	310.87
19/	42/	4	-47.82	5.23	244.49
19/	42/	ELU+	-111.40	8.52	1479.54
19/	42/	ELU-	-425.32	-18.75	496.88
19/	42/	ELS+	-111.40	5.73	1036.05
19/	42/	ELS-	-294.69	-12.33	496.88
19/	47/	1	-127.82	0.50	293.55
19/	47/	2	-183.29	-11.16	227.57
19/	47/	3	-61.85	-12.84	205.72
19/	47/	4	-47.82	5.23	163.19
19/	47/	ELU+	-127.82	8.52	737.65
19/	47/	ELU-	-447.49	-18.75	293.55
19/	47/	ELS+	-127.82	5.73	521.12
19/	47/	ELS-	-311.11	-12.33	293.55
20/	47/	1	-158.96	0.32	285.38
20/	47/	2	-201.25	-5.02	327.70
20/	47/	3	-78.16	-6.83	142.13
20/	47/	4	-74.11	1.83	131.13

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
20/	47/	ELU+	-158.96	3.19	876.81
20/	47/	ELU-	-516.46	-9.92	285.38
20/	47/	ELS+	-158.96	2.16	613.08
20/	47/	ELS-	-360.20	-6.51	285.38
20/	52/	1	-175.38	0.32	1.20
20/	52/	2	-201.25	-5.02	-14.42
20/	52/	3	-78.16	-6.83	9.25
20/	52/	4	-74.11	1.83	5.15
20/	52/	ELU+	-175.38	3.19	15.50
20/	52/	ELU-	-538.63	-9.92	-20.43
20/	52/	ELS+	-175.38	2.16	10.45
20/	52/	ELS-	-376.62	-6.51	-13.22
21/	4/	1	175.38	0.32	1.20
21/	4/	2	201.25	-5.02	-14.42
21/	4/	3	211.22	3.79	-15.05
21/	4/	4	89.40	0.71	-3.71
21/	4/	ELU+	553.59	6.12	1.62
21/	4/	ELU-	175.38	-7.21	-21.37
21/	4/	ELS+	386.60	4.11	1.20
21/	4/	ELS-	175.38	-4.70	-13.84
21/	9/	1	158.96	0.32	285.38
21/	9/	2	201.25	-5.02	327.70
21/	9/	3	211.22	3.79	344.03
21/	9/	4	89.40	0.71	148.27
21/	9/	ELU+	531.42	6.12	901.31
21/	9/	ELU-	158.96	-7.21	285.38
21/	9/	ELS+	370.18	4.11	629.41
21/	9/	ELS-	158.96	-4.70	285.38
22/	9/	1	127.82	0.50	293.55
22/	9/	2	183.29	-11.16	227.57
22/	9/	3	195.51	5.18	240.31
22/	9/	4	73.52	0.30	121.89

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
22/	9/	ELU+	465.81	8.45	756.76
22/	9/	ELU-	127.82	-16.24	293.55
22/	9/	ELS+	323.33	5.69	533.86
22/	9/	ELS-	127.82	-10.66	293.55
22/	14/	1	111.40	0.50	496.88
22/	14/	2	183.29	-11.16	539.17
22/	14/	3	195.51	5.18	572.67
22/	14/	4	73.52	0.30	246.89
22/	14/	ELU+	443.64	8.45	1529.80
22/	14/	ELU-	111.40	-16.24	496.88
22/	14/	ELS+	306.90	5.69	1069.55
22/	14/	ELS-	111.40	-10.66	496.88
24/	14/	1	80.07	0.41	502.62
24/	14/	2	166.73	-13.12	461.59
24/	14/	3	182.75	2.67	490.16
24/	14/	4	58.60	-1.42	222.97
24/	14/	ELU+	382.22	4.55	1413.77
24/	14/	ELU-	80.07	-19.27	502.62
24/	14/	ELS+	262.82	3.07	992.78
24/	14/	ELS-	80.07	-12.71	502.62
24/	24/	1	63.64	0.41	624.77
24/	24/	2	166.73	-13.12	745.03
24/	24/	3	182.75	2.67	800.83
24/	24/	4	58.60	-1.42	322.58
24/	24/	ELU+	360.05	4.55	2044.69
24/	24/	ELU-	63.64	-19.27	624.77
24/	24/	ELS+	246.40	3.07	1425.61
24/	24/	ELS-	63.64	-12.71	624.77
25/	24/	1	32.18	0.15	627.71
25/	24/	2	66.87	-5.70	701.46
25/	24/	3	73.84	0.73	752.86
25/	24/	4	44.40	-4.14	301.62

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
25/	24/	ELU+	154.20	1.30	1976.69
25/	24/	ELU-	32.18	-8.40	627.71
25/	24/	ELS+	106.02	0.88	1380.56
25/	24/	ELS-	32.18	-5.55	627.71
25/	29/	1	15.76	0.15	668.45
25/	29/	2	66.87	-5.70	815.14
25/	29/	3	73.84	0.73	878.39
25/	29/	4	44.40	-4.14	377.10
25/	29/	ELU+	132.04	1.30	2219.99
25/	29/	ELU-	15.76	-8.40	668.45
25/	29/	ELS+	89.60	0.88	1546.84
25/	29/	ELS-	15.76	-5.55	668.45
26/	29/	1	-15.76	-0.15	668.45
26/	29/	2	-66.87	5.70	815.14
26/	29/	3	-73.84	-0.73	878.39
26/	29/	4	30.77	-7.50	361.61
26/	29/	ELU+	30.40	8.40	2219.99
26/	29/	ELU-	-132.04	-11.46	668.45
26/	29/	ELS+	15.01	5.55	1546.84
26/	29/	ELS-	-89.60	-7.66	668.45
26/	34/	1	-32.18	-0.15	627.71
26/	34/	2	-66.87	5.70	701.46
26/	34/	3	-73.84	-0.73	752.86
26/	34/	4	30.77	-7.50	413.92
26/	34/	ELU+	13.98	8.40	1976.69
26/	34/	ELU-	-154.20	-11.46	627.71
26/	34/	ELS+	-1.41	5.55	1380.56
26/	34/	ELS-	-106.02	-7.66	627.71
28/	34/	1	-63.64	-0.41	624.77
28/	34/	2	-166.73	13.12	745.03
28/	34/	3	-182.75	-2.67	800.83
28/	34/	4	16.93	-10.65	410.31

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
28/	34/	ELU+	-38.25	19.27	2044.69
28/	34/	ELU-	-360.05	-16.53	624.77
28/	34/	ELS+	-46.72	12.71	1425.61
28/	34/	ELS-	-246.40	-11.06	624.77
28/	44/	1	-80.07	-0.41	502.62
28/	44/	2	-166.73	13.12	461.59
28/	44/	3	-182.75	-2.67	490.16
28/	44/	4	16.93	-10.65	439.08
28/	44/	ELU+	-54.68	19.27	1413.77
28/	44/	ELU-	-382.22	-16.53	502.62
28/	44/	ELS+	-63.14	12.71	992.78
28/	44/	ELS-	-262.82	-11.06	502.62
29/	44/	1	-111.40	-0.50	496.88
29/	44/	2	-183.29	11.16	539.17
29/	44/	3	-195.51	-5.18	572.67
29/	44/	4	-82.61	-10.13	459.03
29/	44/	ELU+	-111.40	16.24	1529.80
29/	44/	ELU-	-443.64	-15.87	496.88
29/	44/	ELS+	-111.40	10.66	1069.55
29/	44/	ELS-	-306.90	-10.63	496.88
29/	49/	1	-127.82	-0.50	293.55
29/	49/	2	-183.29	11.16	227.57
29/	49/	3	-195.51	-5.18	240.31
29/	49/	4	-82.61	-10.13	318.59
29/	49/	ELU+	-127.82	16.24	874.17
29/	49/	ELU-	-465.81	-15.87	293.55
29/	49/	ELS+	-127.82	10.66	612.13
29/	49/	ELS-	-323.33	-10.63	293.55
30/	49/	1	-158.96	-0.32	285.38
30/	49/	2	-201.25	5.02	327.70
30/	49/	3	-211.22	-3.79	344.03
30/	49/	4	-224.36	-5.78	371.30

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
30/	49/	ELU+	-158.96	7.21	942.22
30/	49/	ELU-	-551.13	-9.11	285.38
30/	49/	ELS+	-158.96	4.70	656.69
30/	49/	ELS-	-383.31	-6.11	285.38
30/	54/	1	-175.38	-0.32	1.20
30/	54/	2	-201.25	5.02	-14.42
30/	54/	3	-211.22	-3.79	-15.05
30/	54/	4	-224.36	-5.78	-10.11
30/	54/	ELU+	-175.38	7.21	1.62
30/	54/	ELU-	-573.30	-9.11	-21.37
30/	54/	ELS+	-175.38	4.70	1.20
30/	54/	ELS-	-399.74	-6.11	-13.84
31/	5/	1	190.14	0.26	-1.23
31/	5/	2	60.45	-3.27	14.43
31/	5/	3	177.71	0.29	-1.18
31/	5/	4	84.02	0.12	-0.68
31/	5/	ELU+	523.26	0.79	20.41
31/	5/	ELU-	190.14	-4.64	-3.44
31/	5/	ELS+	367.85	0.55	13.19
31/	5/	ELS-	190.14	-3.01	-2.41
31/	10/	1	173.72	0.26	308.05
31/	10/	2	60.45	-3.27	117.19
31/	10/	3	177.71	0.29	300.93
31/	10/	4	84.02	0.12	142.15
31/	10/	ELU+	501.09	0.79	867.26
31/	10/	ELU-	173.72	-4.64	308.05
31/	10/	ELS+	351.43	0.55	608.98
31/	10/	ELS-	173.72	-3.01	308.05
32/	10/	1	137.93	0.44	299.84
32/	10/	2	46.21	-5.82	217.60
32/	10/	3	160.20	0.54	289.08
32/	10/	4	67.24	0.17	136.46

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
32/	10/	ELU+	426.51	1.40	838.40
32/	10/	ELU-	137.93	-8.29	299.84
32/	10/	ELS+	298.13	0.98	588.92
32/	10/	ELS-	137.93	-5.38	299.84
32/	15/	1	121.51	0.44	520.37
32/	15/	2	46.21	-5.82	296.15
32/	15/	3	160.20	0.54	561.41
32/	15/	4	67.24	0.17	250.78
32/	15/	ELU+	404.34	1.40	1544.62
32/	15/	ELU-	121.51	-8.29	520.37
32/	15/	ELS+	281.71	0.98	1081.78
32/	15/	ELS-	121.51	-5.38	520.37
34/	15/	1	85.95	0.37	514.63
34/	15/	2	29.09	-5.07	375.68
34/	15/	3	142.97	0.45	552.65
34/	15/	4	50.62	0.05	246.62
34/	15/	ELU+	330.48	1.17	1523.72
34/	15/	ELU-	85.95	-7.23	514.63
34/	15/	ELS+	228.92	0.82	1067.28
34/	15/	ELS-	85.95	-4.69	514.63
34/	25/	1	69.53	0.37	646.79
34/	25/	2	29.09	-5.07	425.13
34/	25/	3	142.97	0.45	795.69
34/	25/	4	50.62	0.05	332.67
34/	25/	ELU+	308.32	1.17	2066.70
34/	25/	ELU-	69.53	-7.23	646.79
34/	25/	ELS+	212.50	0.82	1442.48
34/	25/	ELS-	69.53	-4.69	646.79
35/	25/	1	34.11	0.14	643.85
35/	25/	2	9.94	-1.98	471.15
35/	25/	3	56.85	0.17	791.67
35/	25/	4	34.08	-0.16	331.30

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
35/	25/	ELU+	131.32	0.44	2056.70
35/	25/	ELU-	34.11	-2.82	643.85
35/	25/	ELS+	90.96	0.31	1435.52
35/	25/	ELS-	34.11	-1.83	643.85
35/	30/	1	17.69	0.14	687.88
35/	30/	2	9.94	-1.98	488.05
35/	30/	3	56.85	0.17	888.31
35/	30/	4	34.08	-0.16	389.24
35/	30/	ELU+	109.15	0.44	2261.10
35/	30/	ELU-	17.69	-2.82	687.88
35/	30/	ELS+	74.54	0.31	1576.19
35/	30/	ELS-	17.69	-1.83	687.88
36/	30/	1	-17.69	-0.14	687.88
36/	30/	2	-9.94	1.98	488.05
36/	30/	3	-56.85	-0.17	888.31
36/	30/	4	17.53	-0.37	391.31
36/	30/	ELU+	8.61	2.82	2261.10
36/	30/	ELU-	-109.15	-0.74	687.88
36/	30/	ELS+	-0.16	1.83	1576.19
36/	30/	ELS-	-74.54	-0.51	687.88
36/	35/	1	-34.11	-0.14	643.85
36/	35/	2	-9.94	1.98	471.15
36/	35/	3	-56.85	-0.17	791.67
36/	35/	4	17.53	-0.37	421.11
36/	35/	ELU+	-7.81	2.82	2056.70
36/	35/	ELU-	-131.32	-0.74	643.85
36/	35/	ELS+	-16.58	1.83	1435.52
36/	35/	ELS-	-90.96	-0.51	643.85
38/	35/	1	-69.53	-0.37	646.79
38/	35/	2	-29.09	5.07	425.13
38/	35/	3	-142.97	-0.45	795.69
38/	35/	4	0.87	-0.44	426.24

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
38/	35/	ELU+	-68.22	7.23	2066.70
38/	35/	ELU-	-308.32	-1.17	646.79
38/	35/	ELS+	-68.66	4.69	1442.48
38/	35/	ELS-	-212.50	-0.82	646.79
38/	45/	1	-85.95	-0.37	514.63
38/	45/	2	-29.09	5.07	375.68
38/	45/	3	-142.97	-0.45	552.65
38/	45/	4	0.87	-0.44	427.72
38/	45/	ELU+	-84.64	7.23	1523.72
38/	45/	ELU-	-330.48	-1.17	514.63
38/	45/	ELS+	-85.08	4.69	1067.28
38/	45/	ELS-	-228.92	-0.82	514.63
39/	45/	1	-121.51	-0.44	520.37
39/	45/	2	-46.21	5.82	296.15
39/	45/	3	-160.20	-0.54	561.41
39/	45/	4	-75.79	-0.32	433.22
39/	45/	ELU+	-121.51	8.29	1544.62
39/	45/	ELU-	-404.34	-1.40	520.37
39/	45/	ELS+	-121.51	5.38	1081.78
39/	45/	ELS-	-281.71	-0.98	520.37
39/	50/	1	-137.93	-0.44	299.84
39/	50/	2	-46.21	5.82	217.60
39/	50/	3	-160.20	-0.54	289.08
39/	50/	4	-75.79	-0.32	304.38
39/	50/	ELU+	-137.93	8.29	861.35
39/	50/	ELU-	-426.51	-1.40	299.84
39/	50/	ELS+	-137.93	5.38	604.22
39/	50/	ELS-	-298.13	-0.98	299.84
40/	50/	1	-173.72	-0.26	308.05
40/	50/	2	-60.45	3.27	117.19
40/	50/	3	-177.71	-0.29	300.93
40/	50/	4	-180.17	-0.09	306.57

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
40/	50/	ELU+	-173.72	4.64	875.72
40/	50/	ELU-	-504.77	-0.79	308.05
40/	50/	ELS+	-173.72	3.01	614.62
40/	50/	ELS-	-353.89	-0.55	308.05
40/	55/	1	-190.14	-0.26	-1.23
40/	55/	2	-60.45	3.27	14.43
40/	55/	3	-177.71	-0.29	-1.18
40/	55/	4	-180.17	-0.09	0.29
40/	55/	ELU+	-190.14	4.64	20.41
40/	55/	ELU-	-526.94	-0.79	-3.44
40/	55/	ELS+	-190.14	3.01	13.19
40/	55/	ELS-	-370.31	-0.55	-2.41
41/	3/	1	0.22	0.00	0.07
41/	3/	2	0.33	0.00	-0.01
41/	3/	3	0.22	3.22	0.02
41/	3/	4	0.10	0.89	0.02
41/	3/	ELU+	0.79	4.83	0.12
41/	3/	ELU-	0.22	0.00	0.06
41/	3/	ELS+	0.55	3.22	0.09
41/	3/	ELS-	0.22	0.00	0.06
41/	8/	1	0.22	0.00	0.44
41/	8/	2	0.33	0.00	0.55
41/	8/	3	0.22	3.22	0.40
41/	8/	4	0.10	0.89	0.20
41/	8/	ELU+	0.79	4.83	1.42
41/	8/	ELU-	0.22	0.00	0.44
41/	8/	ELS+	0.55	3.22	0.99
41/	8/	ELS-	0.22	0.00	0.44
42/	8/	1	0.20	0.00	0.52
42/	8/	2	0.81	0.00	-0.02
42/	8/	3	0.46	3.74	0.18
42/	8/	4	0.11	1.10	0.21

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
42/	8/	ELU+	1.48	5.60	1.02
42/	8/	ELU-	0.20	0.00	0.49
42/	8/	ELS+	1.00	3.74	0.73
42/	8/	ELS-	0.20	0.00	0.50
42/	13/	1	0.20	0.00	0.86
42/	13/	2	0.81	0.00	1.34
42/	13/	3	0.46	3.74	0.97
42/	13/	4	0.11	1.10	0.39
42/	13/	ELU+	1.48	5.60	3.18
42/	13/	ELU-	0.20	0.00	0.86
42/	13/	ELS+	1.00	3.74	2.21
42/	13/	ELS-	0.20	0.00	0.86
44/	13/	1	0.12	0.00	0.88
44/	13/	2	4.24	0.00	-2.55
44/	13/	3	2.17	2.74	-0.93
44/	13/	4	0.09	0.96	0.37
44/	13/	ELU+	6.53	4.11	1.74
44/	13/	ELU-	0.12	0.00	-2.95
44/	13/	ELS+	4.37	2.74	1.25
44/	13/	ELS-	0.12	0.00	-1.67
44/	23/	1	0.12	0.00	1.09
44/	23/	2	4.24	0.00	4.66
44/	23/	3	2.17	2.74	2.75
44/	23/	4	0.09	0.96	0.52
44/	23/	ELU+	6.53	4.11	8.46
44/	23/	ELU-	0.12	0.00	1.09
44/	23/	ELS+	4.37	2.74	5.75
44/	23/	ELS-	0.12	0.00	1.09
45/	23/	1	0.04	0.00	1.10
45/	23/	2	1.86	0.00	-0.24
45/	23/	3	0.94	1.01	0.34
45/	23/	4	0.09	0.68	0.47

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
45/	23/	ELU+	2.84	1.51	2.19
45/	23/	ELU-	0.04	0.00	0.74
45/	23/	ELS+	1.90	1.01	1.57
45/	23/	ELS-	0.04	0.00	0.86
45/	28/	1	0.04	0.00	1.17
45/	28/	2	1.86	0.00	2.92
45/	28/	3	0.94	1.01	1.94
45/	28/	4	0.09	0.68	0.62
45/	28/	ELU+	2.84	1.51	5.95
45/	28/	ELU-	0.04	0.00	1.17
45/	28/	ELS+	1.90	1.01	4.09
45/	28/	ELS-	0.04	0.00	1.17
46/	28/	1	-0.04	0.00	1.17
46/	28/	2	-1.86	0.00	2.92
46/	28/	3	-0.94	-1.01	1.94
46/	28/	4	0.25	0.21	0.38
46/	28/	ELU+	0.34	0.32	5.95
46/	28/	ELU-	-2.84	-1.51	1.17
46/	28/	ELS+	0.21	0.21	4.09
46/	28/	ELS-	-1.90	-1.01	1.17
46/	33/	1	-0.04	0.00	1.10
46/	33/	2	-1.86	0.00	-0.24
46/	33/	3	-0.94	-1.01	0.34
46/	33/	4	0.25	0.21	0.81
46/	33/	ELU+	0.34	0.32	2.70
46/	33/	ELU-	-2.84	-1.51	0.74
46/	33/	ELS+	0.21	0.21	1.91
46/	33/	ELS-	-1.90	-1.01	0.86
48/	33/	1	-0.12	-0.00	1.09
48/	33/	2	-4.24	-0.00	4.66
48/	33/	3	-2.17	-2.74	2.75
48/	33/	4	1.77	-0.49	-0.89

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
48/	33/	ELU+	2.53	-0.00	8.46
48/	33/	ELU-	-6.53	-4.11	-0.25
48/	33/	ELS+	1.64	-0.00	5.75
48/	33/	ELS-	-4.37	-2.74	0.20
48/	43/	1	-0.12	-0.00	0.88
48/	43/	2	-4.24	-0.00	-2.55
48/	43/	3	-2.17	-2.74	-0.93
48/	43/	4	1.77	-0.49	2.11
48/	43/	ELU+	2.53	-0.00	4.36
48/	43/	ELU-	-6.53	-4.11	-2.95
48/	43/	ELS+	1.64	-0.00	3.00
48/	43/	ELS-	-4.37	-2.74	-1.67
49/	43/	1	-0.20	-0.00	0.86
49/	43/	2	-0.81	-0.00	1.34
49/	43/	3	-0.46	-3.74	0.97
49/	43/	4	1.11	-1.36	-0.42
49/	43/	ELU+	1.46	-0.00	3.18
49/	43/	ELU-	-1.48	-5.60	0.23
49/	43/	ELS+	0.91	-0.00	2.21
49/	43/	ELS-	-1.00	-3.74	0.44
49/	48/	1	-0.20	-0.00	0.52
49/	48/	2	-0.81	-0.00	-0.02
49/	48/	3	-0.46	-3.74	0.18
49/	48/	4	1.11	-1.36	1.46
49/	48/	ELU+	1.46	-0.00	2.89
49/	48/	ELU-	-1.48	-5.60	0.49
49/	48/	ELS+	0.91	-0.00	1.98
49/	48/	ELS-	-1.00	-3.74	0.50
50/	48/	1	-0.22	-0.00	0.44
50/	48/	2	-0.33	-0.00	0.55
50/	48/	3	-0.22	-3.22	0.40
50/	48/	4	1.94	-1.59	-1.46

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
50/	48/	ELU+	2.69	-0.00	1.42
50/	48/	ELU-	-0.79	-4.83	-1.76
50/	48/	ELS+	1.72	-0.00	0.99
50/	48/	ELS-	-0.55	-3.22	-1.02
50/	53/	1	-0.22	-0.00	0.07
50/	53/	2	-0.33	-0.00	-0.01
50/	53/	3	-0.22	-3.22	0.02
50/	53/	4	1.94	-1.59	1.83
50/	53/	ELU+	2.69	-0.00	2.84
50/	53/	ELU-	-0.79	-4.83	0.06
50/	53/	ELS+	1.72	-0.00	1.90
50/	53/	ELS-	-0.55	-3.22	0.06
51/	1/	1	8.69	1.23	-5.45
51/	1/	2	1.31	-14.43	0.82
51/	1/	3	2.39	-6.95	-0.84
51/	1/	4	3.57	-1.86	-1.95
51/	1/	ELU+	17.09	1.67	-4.22
51/	1/	ELU-	8.69	-20.41	-10.28
51/	1/	ELS+	12.26	1.23	-4.63
51/	1/	ELS-	8.69	-13.19	-7.40
51/	2/	1	-6.62	1.23	-2.67
51/	2/	2	-6.51	-14.43	-5.16
51/	2/	3	-5.43	-6.95	-4.35
51/	2/	4	-4.25	-1.86	-2.74
51/	2/	ELU+	-6.62	1.67	-2.67
51/	2/	ELU-	-18.70	-20.41	-11.34
51/	2/	ELS+	-6.62	1.23	-2.67
51/	2/	ELS-	-13.13	-13.19	-7.83
52/	2/	1	8.92	0.03	-3.00
52/	2/	2	4.24	-0.00	-0.13
52/	2/	3	-0.03	-16.21	2.48
52/	2/	4	2.81	-4.37	0.11

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
52/	2/	ELU+	18.40	0.04	0.73
52/	2/	ELU-	8.87	-24.28	-4.24
52/	2/	ELS+	13.16	0.03	-0.51
52/	2/	ELS-	8.89	-16.17	-3.13
52/	3/	1	0.11	0.03	2.48
52/	3/	2	0.16	-0.00	2.51
52/	3/	3	-4.11	-16.21	-0.00
52/	3/	4	-1.27	-4.37	1.03
52/	3/	ELU+	0.39	0.04	7.11
52/	3/	ELU-	-6.05	-24.28	2.48
52/	3/	ELS+	0.27	0.03	4.99
52/	3/	ELS-	-4.00	-16.17	2.48
53/	3/	1	-0.11	-0.03	2.48
53/	3/	2	-0.16	0.00	2.51
53/	3/	3	-4.33	-16.23	3.22
53/	3/	4	-1.37	-4.39	1.92
53/	3/	ELU+	-0.11	-0.03	8.17
53/	3/	ELU-	-6.64	-24.38	2.48
53/	3/	ELS+	-0.11	-0.03	5.70
53/	3/	ELS-	-4.44	-16.26	2.48
53/	4/	1	-8.92	-0.03	-3.00
53/	4/	2	-4.24	0.00	-0.13
53/	4/	3	-8.41	-16.23	-4.42
53/	4/	4	-5.45	-4.39	-2.17
53/	4/	ELU+	-8.92	-0.03	-3.00
53/	4/	ELU-	-24.65	-24.38	-10.68
53/	4/	ELS+	-8.92	-0.03	-3.00
53/	4/	ELS-	-17.33	-16.26	-7.42
54/	4/	1	6.62	-1.23	-2.67
54/	4/	2	6.51	14.43	-5.16
54/	4/	3	2.99	-1.18	-0.63
54/	4/	4	3.43	-0.68	-1.47

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
54/	4/	ELU+	18.70	20.41	-2.67
54/	4/	ELU-	6.62	-3.44	-11.34
54/	4/	ELS+	13.13	13.19	-2.67
54/	4/	ELS-	6.62	-2.41	-7.83
54/	5/	1	-8.69	-1.23	-5.45
54/	5/	2	-1.31	14.43	0.82
54/	5/	3	-4.83	-1.18	-2.74
54/	5/	4	-4.39	-0.68	-2.57
54/	5/	ELU+	-8.69	20.41	-4.22
54/	5/	ELU-	-18.98	-3.44	-11.47
54/	5/	ELS+	-8.69	13.19	-4.63
54/	5/	ELS-	-13.52	-2.41	-8.19
55/	51/	1	8.69	-1.23	-5.45
55/	51/	2	1.31	14.43	0.82
55/	51/	3	2.39	6.95	-0.84
55/	51/	4	3.52	2.83	-1.91
55/	51/	ELU+	17.01	20.41	-4.22
55/	51/	ELU-	8.69	-1.67	-10.22
55/	51/	ELS+	12.21	13.19	-4.63
55/	51/	ELS-	8.69	-1.23	-7.36
55/	52/	1	-6.62	-1.23	-2.67
55/	52/	2	-6.51	14.43	-5.16
55/	52/	3	-5.43	6.95	-4.35
55/	52/	4	-4.30	2.83	-2.81
55/	52/	ELU+	-6.62	20.41	-2.67
55/	52/	ELU-	-18.70	-1.67	-11.34
55/	52/	ELS+	-6.62	13.19	-2.67
55/	52/	ELS-	-13.13	-1.23	-7.83
56/	52/	1	8.92	-0.03	-3.00
56/	52/	2	4.24	0.00	-0.13
56/	52/	3	-0.03	16.21	2.48
56/	52/	4	10.65	7.99	-4.65

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
56/	52/	ELU+	28.02	24.28	0.73
56/	52/	ELU-	8.87	-0.04	-11.02
56/	52/	ELS+	19.57	16.17	-0.51
56/	52/	ELS-	8.89	-0.03	-7.64
56/	53/	1	0.11	-0.03	2.48
56/	53/	2	0.16	0.00	2.51
56/	53/	3	-4.11	16.21	-0.00
56/	53/	4	6.57	7.99	5.69
56/	53/	ELU+	10.01	24.28	11.87
56/	53/	ELU-	-6.05	-0.04	2.48
56/	53/	ELS+	6.68	16.17	8.16
56/	53/	ELS-	-4.00	-0.03	2.48
57/	53/	1	-0.11	0.03	2.48
57/	53/	2	-0.16	-0.00	2.51
57/	53/	3	-4.33	16.23	3.22
57/	53/	4	-10.12	9.82	7.28
57/	53/	ELU+	-0.11	24.38	14.26
57/	53/	ELU-	-15.33	0.03	2.48
57/	53/	ELS+	-0.11	16.26	9.76
57/	53/	ELS-	-10.23	0.03	2.48
57/	54/	1	-8.92	0.03	-3.00
57/	54/	2	-4.24	-0.00	-0.13
57/	54/	3	-8.41	16.23	-4.42
57/	54/	4	-14.20	9.82	-7.31
57/	54/	ELU+	-8.92	24.38	-3.00
57/	54/	ELU-	-33.34	0.03	-15.01
57/	54/	ELS+	-8.92	16.26	-3.00
57/	54/	ELS-	-23.12	0.03	-10.30
58/	54/	1	6.62	1.23	-2.67
58/	54/	2	6.51	-14.43	-5.16
58/	54/	3	2.99	1.18	-0.63
58/	54/	4	3.47	-0.29	-1.53

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
58/	54/	ELU+	18.70	3.44	-2.67
58/	54/	ELU-	6.62	-20.41	-11.34
58/	54/	ELS+	13.13	2.41	-2.67
58/	54/	ELS-	6.62	-13.19	-7.83
58/	55/	1	-8.69	1.23	-5.45
58/	55/	2	-1.31	-14.43	0.82
58/	55/	3	-4.83	1.18	-2.74
58/	55/	4	-4.35	-0.29	-2.54
58/	55/	ELU+	-8.69	3.44	-4.22
58/	55/	ELU-	-18.98	-20.41	-11.47
58/	55/	ELS+	-8.69	2.41	-4.63
58/	55/	ELS-	-13.52	-13.19	-8.19
59/	6/	1	17.08	8.20	-10.56
59/	6/	2	6.08	-100.41	-2.34
59/	6/	3	6.46	-52.19	-3.63
59/	6/	4	7.59	-14.37	-4.43
59/	6/	ELU+	34.45	11.08	-10.56
59/	6/	ELU-	17.08	-142.41	-20.89
59/	6/	ELS+	24.68	8.20	-10.56
59/	6/	ELS-	17.08	-92.21	-14.98
59/	7/	1	-13.53	8.20	-5.68
59/	7/	2	-9.56	-100.41	-6.34
59/	7/	3	-9.18	-52.19	-6.76
59/	7/	4	-8.05	-14.37	-4.95
59/	7/	ELU+	-13.53	11.08	-5.68
59/	7/	ELU-	-32.60	-142.41	-17.81
59/	7/	ELS+	-13.53	8.20	-5.68
59/	7/	ELS-	-23.09	-92.21	-12.44
60/	7/	1	17.61	0.04	-5.85
60/	7/	2	8.40	-0.29	-0.20
60/	7/	3	7.13	-115.78	-0.76
60/	7/	4	7.48	-32.04	-1.29

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
60/	7/	ELU+	36.37	0.06	-5.85
60/	7/	ELU-	17.61	-173.63	-9.84
60/	7/	ELS+	26.00	0.04	-5.85
60/	7/	ELS-	17.61	-115.74	-7.14
60/	8/	1	-0.01	0.04	4.82
60/	8/	2	0.24	-0.29	4.98
60/	8/	3	-1.03	-115.78	2.90
60/	8/	4	-0.68	-32.04	2.79
60/	8/	ELU+	0.35	0.06	13.97
60/	8/	ELU-	-1.56	-173.63	4.82
60/	8/	ELS+	0.23	0.04	9.79
60/	8/	ELS-	-1.04	-115.74	4.82
61/	8/	1	0.01	-0.04	4.82
61/	8/	2	-0.24	0.29	4.98
61/	8/	3	-1.27	-115.57	3.42
61/	8/	4	-0.69	-32.06	3.00
61/	8/	ELU+	0.01	0.39	13.97
61/	8/	ELU-	-1.90	-173.41	4.82
61/	8/	ELS+	0.01	0.25	9.79
61/	8/	ELS-	-1.26	-115.61	4.82
61/	9/	1	-17.61	-0.04	-5.85
61/	9/	2	-8.40	0.29	-0.20
61/	9/	3	-9.43	-115.57	-3.00
61/	9/	4	-8.85	-32.06	-2.72
61/	9/	ELU+	-17.61	0.39	-5.85
61/	9/	ELU-	-37.91	-173.41	-12.41
61/	9/	ELS+	-17.61	0.25	-5.85
61/	9/	ELS-	-27.04	-115.61	-8.86
62/	9/	1	13.53	-8.20	-5.68
62/	9/	2	9.56	100.41	-6.34
62/	9/	3	6.28	-11.86	-1.61
62/	9/	4	7.03	-5.69	-3.13

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
62/	9/	ELU+	32.60	142.41	-5.68
62/	9/	ELU-	13.53	-28.86	-17.17
62/	9/	ELS+	23.09	92.21	-5.68
62/	9/	ELS-	13.53	-20.06	-12.02
62/	10/	1	-17.08	-8.20	-10.56
62/	10/	2	-6.08	100.41	-2.34
62/	10/	3	-9.36	-11.86	-5.14
62/	10/	4	-8.61	-5.69	-4.95
62/	10/	ELU+	-17.08	142.41	-10.56
62/	10/	ELU-	-37.10	-28.86	-21.96
62/	10/	ELS+	-17.08	92.21	-10.56
62/	10/	ELS-	-26.44	-20.06	-15.70
63/	11/	1	16.86	5.75	-10.30
63/	11/	2	8.96	-79.53	-5.66
63/	11/	3	7.90	-41.01	-5.29
63/	11/	4	8.00	-12.36	-4.90
63/	11/	ELU+	36.20	7.76	-10.30
63/	11/	ELU-	16.86	-113.54	-22.39
63/	11/	ELS+	25.82	5.75	-10.30
63/	11/	ELS-	16.86	-73.78	-15.95
63/	12/	1	-13.75	5.75	-5.93
63/	12/	2	-6.68	-79.53	-3.04
63/	12/	3	-7.74	-41.01	-5.11
63/	12/	4	-7.64	-12.36	-4.49
63/	12/	ELU+	-13.75	7.76	-5.93
63/	12/	ELU-	-30.18	-113.54	-15.68
63/	12/	ELS+	-13.75	5.75	-5.93
63/	12/	ELS-	-21.50	-73.78	-11.05
64/	12/	1	17.58	0.01	-5.84
64/	12/	2	9.88	-1.95	-1.08
64/	12/	3	11.84	-93.17	-5.21
64/	12/	4	8.55	-28.10	-2.41

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
64/	12/	ELU+	41.49	0.01	-5.84
64/	12/	ELU-	17.58	-139.75	-15.69
64/	12/	ELS+	29.42	0.01	-5.84
64/	12/	ELS-	17.58	-93.16	-11.05
64/	13/	1	-0.04	0.01	4.80
64/	13/	2	1.72	-1.95	5.88
64/	13/	3	3.68	-93.17	4.10
64/	13/	4	0.39	-28.10	2.96
64/	13/	ELU+	5.48	0.01	15.30
64/	13/	ELU-	-0.05	-139.75	4.80
64/	13/	ELS+	3.64	0.01	10.68
64/	13/	ELS-	-0.04	-93.16	4.80
65/	13/	1	0.04	-0.01	4.80
65/	13/	2	-1.72	1.95	5.88
65/	13/	3	1.97	-91.27	3.11
65/	13/	4	0.41	-28.08	2.82
65/	13/	ELU+	3.01	2.91	15.30
65/	13/	ELU-	-2.54	-136.92	4.80
65/	13/	ELS+	2.01	1.94	10.68
65/	13/	ELS-	-1.68	-91.28	4.80
65/	14/	1	-17.58	-0.01	-5.84
65/	14/	2	-9.88	1.95	-1.08
65/	14/	3	-6.19	-91.27	0.58
65/	14/	4	-7.75	-28.08	-1.58
65/	14/	ELU+	-17.58	2.91	-4.96
65/	14/	ELU-	-38.55	-136.92	-10.26
65/	14/	ELS+	-17.58	1.94	-5.26
65/	14/	ELS-	-27.46	-91.28	-7.42
66/	14/	1	13.75	-5.75	-5.93
66/	14/	2	6.68	79.53	-3.04
66/	14/	3	6.57	-8.76	-1.93
66/	14/	4	7.18	-4.16	-3.30

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
66/	14/	ELU+	29.33	113.54	-5.93
66/	14/	ELU-	13.75	-20.90	-12.96
66/	14/	ELS+	20.93	73.78	-5.93
66/	14/	ELS-	13.75	-14.50	-9.23
66/	15/	1	-16.86	-5.75	-10.30
66/	15/	2	-8.96	79.53	-5.66
66/	15/	3	-9.07	-8.76	-4.81
66/	15/	4	-8.46	-4.16	-4.78
66/	15/	ELU+	-16.86	113.54	-10.30
66/	15/	ELU-	-36.37	-20.90	-22.39
66/	15/	ELS+	-16.86	73.78	-10.30
66/	15/	ELS-	-25.93	-14.50	-15.95
71/	21/	1	16.72	2.94	-10.14
71/	21/	2	10.98	-46.02	-7.99
71/	21/	3	8.88	-22.84	-6.42
71/	21/	4	8.31	-8.85	-5.27
71/	21/	ELU+	39.05	3.96	-10.14
71/	21/	ELU-	16.72	-66.09	-25.67
71/	21/	ELS+	27.71	2.94	-10.14
71/	21/	ELS-	16.72	-43.08	-18.13
71/	22/	1	-13.89	2.94	-6.09
71/	22/	2	-4.66	-46.02	-0.71
71/	22/	3	-6.76	-22.84	-4.00
71/	22/	4	-7.33	-8.85	-4.13
71/	22/	ELU+	-13.89	3.96	-6.09
71/	22/	ELU-	-29.74	-66.09	-14.42
71/	22/	ELS+	-13.89	2.94	-6.09
71/	22/	ELS-	-21.22	-43.08	-10.22
72/	22/	1	17.57	0.00	-5.84
72/	22/	2	21.67	-2.45	-8.13
72/	22/	3	20.34	-54.42	-11.50
72/	22/	4	9.38	-22.39	-3.32

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
72/	22/	ELU+	56.23	0.00	-5.84
72/	22/	ELU-	17.57	-81.63	-25.13
72/	22/	ELS+	39.25	0.00	-5.84
72/	22/	ELS-	17.57	-54.42	-17.34
72/	23/	1	-0.04	0.00	4.80
72/	23/	2	13.51	-2.45	12.98
72/	23/	3	12.18	-54.42	8.02
72/	23/	4	1.22	-22.39	3.05
72/	23/	ELU+	20.23	0.00	25.94
72/	23/	ELU-	-0.06	-81.63	4.80
72/	23/	ELS+	13.47	0.00	17.77
72/	23/	ELS-	-0.04	-54.42	4.80
73/	23/	1	0.04	-0.00	4.80
73/	23/	2	-13.51	2.45	12.98
73/	23/	3	-1.30	-52.00	6.28
73/	23/	4	1.22	-22.33	2.76
73/	23/	ELU+	1.89	3.67	25.94
73/	23/	ELU-	-20.23	-78.01	4.80
73/	23/	ELS+	1.27	2.44	17.77
73/	23/	ELS-	-13.47	-52.01	4.80
73/	24/	1	-17.57	-0.00	-5.84
73/	24/	2	-21.67	2.45	-8.13
73/	24/	3	-9.46	-52.00	-0.18
73/	24/	4	-6.94	-22.33	-0.67
73/	24/	ELU+	-17.57	3.67	-5.84
73/	24/	ELU-	-56.23	-78.01	-20.08
73/	24/	ELS+	-17.57	2.44	-5.84
73/	24/	ELS-	-39.25	-52.01	-13.97
74/	24/	1	13.89	-2.94	-6.09
74/	24/	2	4.66	46.02	-0.71
74/	24/	3	6.73	-4.02	-2.12
74/	24/	4	7.26	-1.38	-3.40

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
74/	24/	ELU+	29.64	66.09	-6.09
74/	24/	ELU-	13.89	-10.00	-13.32
74/	24/	ELS+	21.15	43.08	-6.09
74/	24/	ELS-	13.89	-6.96	-9.49
74/	25/	1	-16.72	-2.94	-10.14
74/	25/	2	-10.98	46.02	-7.99
74/	25/	3	-8.91	-4.02	-4.62
74/	25/	4	-8.38	-1.38	-4.68
74/	25/	ELU+	-16.72	66.09	-10.14
74/	25/	ELU-	-39.05	-10.00	-25.67
74/	25/	ELS+	-16.72	43.08	-10.14
74/	25/	ELS-	-27.71	-6.96	-18.13
75/	26/	1	16.67	-0.00	-10.09
75/	26/	2	11.73	-0.00	-8.85
75/	26/	3	9.23	-0.00	-6.83
75/	26/	4	8.49	-3.67	-5.48
75/	26/	ELU+	40.10	-0.00	-10.09
75/	26/	ELU-	16.67	-5.51	-26.89
75/	26/	ELS+	28.40	-0.00	-10.09
75/	26/	ELS-	16.67	-3.67	-18.94
75/	27/	1	-13.94	-0.00	-6.15
75/	27/	2	-3.91	-0.00	0.14
75/	27/	3	-6.41	-0.00	-3.60
75/	27/	4	-7.15	-3.67	-3.93
75/	27/	ELU+	-13.94	-0.00	-5.93
75/	27/	ELU-	-29.54	-5.51	-14.20
75/	27/	ELS+	-13.94	-0.00	-6.00
75/	27/	ELS-	-21.09	-3.67	-10.08
76/	27/	1	17.57	-0.00	-5.84
76/	27/	2	26.89	-0.00	-11.26
76/	27/	3	23.91	-0.00	-14.07
76/	27/	4	10.10	-13.65	-4.03

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
76/	27/	ELU+	64.07	-0.00	-5.84
76/	27/	ELU-	17.57	-20.47	-28.99
76/	27/	ELS+	44.47	-0.00	-5.84
76/	27/	ELS-	17.57	-13.65	-19.91
76/	28/	1	-0.04	-0.00	4.80
76/	28/	2	18.73	-0.00	16.12
76/	28/	3	15.75	-0.00	9.72
76/	28/	4	1.94	-13.65	3.19
76/	28/	ELU+	28.06	-0.00	30.65
76/	28/	ELU-	-0.06	-20.47	4.80
76/	28/	ELS+	18.69	-0.00	20.91
76/	28/	ELS-	-0.04	-13.65	4.80
77/	28/	1	0.04	-0.00	4.80
77/	28/	2	-18.73	-0.00	16.12
77/	28/	3	-2.94	-0.00	7.71
77/	28/	4	1.78	-13.41	2.73
77/	28/	ELU+	2.73	-0.00	30.65
77/	28/	ELU-	-28.06	-20.12	4.80
77/	28/	ELS+	1.82	-0.00	20.91
77/	28/	ELS-	-18.69	-13.41	4.80
77/	29/	1	-17.57	-0.00	-5.84
77/	29/	2	-26.89	-0.00	-11.26
77/	29/	3	-11.10	-0.00	-0.72
77/	29/	4	-6.38	-13.41	-0.03
77/	29/	ELU+	-17.57	-0.00	-5.84
77/	29/	ELU-	-64.07	-20.12	-24.77
77/	29/	ELS+	-17.57	-0.00	-5.84
77/	29/	ELS-	-44.47	-13.41	-17.10
78/	29/	1	13.94	-0.00	-6.15
78/	29/	2	3.91	0.00	0.14
78/	29/	3	6.78	-0.00	-2.18
78/	29/	4	7.25	2.08	-3.39

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
78/	29/	ELU+	29.69	3.11	-5.93
78/	29/	ELU-	13.94	-0.00	-13.38
78/	29/	ELS+	21.19	2.08	-6.00
78/	29/	ELS-	13.94	-0.00	-9.53
78/	30/	1	-16.67	-0.00	-10.09
78/	30/	2	-11.73	0.00	-8.85
78/	30/	3	-8.86	-0.00	-4.56
78/	30/	4	-8.39	2.08	-4.70
78/	30/	ELU+	-16.67	3.11	-10.09
78/	30/	ELU-	-40.10	-0.00	-26.89
78/	30/	ELS+	-16.67	2.08	-10.09
78/	30/	ELS-	-28.40	-0.00	-18.94
79/	31/	1	16.72	-2.94	-10.14
79/	31/	2	10.98	46.02	-7.99
79/	31/	3	8.88	22.84	-6.42
79/	31/	4	8.48	3.33	-5.47
79/	31/	ELU+	39.05	66.09	-10.14
79/	31/	ELU-	16.72	-3.96	-25.67
79/	31/	ELS+	27.71	43.08	-10.14
79/	31/	ELS-	16.72	-2.94	-18.13
79/	32/	1	-13.89	-2.94	-6.09
79/	32/	2	-4.66	46.02	-0.71
79/	32/	3	-6.76	22.84	-4.00
79/	32/	4	-7.16	3.33	-3.95
79/	32/	ELU+	-13.89	66.09	-6.09
79/	32/	ELU-	-29.49	-3.96	-14.22
79/	32/	ELS+	-13.89	43.08	-6.09
79/	32/	ELS-	-21.05	-2.94	-10.09
80/	32/	1	17.57	-0.00	-5.84
80/	32/	2	21.67	2.45	-8.13
80/	32/	3	20.34	54.42	-11.50
80/	32/	4	11.14	-0.20	-4.74

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
80/	32/	ELU+	56.23	81.63	-5.84
80/	32/	ELU-	17.57	-0.30	-25.13
80/	32/	ELS+	39.25	54.42	-5.84
80/	32/	ELS-	17.57	-0.20	-17.34
80/	33/	1	-0.04	-0.00	4.80
80/	33/	2	13.51	2.45	12.98
80/	33/	3	12.18	54.42	8.02
80/	33/	4	2.98	-0.20	3.73
80/	33/	ELU+	20.23	81.63	25.94
80/	33/	ELU-	-0.06	-0.30	4.80
80/	33/	ELS+	13.47	54.42	17.77
80/	33/	ELS-	-0.04	-0.20	4.80
81/	33/	1	0.04	0.00	4.80
81/	33/	2	-13.51	-2.45	12.98
81/	33/	3	-1.30	52.00	6.28
81/	33/	4	1.46	1.51	3.03
81/	33/	ELU+	2.25	78.01	25.94
81/	33/	ELU-	-20.23	-3.67	4.80
81/	33/	ELS+	1.50	52.01	17.77
81/	33/	ELS-	-13.47	-2.44	4.80
81/	34/	1	-17.57	0.00	-5.84
81/	34/	2	-21.67	-2.45	-8.13
81/	34/	3	-9.46	52.00	-0.18
81/	34/	4	-6.70	1.51	-0.12
81/	34/	ELU+	-17.57	78.01	-5.84
81/	34/	ELU-	-56.23	-3.67	-20.08
81/	34/	ELS+	-17.57	52.01	-5.84
81/	34/	ELS-	-39.25	-2.44	-13.97
82/	34/	1	13.89	2.94	-6.09
82/	34/	2	4.66	-46.02	-0.71
82/	34/	3	6.73	4.02	-2.12
82/	34/	4	7.14	5.12	-3.27

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
82/	34/	ELU+	29.47	11.65	-6.09
82/	34/	ELU-	13.89	-66.09	-13.13
82/	34/	ELS+	21.03	8.06	-6.09
82/	34/	ELS-	13.89	-43.08	-9.36
82/	35/	1	-16.72	2.94	-10.14
82/	35/	2	-10.98	-46.02	-7.99
82/	35/	3	-8.91	4.02	-4.62
82/	35/	4	-8.50	5.12	-4.83
82/	35/	ELU+	-16.72	11.65	-10.14
82/	35/	ELU-	-39.05	-66.09	-25.67
82/	35/	ELS+	-16.72	8.06	-10.14
82/	35/	ELS-	-27.71	-43.08	-18.13
87/	41/	1	16.86	-5.75	-10.30
87/	41/	2	8.96	79.53	-5.66
87/	41/	3	7.90	41.01	-5.29
87/	41/	4	8.23	11.94	-5.19
87/	41/	ELU+	36.20	113.54	-10.30
87/	41/	ELU-	16.86	-7.76	-22.39
87/	41/	ELS+	25.82	73.78	-10.30
87/	41/	ELS-	16.86	-5.75	-15.95
87/	42/	1	-13.75	-5.75	-5.93
87/	42/	2	-6.68	79.53	-3.04
87/	42/	3	-7.74	41.01	-5.11
87/	42/	4	-7.41	11.94	-4.25
87/	42/	ELU+	-13.75	113.54	-5.93
87/	42/	ELU-	-30.18	-7.76	-15.68
87/	42/	ELS+	-13.75	73.78	-5.93
87/	42/	ELS-	-21.50	-5.75	-11.05
88/	42/	1	17.58	-0.01	-5.84
88/	42/	2	9.88	1.95	-1.08
88/	42/	3	11.84	93.17	-5.21
88/	42/	4	16.19	22.91	-7.54

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
88/	42/	ELU+	48.02	139.75	-5.84
88/	42/	ELU-	17.58	-0.01	-19.19
88/	42/	ELS+	33.77	93.16	-5.84
88/	42/	ELS-	17.58	-0.01	-13.38
88/	43/	1	-0.04	-0.01	4.80
88/	43/	2	1.72	1.95	5.88
88/	43/	3	3.68	93.17	4.10
88/	43/	4	8.03	22.91	7.00
88/	43/	ELU+	12.01	139.75	16.97
88/	43/	ELU-	-0.05	-0.01	4.80
88/	43/	ELS+	7.99	93.16	11.79
88/	43/	ELS-	-0.04	-0.01	4.80
89/	43/	1	0.04	0.01	4.80
89/	43/	2	-1.72	-1.95	5.88
89/	43/	3	1.97	91.27	3.11
89/	43/	4	-4.04	25.45	6.13
89/	43/	ELU+	3.01	136.92	15.67
89/	43/	ELU-	-6.03	-2.91	4.80
89/	43/	ELS+	2.01	91.28	10.92
89/	43/	ELS-	-4.01	-1.94	4.80
89/	44/	1	-17.58	0.01	-5.84
89/	44/	2	-9.88	-1.95	-1.08
89/	44/	3	-6.19	91.27	0.58
89/	44/	4	-12.20	25.45	-3.62
89/	44/	ELU+	-17.58	136.92	-4.96
89/	44/	ELU-	-42.04	-2.91	-13.32
89/	44/	ELS+	-17.58	91.28	-5.26
89/	44/	ELS-	-29.78	-1.94	-9.46
90/	44/	1	13.75	5.75	-5.93
90/	44/	2	6.68	-79.53	-3.04
90/	44/	3	6.57	8.76	-1.93
90/	44/	4	6.99	5.50	-3.10

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
90/	44/	ELU+	29.05	20.90	-5.93
90/	44/	ELU-	13.75	-113.54	-12.66
90/	44/	ELS+	20.74	14.50	-5.93
90/	44/	ELS-	13.75	-73.78	-9.03
90/	45/	1	-16.86	5.75	-10.30
90/	45/	2	-8.96	-79.53	-5.66
90/	45/	3	-9.07	8.76	-4.81
90/	45/	4	-8.65	5.50	-5.01
90/	45/	ELU+	-16.86	20.90	-10.30
90/	45/	ELU-	-36.37	-113.54	-22.39
90/	45/	ELS+	-16.86	14.50	-10.30
90/	45/	ELS-	-25.93	-73.78	-15.95
91/	46/	1	17.08	-8.20	-10.56
91/	46/	2	6.08	100.41	-2.34
91/	46/	3	6.46	52.19	-3.63
91/	46/	4	7.72	19.93	-4.61
91/	46/	ELU+	34.64	142.41	-10.56
91/	46/	ELU-	17.08	-11.08	-21.16
91/	46/	ELS+	24.80	92.21	-10.56
91/	46/	ELS-	17.08	-8.20	-15.16
91/	47/	1	-13.53	-8.20	-5.68
91/	47/	2	-9.56	100.41	-6.34
91/	47/	3	-9.18	52.19	-6.76
91/	47/	4	-7.92	19.93	-4.84
91/	47/	ELU+	-13.53	142.41	-5.68
91/	47/	ELU-	-32.60	-11.08	-17.81
91/	47/	ELS+	-13.53	92.21	-5.68
91/	47/	ELS-	-23.09	-8.20	-12.44
92/	47/	1	17.61	-0.04	-5.85
92/	47/	2	8.40	0.29	-0.20
92/	47/	3	7.13	115.78	-0.76
92/	47/	4	18.36	51.99	-8.23

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
92/	47/	ELU+	51.31	173.63	-5.85
92/	47/	ELU-	17.61	-0.06	-20.25
92/	47/	ELS+	35.97	115.74	-5.85
92/	47/	ELS-	17.61	-0.04	-14.09
92/	48/	1	-0.01	-0.04	4.82
92/	48/	2	0.24	0.29	4.98
92/	48/	3	-1.03	115.78	2.90
92/	48/	4	10.20	51.99	8.90
92/	48/	ELU+	15.29	173.63	19.86
92/	48/	ELU-	-1.56	-0.06	4.82
92/	48/	ELS+	10.19	115.74	13.72
92/	48/	ELS-	-1.04	-0.04	4.82
93/	48/	1	0.01	0.04	4.82
93/	48/	2	-0.24	-0.29	4.98
93/	48/	3	-1.27	115.57	3.42
93/	48/	4	-9.26	54.91	8.67
93/	48/	ELU+	0.01	173.41	19.51
93/	48/	ELU-	-13.88	-0.39	4.82
93/	48/	ELS+	0.01	115.61	13.49
93/	48/	ELS-	-9.25	-0.25	4.82
93/	49/	1	-17.61	0.04	-5.85
93/	49/	2	-8.40	-0.29	-0.20
93/	49/	3	-9.43	115.57	-3.00
93/	49/	4	-17.42	54.91	-7.34
93/	49/	ELU+	-17.61	173.41	-5.85
93/	49/	ELU-	-49.90	-0.39	-18.91
93/	49/	ELS+	-17.61	115.61	-5.85
93/	49/	ELS-	-35.03	-0.25	-13.19
94/	49/	1	13.53	8.20	-5.68
94/	49/	2	9.56	-100.41	-6.34
94/	49/	3	6.28	11.86	-1.61
94/	49/	4	6.89	2.20	-3.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)
94/	49/	ELU+	32.60	28.86	-5.68
94/	49/	ELU-	13.53	-142.41	-17.17
94/	49/	ELS+	23.09	20.06	-5.68
94/	49/	ELS-	13.53	-92.21	-12.02
94/	50/	1	-17.08	8.20	-10.56
94/	50/	2	-6.08	-100.41	-2.34
94/	50/	3	-9.36	11.86	-5.14
94/	50/	4	-8.75	2.20	-5.13
94/	50/	ELU+	-17.08	28.86	-10.56
94/	50/	ELU-	-37.10	-142.41	-21.96
94/	50/	ELS+	-17.08	20.06	-10.56
94/	50/	ELS-	-26.44	-92.21	-15.70

Esfuerzos - Casos: 6 7 : Envolvente: 1

- Caso: 5 (ELU)

Filtrar	Barra	Caso
Lista completa	1 2 4A6 8A12 14	1A10
Selección	1 2 4A6 8A12 14	5
Número total	76	10
Número seleccionado	76	1

- Casos: 6 7

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
1/	1/	ELU/2	347.36>>	4.55	19.97	1*1.35 + 2*1.50
1/	6/	ELU/5	173.72<<	-0.26	308.05	1*1.00
1/	1/	ELU/6	280.81	4.64>>	20.41	1*1.00 + 2*1.50
1/	1/	ELU/1	256.69	-0.35<<	-1.67	1*1.35
1/	6/	ELU/2	325.19	4.55	591.65>>	1*1.35 + 2*1.50
1/	1/	ELU/1	256.69	-0.35	-1.67<<	1*1.35
2/	6/	ELU/2	255.52>>	8.13	731.19	1*1.35 + 2*1.50
2/	11/	ELU/5	121.51<<	-0.44	520.37	1*1.00
2/	6/	ELU/6	207.25	8.29>>	626.24	1*1.00 + 2*1.50
2/	6/	ELU/1	186.21	-0.60<<	404.78	1*1.35
2/	11/	ELU/2	233.35	8.13	1146.73>>	1*1.35 + 2*1.50
2/	6/	ELU/5	137.93	-0.44	299.84<<	1*1.00
4/	11/	ELU/2	159.67>>	7.10	1258.26	1*1.35 + 2*1.50
4/	21/	ELU/5	69.53<<	-0.37	646.79	1*1.00
4/	11/	ELU/6	129.59	7.23>>	1078.14	1*1.00 + 2*1.50
4/	11/	ELU/1	116.04	-0.50<<	694.74	1*1.35
4/	21/	ELU/2	137.50	7.10	1510.86>>	1*1.35 + 2*1.50
4/	11/	ELU/5	85.95	-0.37	514.63<<	1*1.00
5/	21/	ELU/2	60.96>>	2.77	1575.92	1*1.35 + 2*1.50
5/	26/	ELU/5	17.69<<	-0.14	687.88	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
5/	21/	ELU/6	49.03	2.82>>	1350.57	1*1.00 + 2*1.50
5/	21/	ELU/1	46.05	-0.19<<	869.20	1*1.35
5/	26/	ELU/2	38.79	2.77	1660.72>>	1*1.35 + 2*1.50
5/	21/	ELU/5	34.11	-0.14	643.85<<	1*1.00
6/	26/	ELU/5	-17.69>>	0.14	687.88	1*1.00
6/	31/	ELU/2	-60.96<<	-2.77	1575.92	1*1.35 + 2*1.50
6/	26/	ELU/4	-36.50	0.23>>	1322.91	1*1.35 + 4*1.50
6/	26/	ELU/6	-32.60	-2.82<<	1419.96	1*1.00 + 2*1.50
6/	26/	ELU/2	-38.79	-2.77	1660.72>>	1*1.35 + 2*1.50
6/	31/	ELU/5	-34.11	0.14	643.85<<	1*1.00
8/	31/	ELU/5	-69.53>>	0.37	646.79	1*1.00
8/	41/	ELU/2	-159.67<<	-7.10	1258.26	1*1.35 + 2*1.50
8/	31/	ELU/1	-93.87	0.50>>	873.16	1*1.35
8/	31/	ELU/6	-113.16	-7.23<<	1284.48	1*1.00 + 2*1.50
8/	31/	ELU/2	-137.50	-7.10	1510.86>>	1*1.35 + 2*1.50
8/	41/	ELU/5	-85.95	0.37	514.63<<	1*1.00
9/	41/	ELU/5	-121.51>>	0.44	520.37	1*1.00
9/	46/	ELU/2	-255.52<<	-8.13	731.19	1*1.35 + 2*1.50
9/	41/	ELU/1	-164.04	0.60>>	702.50	1*1.35
9/	41/	ELU/6	-190.82	-8.29<<	964.60	1*1.00 + 2*1.50
9/	41/	ELU/2	-233.35	-8.13	1146.73>>	1*1.35 + 2*1.50
9/	46/	ELU/5	-137.93	0.44	299.84<<	1*1.00
10/	46/	ELU/5	-173.72>>	0.26	308.05	1*1.00
10/	51/	ELU/2	-347.36<<	-4.55	19.97	1*1.35 + 2*1.50
10/	46/	ELU/1	-234.52	0.35>>	415.86	1*1.35
10/	46/	ELU/6	-264.39	-4.64<<	483.83	1*1.00 + 2*1.50
10/	46/	ELU/2	-325.19	-4.55	591.65>>	1*1.35 + 2*1.50
10/	51/	ELU/1	-256.69	0.35	-1.67<<	1*1.35
11/	2/	ELU/2	538.63>>	7.10	-20.01	1*1.35 + 2*1.50
11/	7/	ELU/5	158.96<<	-0.32	285.38	1*1.00
11/	2/	ELU/7	292.62	9.92>>	15.08	1*1.00 + 3*1.50
11/	2/	ELU/1	236.76	-0.44<<	1.62	1*1.35

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
11/	7/	ELU/2	516.46	7.10	876.81>>	1*1.35 + 2*1.50
11/	2/	ELU/6	477.25	7.21	-20.43<<	1*1.00 + 2*1.50
12/	7/	ELU/2	447.49>>	16.06	737.65	1*1.35 + 2*1.50
12/	12/	ELU/5	111.40<<	-0.50	496.88	1*1.00
12/	7/	ELU/7	220.60	18.75>>	602.13	1*1.00 + 3*1.50
12/	7/	ELU/1	172.56	-0.68<<	396.29	1*1.35
12/	12/	ELU/2	425.32	16.06	1479.54>>	1*1.35 + 2*1.50
12/	7/	ELU/5	127.82	-0.50	293.55<<	1*1.00
14/	12/	ELU/2	358.19>>	19.13	1370.92	1*1.35 + 2*1.50
14/	22/	ELU/5	63.64<<	-0.41	624.77	1*1.00
14/	12/	ELU/6	330.16	19.27>>	1195.00	1*1.00 + 2*1.50
14/	12/	ELU/1	108.09	-0.55<<	678.53	1*1.35
14/	22/	ELU/2	336.02	19.13	1960.99>>	1*1.35 + 2*1.50
14/	12/	ELU/5	80.07	-0.41	502.62<<	1*1.00
15/	22/	ELU/2	143.75>>	8.34	1899.59	1*1.35 + 2*1.50
15/	27/	ELU/5	15.76<<	-0.15	668.45	1*1.00
15/	22/	ELU/8	49.17	13.94>>	1038.59	1*1.00 + 4*1.50
15/	22/	ELU/1	43.44	-0.21<<	847.40	1*1.35
15/	27/	ELU/2	121.58	8.34	2125.12>>	1*1.35 + 2*1.50
15/	22/	ELU/5	32.18	-0.15	627.71<<	1*1.00
16/	27/	ELU/5	-15.76>>	0.15	668.45	1*1.00
16/	32/	ELU/2	-143.75<<	-8.34	1899.59	1*1.35 + 2*1.50
16/	27/	ELU/4	-30.15	14.15>>	1357.15	1*1.35 + 4*1.50
16/	27/	ELU/6	-116.07	-8.40<<	1891.17	1*1.00 + 2*1.50
16/	27/	ELU/2	-121.58	-8.34	2125.12>>	1*1.35 + 2*1.50
16/	32/	ELU/5	-32.18	0.15	627.71<<	1*1.00
18/	32/	ELU/5	-63.64>>	0.41	624.77	1*1.00
18/	42/	ELU/2	-358.19<<	-19.13	1370.92	1*1.35 + 2*1.50
18/	32/	ELU/4	-122.25	13.32>>	1288.38	1*1.35 + 4*1.50
18/	32/	ELU/6	-313.74	-19.27<<	1742.32	1*1.00 + 2*1.50
18/	32/	ELU/2	-336.02	-19.13	1960.99>>	1*1.35 + 2*1.50
18/	42/	ELU/5	-80.07	0.41	502.62<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
19/	42/	ELU/5	-111.40>>	0.50	496.88	1*1.00
19/	47/	ELU/2	-447.49<<	-16.06	737.65	1*1.35 + 2*1.50
19/	42/	ELU/4	-222.12	8.52>>	1037.52	1*1.35 + 4*1.50
19/	42/	ELU/7	-204.18	-18.75<<	963.18	1*1.00 + 3*1.50
19/	42/	ELU/2	-425.32	-16.06	1479.54>>	1*1.35 + 2*1.50
19/	47/	ELU/5	-127.82	0.50	293.55<<	1*1.00
20/	47/	ELU/5	-158.96>>	0.32	285.38	1*1.00
20/	52/	ELU/2	-538.63<<	-7.10	-20.01	1*1.35 + 2*1.50
20/	47/	ELU/4	-325.75	3.19>>	581.97	1*1.35 + 4*1.50
20/	47/	ELU/7	-276.20	-9.92<<	498.58	1*1.00 + 3*1.50
20/	47/	ELU/2	-516.46	-7.10	876.81>>	1*1.35 + 2*1.50
20/	52/	ELU/6	-477.25	-7.21	-20.43<<	1*1.00 + 2*1.50
21/	4/	ELU/3	553.59>>	6.12	-20.95	1*1.35 + 3*1.50
21/	9/	ELU/5	158.96<<	0.32	285.38	1*1.00
21/	4/	ELU/3	553.59	6.12>>	-20.95	1*1.35 + 3*1.50
21/	4/	ELU/6	477.25	-7.21<<	-20.43	1*1.00 + 2*1.50
21/	9/	ELU/3	531.42	6.12	901.31>>	1*1.35 + 3*1.50
21/	4/	ELU/7	492.21	6.01	-21.37<<	1*1.00 + 3*1.50
22/	9/	ELU/3	465.81>>	8.45	756.76	1*1.35 + 3*1.50
22/	14/	ELU/5	111.40<<	0.50	496.88	1*1.00
22/	9/	ELU/3	465.81	8.45>>	756.76	1*1.35 + 3*1.50
22/	9/	ELU/6	402.76	-16.24<<	634.91	1*1.00 + 2*1.50
22/	14/	ELU/3	443.64	8.45	1529.80>>	1*1.35 + 3*1.50
22/	9/	ELU/5	127.82	0.50	293.55<<	1*1.00
24/	14/	ELU/3	382.22>>	4.55	1413.77	1*1.35 + 3*1.50
24/	24/	ELU/5	63.64<<	0.41	624.77	1*1.00
24/	14/	ELU/3	382.22	4.55>>	1413.77	1*1.35 + 3*1.50
24/	14/	ELU/6	330.16	-19.27<<	1195.00	1*1.00 + 2*1.50
24/	24/	ELU/3	360.05	4.55	2044.69>>	1*1.35 + 3*1.50
24/	14/	ELU/5	80.07	0.41	502.62<<	1*1.00
25/	24/	ELU/3	154.20>>	1.30	1976.69	1*1.35 + 3*1.50
25/	29/	ELU/5	15.76<<	0.15	668.45	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
25/	24/	ELU/3	154.20	1.30>>	1976.69	1*1.35 + 3*1.50
25/	24/	ELU/6	132.49	-8.40<<	1679.90	1*1.00 + 2*1.50
25/	29/	ELU/3	132.04	1.30	2219.99>>	1*1.35 + 3*1.50
25/	24/	ELU/5	32.18	0.15	627.71<<	1*1.00
26/	29/	ELU/8	30.40>>	-11.41	1210.87	1*1.00 + 4*1.50
26/	34/	ELU/3	-154.20<<	-1.30	1976.69	1*1.35 + 3*1.50
26/	29/	ELU/6	-116.07	8.40>>	1891.17	1*1.00 + 2*1.50
26/	29/	ELU/4	24.88	-11.46<<	1444.83	1*1.35 + 4*1.50
26/	29/	ELU/3	-132.04	-1.30	2219.99>>	1*1.35 + 3*1.50
26/	34/	ELU/5	-32.18	-0.15	627.71<<	1*1.00
28/	34/	ELU/8	-38.25>>	-16.39	1240.23	1*1.00 + 4*1.50
28/	44/	ELU/3	-382.22<<	-4.55	1413.77	1*1.35 + 3*1.50
28/	34/	ELU/6	-313.74	19.27>>	1742.32	1*1.00 + 2*1.50
28/	34/	ELU/4	-60.53	-16.53<<	1458.90	1*1.35 + 4*1.50
28/	34/	ELU/3	-360.05	-4.55	2044.69>>	1*1.35 + 3*1.50
28/	44/	ELU/5	-80.07	-0.41	502.62<<	1*1.00
29/	44/	ELU/5	-111.40>>	-0.50	496.88	1*1.00
29/	49/	ELU/3	-465.81<<	-8.45	756.76	1*1.35 + 3*1.50
29/	44/	ELU/6	-386.33	16.24>>	1305.63	1*1.00 + 2*1.50
29/	44/	ELU/4	-274.31	-15.87<<	1359.34	1*1.35 + 4*1.50
29/	44/	ELU/3	-443.64	-8.45	1529.80>>	1*1.35 + 3*1.50
29/	49/	ELU/5	-127.82	-0.50	293.55<<	1*1.00
30/	49/	ELU/5	-158.96>>	-0.32	285.38	1*1.00
30/	54/	ELU/4	-573.30<<	-9.11	-13.54	1*1.35 + 4*1.50
30/	49/	ELU/6	-460.83	7.21>>	776.93	1*1.00 + 2*1.50
30/	49/	ELU/4	-551.13	-9.11<<	942.22	1*1.35 + 4*1.50
30/	49/	ELU/4	-551.13	-9.11	942.22>>	1*1.35 + 4*1.50
30/	54/	ELU/7	-492.21	-6.01	-21.37<<	1*1.00 + 3*1.50
31/	5/	ELU/3	523.26>>	0.79	-3.44	1*1.35 + 3*1.50
31/	10/	ELU/5	173.72<<	0.26	308.05	1*1.00
31/	5/	ELU/3	523.26	0.79>>	-3.44	1*1.35 + 3*1.50
31/	5/	ELU/6	280.81	-4.64<<	20.41	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
31/	10/	ELU/3	501.09	0.79	867.26>>	1*1.35 + 3*1.50
31/	5/	ELU/3	523.26	0.79	-3.44<<	1*1.35 + 3*1.50
32/	10/	ELU/3	426.51>>	1.40	838.40	1*1.35 + 3*1.50
32/	15/	ELU/5	121.51<<	0.44	520.37	1*1.00
32/	10/	ELU/3	426.51	1.40>>	838.40	1*1.35 + 3*1.50
32/	10/	ELU/6	207.25	-8.29<<	626.24	1*1.00 + 2*1.50
32/	15/	ELU/3	404.34	1.40	1544.62>>	1*1.35 + 3*1.50
32/	10/	ELU/5	137.93	0.44	299.84<<	1*1.00
34/	15/	ELU/3	330.48>>	1.17	1523.72	1*1.35 + 3*1.50
34/	25/	ELU/5	69.53<<	0.37	646.79	1*1.00
34/	15/	ELU/3	330.48	1.17>>	1523.72	1*1.35 + 3*1.50
34/	15/	ELU/6	129.59	-7.23<<	1078.14	1*1.00 + 2*1.50
34/	25/	ELU/3	308.32	1.17	2066.70>>	1*1.35 + 3*1.50
34/	15/	ELU/5	85.95	0.37	514.63<<	1*1.00
35/	25/	ELU/3	131.32>>	0.44	2056.70	1*1.35 + 3*1.50
35/	30/	ELU/5	17.69<<	0.14	687.88	1*1.00
35/	25/	ELU/3	131.32	0.44>>	2056.70	1*1.35 + 3*1.50
35/	25/	ELU/6	49.03	-2.82<<	1350.57	1*1.00 + 2*1.50
35/	30/	ELU/3	109.15	0.44	2261.10>>	1*1.35 + 3*1.50
35/	25/	ELU/5	34.11	0.14	643.85<<	1*1.00
36/	30/	ELU/8	8.61>>	-0.69	1274.84	1*1.00 + 4*1.50
36/	35/	ELU/3	-131.32<<	-0.44	2056.70	1*1.35 + 3*1.50
36/	30/	ELU/6	-32.60	2.82>>	1419.96	1*1.00 + 2*1.50
36/	30/	ELU/4	2.42	-0.74<<	1515.60	1*1.35 + 4*1.50
36/	30/	ELU/3	-109.15	-0.44	2261.10>>	1*1.35 + 3*1.50
36/	35/	ELU/5	-34.11	-0.14	643.85<<	1*1.00
38/	35/	ELU/8	-68.22>>	-1.03	1286.14	1*1.00 + 4*1.50
38/	45/	ELU/3	-330.48<<	-1.17	1523.72	1*1.35 + 3*1.50
38/	35/	ELU/6	-113.16	7.23>>	1284.48	1*1.00 + 2*1.50
38/	35/	ELU/3	-308.32	-1.17<<	2066.70	1*1.35 + 3*1.50
38/	35/	ELU/3	-308.32	-1.17	2066.70>>	1*1.35 + 3*1.50
38/	45/	ELU/5	-85.95	-0.37	514.63<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
39/	45/	ELU/5	-121.51>>	-0.44	520.37	1*1.00
39/	50/	ELU/3	-426.51<<	-1.40	838.40	1*1.35 + 3*1.50
39/	45/	ELU/6	-190.82	8.29>>	964.60	1*1.00 + 2*1.50
39/	45/	ELU/3	-404.34	-1.40<<	1544.62	1*1.35 + 3*1.50
39/	45/	ELU/3	-404.34	-1.40	1544.62>>	1*1.35 + 3*1.50
39/	50/	ELU/5	-137.93	-0.44	299.84<<	1*1.00
40/	50/	ELU/5	-173.72>>	-0.26	308.05	1*1.00
40/	55/	ELU/4	-526.94<<	-0.49	-1.24	1*1.35 + 4*1.50
40/	50/	ELU/6	-264.39	4.64>>	483.83	1*1.00 + 2*1.50
40/	50/	ELU/3	-501.09	-0.79<<	867.26	1*1.35 + 3*1.50
40/	50/	ELU/4	-504.77	-0.49	875.72>>	1*1.35 + 4*1.50
40/	55/	ELU/3	-523.26	-0.79	-3.44<<	1*1.35 + 3*1.50
41/	3/	ELU/2	0.79>>	0.00	0.08	1*1.35 + 2*1.50
41/	3/	ELU/5	0.22<<	0.00	0.07	1*1.00
41/	3/	ELU/3	0.63	4.83>>	0.12	1*1.35 + 3*1.50
41/	3/	ELU/5	0.22	0.00<<	0.07	1*1.00
41/	8/	ELU/2	0.79	0.00	1.42>>	1*1.35 + 2*1.50
41/	3/	ELU/6	0.71	0.00	0.06<<	1*1.00 + 2*1.50
42/	8/	ELU/2	1.48>>	0.00	0.67	1*1.35 + 2*1.50
42/	8/	ELU/5	0.20<<	0.00	0.52	1*1.00
42/	8/	ELU/3	0.96	5.60>>	0.98	1*1.35 + 3*1.50
42/	8/	ELU/5	0.20	0.00<<	0.52	1*1.00
42/	13/	ELU/2	1.48	0.00	3.18>>	1*1.35 + 2*1.50
42/	8/	ELU/6	1.41	0.00	0.49<<	1*1.00 + 2*1.50
44/	13/	ELU/2	6.53>>	0.00	-2.64	1*1.35 + 2*1.50
44/	13/	ELU/5	0.12<<	0.00	0.88	1*1.00
44/	13/	ELU/3	3.42	4.11>>	-0.20	1*1.35 + 3*1.50
44/	13/	ELU/5	0.12	0.00<<	0.88	1*1.00
44/	23/	ELU/2	6.53	0.00	8.46>>	1*1.35 + 2*1.50
44/	13/	ELU/6	6.49	0.00	-2.95<<	1*1.00 + 2*1.50
45/	23/	ELU/2	2.84>>	0.00	1.13	1*1.35 + 2*1.50
45/	23/	ELU/5	0.04<<	0.00	1.10	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
45/	23/	ELU/3	1.47	1.51>>	1.99	1*1.35 + 3*1.50
45/	23/	ELU/5	0.04	0.00<<	1.10	1*1.00
45/	28/	ELU/2	2.84	0.00	5.95>>	1*1.35 + 2*1.50
45/	23/	ELU/6	2.83	0.00	0.74<<	1*1.00 + 2*1.50
46/	28/	ELU/8	0.34>>	0.32	1.74	1*1.00 + 4*1.50
46/	28/	ELU/2	-2.84<<	0.00	5.95	1*1.35 + 2*1.50
46/	28/	ELU/4	0.32	0.32>>	2.15	1*1.35 + 4*1.50
46/	28/	ELU/7	-1.46	-1.51<<	4.08	1*1.00 + 3*1.50
46/	28/	ELU/2	-2.84	0.00	5.95>>	1*1.35 + 2*1.50
46/	33/	ELU/6	-2.83	0.00	0.74<<	1*1.00 + 2*1.50
48/	33/	ELU/8	2.53>>	-0.74	-0.25	1*1.00 + 4*1.50
48/	33/	ELU/2	-6.53<<	-0.00	8.46	1*1.35 + 2*1.50
48/	33/	ELU/5	-0.12	-0.00>>	1.09	1*1.00
48/	33/	ELU/3	-3.42	-4.11<<	5.60	1*1.35 + 3*1.50
48/	33/	ELU/2	-6.53	-0.00	8.46>>	1*1.35 + 2*1.50
48/	43/	ELU/6	-6.49	-0.00	-2.95<<	1*1.00 + 2*1.50
49/	43/	ELU/8	1.46>>	-2.04	0.23	1*1.00 + 4*1.50
49/	43/	ELU/2	-1.48<<	-0.00	3.18	1*1.35 + 2*1.50
49/	43/	ELU/5	-0.20	-0.00>>	0.86	1*1.00
49/	43/	ELU/3	-0.96	-5.60<<	2.62	1*1.35 + 3*1.50
49/	43/	ELU/2	-1.48	-0.00	3.18>>	1*1.35 + 2*1.50
49/	43/	ELU/8	1.46	-2.04	0.23<<	1*1.00 + 4*1.50
50/	48/	ELU/8	2.69>>	-2.39	-1.76	1*1.00 + 4*1.50
50/	48/	ELU/2	-0.79<<	-0.00	1.42	1*1.35 + 2*1.50
50/	48/	ELU/5	-0.22	-0.00>>	0.44	1*1.00
50/	48/	ELU/3	-0.63	-4.83<<	1.19	1*1.35 + 3*1.50
50/	53/	ELU/4	2.61	-2.39	2.84>>	1*1.35 + 4*1.50
50/	48/	ELU/8	2.69	-2.39	-1.76<<	1*1.00 + 4*1.50
51/	1/	ELU/4	17.09>>	-1.13	-10.28	1*1.35 + 4*1.50
51/	2/	ELU/2	-18.70<<	-19.97	-11.34	1*1.35 + 2*1.50
51/	1/	ELU/1	11.74	1.67>>	-7.35	1*1.35
51/	1/	ELU/6	10.66	-20.41<<	-4.22	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
51/	2/	ELU/5	-6.62	1.23	-2.67>>	1*1.00
51/	2/	ELU/2	-18.70	-19.97	-11.34<<	1*1.35 + 2*1.50
52/	2/	ELU/2	18.40>>	0.04	-4.24	1*1.35 + 2*1.50
52/	3/	ELU/7	-6.05<<	-24.28	2.48	1*1.00 + 3*1.50
52/	2/	ELU/1	12.04	0.04>>	-4.04	1*1.35
52/	2/	ELU/7	8.87	-24.28<<	0.73	1*1.00 + 3*1.50
52/	3/	ELU/2	0.39	0.04	7.11>>	1*1.35 + 2*1.50
52/	2/	ELU/2	18.40	0.04	-4.24<<	1*1.35 + 2*1.50
53/	3/	ELU/5	-0.11>>	-0.03	2.48	1*1.00
53/	4/	ELU/3	-24.65<<	-24.38	-10.68	1*1.35 + 3*1.50
53/	3/	ELU/6	-0.36	-0.03>>	6.24	1*1.00 + 2*1.50
53/	3/	ELU/3	-6.64	-24.38<<	8.17	1*1.35 + 3*1.50
53/	3/	ELU/3	-6.64	-24.38	8.17>>	1*1.35 + 3*1.50
53/	4/	ELU/3	-24.65	-24.38	-10.68<<	1*1.35 + 3*1.50
54/	4/	ELU/2	18.70>>	19.97	-11.34	1*1.35 + 2*1.50
54/	5/	ELU/3	-18.98<<	-3.44	-11.47	1*1.35 + 3*1.50
54/	4/	ELU/6	16.38	20.41>>	-10.41	1*1.00 + 2*1.50
54/	4/	ELU/3	13.43	-3.44<<	-4.56	1*1.35 + 3*1.50
54/	4/	ELU/5	6.62	-1.23	-2.67>>	1*1.00
54/	5/	ELU/3	-18.98	-3.44	-11.47<<	1*1.35 + 3*1.50
55/	51/	ELU/4	17.01>>	2.58	-10.22	1*1.35 + 4*1.50
55/	52/	ELU/2	-18.70<<	19.97	-11.34	1*1.35 + 2*1.50
55/	51/	ELU/6	10.66	20.41>>	-4.22	1*1.00 + 2*1.50
55/	51/	ELU/1	11.74	-1.67<<	-7.35	1*1.35
55/	52/	ELU/5	-6.62	-1.23	-2.67>>	1*1.00
55/	52/	ELU/2	-18.70	19.97	-11.34<<	1*1.35 + 2*1.50
56/	52/	ELU/4	28.02>>	11.94	-11.02	1*1.35 + 4*1.50
56/	53/	ELU/7	-6.05<<	24.28	2.48	1*1.00 + 3*1.50
56/	52/	ELU/7	8.87	24.28>>	0.73	1*1.00 + 3*1.50
56/	52/	ELU/1	12.04	-0.04<<	-4.04	1*1.35
56/	53/	ELU/4	10.01	11.94	11.87>>	1*1.35 + 4*1.50
56/	52/	ELU/4	28.02	11.94	-11.02<<	1*1.35 + 4*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
57/	53/	ELU/5	-0.11>>	0.03	2.48	1*1.00
57/	54/	ELU/4	-33.34<<	14.78	-15.01	1*1.35 + 4*1.50
57/	53/	ELU/3	-6.64	24.38>>	8.17	1*1.35 + 3*1.50
57/	53/	ELU/6	-0.36	0.03<<	6.24	1*1.00 + 2*1.50
57/	53/	ELU/4	-15.33	14.78	14.26>>	1*1.35 + 4*1.50
57/	54/	ELU/4	-33.34	14.78	-15.01<<	1*1.35 + 4*1.50
58/	54/	ELU/2	18.70>>	-19.97	-11.34	1*1.35 + 2*1.50
58/	55/	ELU/3	-18.98<<	3.44	-11.47	1*1.35 + 3*1.50
58/	54/	ELU/3	13.43	3.44>>	-4.56	1*1.35 + 3*1.50
58/	54/	ELU/6	16.38	-20.41<<	-10.41	1*1.00 + 2*1.50
58/	54/	ELU/5	6.62	1.23	-2.67>>	1*1.00
58/	55/	ELU/3	-18.98	3.44	-11.47<<	1*1.35 + 3*1.50
59/	6/	ELU/4	34.45>>	-10.47	-20.89	1*1.35 + 4*1.50
59/	7/	ELU/2	-32.60<<	-139.54	-17.17	1*1.35 + 2*1.50
59/	6/	ELU/1	23.06	11.08>>	-14.25	1*1.35
59/	6/	ELU/6	26.21	-142.41<<	-14.07	1*1.00 + 2*1.50
59/	7/	ELU/5	-13.53	8.20	-5.68>>	1*1.00
59/	6/	ELU/4	34.45	-10.47	-20.89<<	1*1.35 + 4*1.50
60/	7/	ELU/2	36.37>>	-0.37	-8.21	1*1.35 + 2*1.50
60/	8/	ELU/3	-1.56<<	-173.62	10.86	1*1.35 + 3*1.50
60/	7/	ELU/1	23.77	0.06>>	-7.90	1*1.35
60/	7/	ELU/7	28.30	-173.63<<	-6.99	1*1.00 + 3*1.50
60/	8/	ELU/2	0.34	-0.37	13.97>>	1*1.35 + 2*1.50
60/	7/	ELU/4	34.98	-48.01	-9.84<<	1*1.35 + 4*1.50
61/	8/	ELU/1	0.01>>	-0.06	6.50	1*1.35
61/	9/	ELU/3	-37.91<<	-173.41	-12.41	1*1.35 + 3*1.50
61/	8/	ELU/6	-0.35	0.39>>	12.28	1*1.00 + 2*1.50
61/	8/	ELU/3	-1.89	-173.41<<	11.63	1*1.35 + 3*1.50
61/	8/	ELU/2	-0.34	0.37	13.97>>	1*1.35 + 2*1.50
61/	9/	ELU/3	-37.91	-173.41	-12.41<<	1*1.35 + 3*1.50
62/	9/	ELU/2	32.60>>	139.54	-17.17	1*1.35 + 2*1.50
62/	10/	ELU/3	-37.10<<	-28.86	-21.96	1*1.35 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
62/	9/	ELU/6	27.87	142.41>>	-15.19	1*1.00 + 2*1.50
62/	9/	ELU/3	27.69	-28.86<<	-10.08	1*1.35 + 3*1.50
62/	9/	ELU/5	13.53	-8.20	-5.68>>	1*1.00
62/	10/	ELU/3	-37.10	-28.86	-21.96<<	1*1.35 + 3*1.50
63/	11/	ELU/2	36.20>>	-111.53	-22.39	1*1.35 + 2*1.50
63/	12/	ELU/3	-30.18<<	-53.75	-15.68	1*1.35 + 3*1.50
63/	11/	ELU/1	22.76	7.76>>	-13.90	1*1.35
63/	11/	ELU/6	30.30	-113.54<<	-18.78	1*1.00 + 2*1.50
63/	12/	ELU/5	-13.75	5.75	-5.93>>	1*1.00
63/	11/	ELU/2	36.20	-111.53	-22.39<<	1*1.35 + 2*1.50
64/	12/	ELU/3	41.49>>	-139.75	-15.69	1*1.35 + 3*1.50
64/	13/	ELU/1	-0.05<<	0.01	6.48	1*1.35
64/	12/	ELU/1	23.73	0.01>>	-7.88	1*1.35
64/	12/	ELU/7	35.34	-139.75<<	-13.65	1*1.00 + 3*1.50
64/	13/	ELU/2	2.53	-2.91	15.30>>	1*1.35 + 2*1.50
64/	12/	ELU/3	41.49	-139.75	-15.69<<	1*1.35 + 3*1.50
65/	13/	ELU/3	3.01>>	-136.92	11.14	1*1.35 + 3*1.50
65/	14/	ELU/2	-38.55<<	2.91	-9.50	1*1.35 + 2*1.50
65/	13/	ELU/6	-2.54	2.91>>	13.62	1*1.00 + 2*1.50
65/	13/	ELU/3	3.01	-136.92<<	11.14	1*1.35 + 3*1.50
65/	13/	ELU/2	-2.53	2.91	15.30>>	1*1.35 + 2*1.50
65/	14/	ELU/4	-35.36	-42.14	-10.26<<	1*1.35 + 4*1.50
66/	14/	ELU/4	29.33>>	-14.00	-12.96	1*1.35 + 4*1.50
66/	15/	ELU/3	-36.37<<	-20.90	-21.12	1*1.35 + 3*1.50
66/	14/	ELU/6	23.78	113.54>>	-10.49	1*1.00 + 2*1.50
66/	14/	ELU/3	28.42	-20.90<<	-10.91	1*1.35 + 3*1.50
66/	14/	ELU/5	13.75	-5.75	-5.93>>	1*1.00
66/	15/	ELU/2	-36.20	111.53	-22.39<<	1*1.35 + 2*1.50
71/	21/	ELU/2	39.05>>	-65.07	-25.67	1*1.35 + 2*1.50
71/	22/	ELU/4	-29.74<<	-9.32	-14.42	1*1.35 + 4*1.50
71/	21/	ELU/1	22.57	3.96>>	-13.69	1*1.35
71/	21/	ELU/6	33.20	-66.09<<	-22.13	1*1.00 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
71/	22/	ELU/5	-13.89	2.94	-6.09>>	1*1.00
71/	21/	ELU/2	39.05	-65.07	-25.67<<	1*1.35 + 2*1.50
72/	22/	ELU/2	56.23>>	-3.67	-20.08	1*1.35 + 2*1.50
72/	23/	ELU/1	-0.06<<	0.00	6.47	1*1.35
72/	22/	ELU/1	23.73	0.00>>	-7.88	1*1.35
72/	22/	ELU/7	48.09	-81.63<<	-23.09	1*1.00 + 3*1.50
72/	23/	ELU/2	20.21	-3.67	25.94>>	1*1.35 + 2*1.50
72/	22/	ELU/3	54.24	-81.63	-25.13<<	1*1.35 + 3*1.50
73/	23/	ELU/4	1.89>>	-33.51	10.61	1*1.35 + 4*1.50
73/	24/	ELU/2	-56.23<<	3.67	-20.08	1*1.35 + 2*1.50
73/	23/	ELU/6	-20.23	3.67>>	24.26	1*1.00 + 2*1.50
73/	23/	ELU/3	-1.90	-78.01<<	15.90	1*1.35 + 3*1.50
73/	23/	ELU/2	-20.21	3.67	25.94>>	1*1.35 + 2*1.50
73/	24/	ELU/2	-56.23	3.67	-20.08<<	1*1.35 + 2*1.50
74/	24/	ELU/4	29.64>>	-6.03	-13.32	1*1.35 + 4*1.50
74/	25/	ELU/2	-39.05<<	65.07	-25.67	1*1.35 + 2*1.50
74/	24/	ELU/6	20.88	66.09>>	-7.16	1*1.00 + 2*1.50
74/	24/	ELU/3	28.85	-10.00<<	-11.40	1*1.35 + 3*1.50
74/	24/	ELU/5	13.89	-2.94	-6.09>>	1*1.00
74/	25/	ELU/2	-39.05	65.07	-25.67<<	1*1.35 + 2*1.50
75/	26/	ELU/2	40.10>>	-0.00	-26.89	1*1.35 + 2*1.50
75/	27/	ELU/4	-29.54<<	-5.51	-14.20	1*1.35 + 4*1.50
75/	26/	ELU/5	16.67	-0.00>>	-10.09	1*1.00
75/	26/	ELU/4	35.25	-5.51<<	-21.83	1*1.35 + 4*1.50
75/	27/	ELU/6	-19.80	-0.00	-5.93>>	1*1.00 + 2*1.50
75/	26/	ELU/2	40.10	-0.00	-26.89<<	1*1.35 + 2*1.50
76/	27/	ELU/2	64.07>>	-0.00	-24.77	1*1.35 + 2*1.50
76/	28/	ELU/1	-0.06<<	-0.00	6.47	1*1.35
76/	27/	ELU/5	17.57	-0.00>>	-5.84	1*1.00
76/	27/	ELU/4	38.88	-20.47<<	-13.93	1*1.35 + 4*1.50
76/	28/	ELU/2	28.05	-0.00	30.65>>	1*1.35 + 2*1.50
76/	27/	ELU/3	59.59	-0.00	-28.99<<	1*1.35 + 3*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
77/	28/	ELU/4	2.73>>	-20.12	10.57	1*1.35 + 4*1.50
77/	29/	ELU/2	-64.07<<	-0.00	-24.77	1*1.35 + 2*1.50
77/	28/	ELU/5	0.04	-0.00>>	4.80	1*1.00
77/	28/	ELU/4	2.73	-20.12<<	10.57	1*1.35 + 4*1.50
77/	28/	ELU/2	-28.05	-0.00	30.65>>	1*1.35 + 2*1.50
77/	29/	ELU/2	-64.07	-0.00	-24.77<<	1*1.35 + 2*1.50
78/	29/	ELU/4	29.69>>	3.11	-13.38	1*1.35 + 4*1.50
78/	30/	ELU/2	-40.10<<	0.00	-26.89	1*1.35 + 2*1.50
78/	29/	ELU/8	24.81	3.11>>	-11.23	1*1.00 + 4*1.50
78/	29/	ELU/3	28.99	-0.00<<	-11.56	1*1.35 + 3*1.50
78/	29/	ELU/6	19.80	0.00	-5.93>>	1*1.00 + 2*1.50
78/	30/	ELU/2	-40.10	0.00	-26.89<<	1*1.35 + 2*1.50
79/	31/	ELU/2	39.05>>	65.07	-25.67	1*1.35 + 2*1.50
79/	32/	ELU/4	-29.49<<	1.04	-14.15	1*1.35 + 4*1.50
79/	31/	ELU/6	33.20	66.09>>	-22.13	1*1.00 + 2*1.50
79/	31/	ELU/1	22.57	-3.96<<	-13.69	1*1.35
79/	32/	ELU/5	-13.89	-2.94	-6.09>>	1*1.00
79/	31/	ELU/2	39.05	65.07	-25.67<<	1*1.35 + 2*1.50
80/	32/	ELU/2	56.23>>	3.67	-20.08	1*1.35 + 2*1.50
80/	33/	ELU/1	-0.06<<	-0.00	6.47	1*1.35
80/	32/	ELU/7	48.09	81.63>>	-23.09	1*1.00 + 3*1.50
80/	32/	ELU/4	40.43	-0.30<<	-14.98	1*1.35 + 4*1.50
80/	33/	ELU/2	20.21	3.67	25.94>>	1*1.35 + 2*1.50
80/	32/	ELU/3	54.24	81.63	-25.13<<	1*1.35 + 3*1.50
81/	33/	ELU/4	2.25>>	2.27	11.01	1*1.35 + 4*1.50
81/	34/	ELU/2	-56.23<<	-3.67	-20.08	1*1.35 + 2*1.50
81/	33/	ELU/3	-1.90	78.01>>	15.90	1*1.35 + 3*1.50
81/	33/	ELU/6	-20.23	-3.67<<	24.26	1*1.00 + 2*1.50
81/	33/	ELU/2	-20.21	-3.67	25.94>>	1*1.35 + 2*1.50
81/	34/	ELU/2	-56.23	-3.67	-20.08<<	1*1.35 + 2*1.50
82/	34/	ELU/4	29.47>>	11.65	-13.13	1*1.35 + 4*1.50
82/	35/	ELU/2	-39.05<<	-65.07	-25.67	1*1.35 + 2*1.50

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
82/	34/	ELU/4	29.47	11.65>>	-13.13	1*1.35 + 4*1.50
82/	34/	ELU/6	20.88	-66.09<<	-7.16	1*1.00 + 2*1.50
82/	34/	ELU/5	13.89	2.94	-6.09>>	1*1.00
82/	35/	ELU/2	-39.05	-65.07	-25.67<<	1*1.35 + 2*1.50
87/	41/	ELU/2	36.20>>	111.53	-22.39	1*1.35 + 2*1.50
87/	42/	ELU/3	-30.18<<	53.75	-15.68	1*1.35 + 3*1.50
87/	41/	ELU/6	30.30	113.54>>	-18.78	1*1.00 + 2*1.50
87/	41/	ELU/1	22.76	-7.76<<	-13.90	1*1.35
87/	42/	ELU/5	-13.75	-5.75	-5.93>>	1*1.00
87/	41/	ELU/2	36.20	111.53	-22.39<<	1*1.35 + 2*1.50
88/	42/	ELU/4	48.02>>	34.35	-19.19	1*1.35 + 4*1.50
88/	43/	ELU/1	-0.05<<	-0.01	6.48	1*1.35
88/	42/	ELU/7	35.34	139.75>>	-13.65	1*1.00 + 3*1.50
88/	42/	ELU/1	23.73	-0.01<<	-7.88	1*1.35
88/	43/	ELU/4	12.00	34.35	16.97>>	1*1.35 + 4*1.50
88/	42/	ELU/4	48.02	34.35	-19.19<<	1*1.35 + 4*1.50
89/	43/	ELU/3	3.01>>	136.92	11.14	1*1.35 + 3*1.50
89/	44/	ELU/4	-42.04<<	38.18	-13.32	1*1.35 + 4*1.50
89/	43/	ELU/3	3.01	136.92>>	11.14	1*1.35 + 3*1.50
89/	43/	ELU/6	-2.54	-2.91<<	13.62	1*1.00 + 2*1.50
89/	43/	ELU/4	-6.02	38.18	15.67>>	1*1.35 + 4*1.50
89/	44/	ELU/4	-42.04	38.18	-13.32<<	1*1.35 + 4*1.50
90/	44/	ELU/4	29.05>>	16.01	-12.66	1*1.35 + 4*1.50
90/	45/	ELU/3	-36.37<<	20.90	-21.12	1*1.35 + 3*1.50
90/	44/	ELU/3	28.42	20.90>>	-10.91	1*1.35 + 3*1.50
90/	44/	ELU/6	23.78	-113.54<<	-10.49	1*1.00 + 2*1.50
90/	44/	ELU/5	13.75	5.75	-5.93>>	1*1.00
90/	45/	ELU/2	-36.20	-111.53	-22.39<<	1*1.35 + 2*1.50
91/	46/	ELU/4	34.64>>	18.82	-21.16	1*1.35 + 4*1.50
91/	47/	ELU/2	-32.60<<	139.54	-17.17	1*1.35 + 2*1.50
91/	46/	ELU/6	26.21	142.41>>	-14.07	1*1.00 + 2*1.50
91/	46/	ELU/1	23.06	-11.08<<	-14.25	1*1.35

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
91/	47/	ELU/5	-13.53	-8.20	-5.68>>	1*1.00
91/	46/	ELU/4	34.64	18.82	-21.16<<	1*1.35 + 4*1.50
92/	47/	ELU/4	51.31>>	77.93	-20.25	1*1.35 + 4*1.50
92/	48/	ELU/3	-1.56<<	173.62	10.86	1*1.35 + 3*1.50
92/	47/	ELU/7	28.30	173.63>>	-6.99	1*1.00 + 3*1.50
92/	47/	ELU/1	23.77	-0.06<<	-7.90	1*1.35
92/	48/	ELU/4	15.29	77.93	19.86>>	1*1.35 + 4*1.50
92/	47/	ELU/4	51.31	77.93	-20.25<<	1*1.35 + 4*1.50
93/	48/	ELU/1	0.01>>	0.06	6.50	1*1.35
93/	49/	ELU/4	-49.90<<	82.42	-18.91	1*1.35 + 4*1.50
93/	48/	ELU/3	-1.89	173.41>>	11.63	1*1.35 + 3*1.50
93/	48/	ELU/6	-0.35	-0.39<<	12.28	1*1.00 + 2*1.50
93/	48/	ELU/4	-13.88	82.42	19.51>>	1*1.35 + 4*1.50
93/	49/	ELU/4	-49.90	82.42	-18.91<<	1*1.35 + 4*1.50
94/	49/	ELU/2	32.60>>	-139.54	-17.17	1*1.35 + 2*1.50
94/	50/	ELU/3	-37.10<<	28.86	-21.96	1*1.35 + 3*1.50
94/	49/	ELU/3	27.69	28.86>>	-10.08	1*1.35 + 3*1.50
94/	49/	ELU/6	27.87	-142.41<<	-15.19	1*1.00 + 2*1.50
94/	49/	ELU/5	13.53	8.20	-5.68>>	1*1.00
94/	50/	ELU/3	-37.10	28.86	-21.96<<	1*1.35 + 3*1.50

Esfuerzos - Casos: 9 10 : Envolvente: 2

- Caso: 8 (ELS)

Filtrar	Barra	Caso
Lista completa	1 2 4A6 8A12 14	1A10
Selección	1 2 4A6 8A12 14	8
Número total	76	10
Número seleccionado	76	1

- Casos: 9 10

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
1/	1/	ELS/2	250.59>>	3.01	13.19	1*1.00 + 2*1.00
1/	6/	ELS/1	173.72<<	-0.26	308.05	1*1.00
1/	1/	ELS/2	250.59	3.01>>	13.19	1*1.00 + 2*1.00
1/	1/	ELS/1	190.14	-0.26<<	-1.23	1*1.00
1/	6/	ELS/2	234.17	3.01	425.23>>	1*1.00 + 2*1.00
1/	1/	ELS/1	190.14	-0.26	-1.23<<	1*1.00
2/	6/	ELS/2	184.14>>	5.38	517.44	1*1.00 + 2*1.00
2/	11/	ELS/1	121.51<<	-0.44	520.37	1*1.00
2/	6/	ELS/2	184.14	5.38>>	517.44	1*1.00 + 2*1.00
2/	6/	ELS/1	137.93	-0.44<<	299.84	1*1.00
2/	11/	ELS/2	167.72	5.38	816.52>>	1*1.00 + 2*1.00
2/	6/	ELS/1	137.93	-0.44	299.84<<	1*1.00
4/	11/	ELS/2	115.04>>	4.69	890.30	1*1.00 + 2*1.00
4/	21/	ELS/1	69.53<<	-0.37	646.79	1*1.00
4/	11/	ELS/2	115.04	4.69>>	890.30	1*1.00 + 2*1.00
4/	11/	ELS/1	85.95	-0.37<<	514.63	1*1.00
4/	21/	ELS/2	98.62	4.69	1071.92>>	1*1.00 + 2*1.00
4/	11/	ELS/1	85.95	-0.37	514.63<<	1*1.00
5/	21/	ELS/2	44.05>>	1.83	1115.00	1*1.00 + 2*1.00
5/	26/	ELS/1	17.69<<	-0.14	687.88	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
5/	21/	ELS/2	44.05	1.83>>	1115.00	1*1.00 + 2*1.00
5/	21/	ELS/1	34.11	-0.14<<	643.85	1*1.00
5/	26/	ELS/2	27.63	1.83	1175.93>>	1*1.00 + 2*1.00
5/	21/	ELS/1	34.11	-0.14	643.85<<	1*1.00
6/	26/	ELS/1	-17.69>>	0.14	687.88	1*1.00
6/	31/	ELS/2	-44.05<<	-1.83	1115.00	1*1.00 + 2*1.00
6/	26/	ELS/4	-26.10	0.17>>	950.72	1*1.00 + 4*1.00
6/	26/	ELS/2	-27.63	-1.83<<	1175.93	1*1.00 + 2*1.00
6/	26/	ELS/2	-27.63	-1.83	1175.93>>	1*1.00 + 2*1.00
6/	31/	ELS/1	-34.11	0.14	643.85<<	1*1.00
8/	31/	ELS/1	-69.53>>	0.37	646.79	1*1.00
8/	41/	ELS/2	-115.04<<	-4.69	890.30	1*1.00 + 2*1.00
8/	31/	ELS/1	-69.53	0.37>>	646.79	1*1.00
8/	31/	ELS/2	-98.62	-4.69<<	1071.92	1*1.00 + 2*1.00
8/	31/	ELS/2	-98.62	-4.69	1071.92>>	1*1.00 + 2*1.00
8/	41/	ELS/1	-85.95	0.37	514.63<<	1*1.00
9/	41/	ELS/1	-121.51>>	0.44	520.37	1*1.00
9/	46/	ELS/2	-184.14<<	-5.38	517.44	1*1.00 + 2*1.00
9/	41/	ELS/1	-121.51	0.44>>	520.37	1*1.00
9/	41/	ELS/2	-167.72	-5.38<<	816.52	1*1.00 + 2*1.00
9/	41/	ELS/2	-167.72	-5.38	816.52>>	1*1.00 + 2*1.00
9/	46/	ELS/1	-137.93	0.44	299.84<<	1*1.00
10/	46/	ELS/1	-173.72>>	0.26	308.05	1*1.00
10/	51/	ELS/2	-250.59<<	-3.01	13.19	1*1.00 + 2*1.00
10/	46/	ELS/1	-173.72	0.26>>	308.05	1*1.00
10/	46/	ELS/2	-234.17	-3.01<<	425.23	1*1.00 + 2*1.00
10/	46/	ELS/2	-234.17	-3.01	425.23>>	1*1.00 + 2*1.00
10/	51/	ELS/1	-190.14	0.26	-1.23<<	1*1.00
11/	2/	ELS/2	376.62>>	4.70	-13.22	1*1.00 + 2*1.00
11/	7/	ELS/1	158.96<<	-0.32	285.38	1*1.00
11/	2/	ELS/3	253.54	6.51>>	10.45	1*1.00 + 3*1.00
11/	2/	ELS/1	175.38	-0.32<<	1.20	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
11/	7/	ELS/2	360.20	4.70	613.08>>	1*1.00 + 2*1.00
11/	2/	ELS/2	376.62	4.70	-13.22<<	1*1.00 + 2*1.00
12/	7/	ELS/2	311.11>>	10.66	521.12	1*1.00 + 2*1.00
12/	12/	ELS/1	111.40<<	-0.50	496.88	1*1.00
12/	7/	ELS/3	189.67	12.33>>	499.27	1*1.00 + 3*1.00
12/	7/	ELS/1	127.82	-0.50<<	293.55	1*1.00
12/	12/	ELS/2	294.69	10.66	1036.05>>	1*1.00 + 2*1.00
12/	7/	ELS/1	127.82	-0.50	293.55<<	1*1.00
14/	12/	ELS/2	246.80>>	12.71	964.21	1*1.00 + 2*1.00
14/	22/	ELS/1	63.64<<	-0.41	624.77	1*1.00
14/	12/	ELS/2	246.80	12.71>>	964.21	1*1.00 + 2*1.00
14/	12/	ELS/1	80.07	-0.41<<	502.62	1*1.00
14/	22/	ELS/2	230.38	12.71	1369.81>>	1*1.00 + 2*1.00
14/	12/	ELS/1	80.07	-0.41	502.62<<	1*1.00
15/	22/	ELS/2	99.05>>	5.55	1329.17	1*1.00 + 2*1.00
15/	27/	ELS/1	15.76<<	-0.15	668.45	1*1.00
15/	22/	ELS/4	43.51	9.24>>	901.63	1*1.00 + 4*1.00
15/	22/	ELS/1	32.18	-0.15<<	627.71	1*1.00
15/	27/	ELS/2	82.63	5.55	1483.59>>	1*1.00 + 2*1.00
15/	22/	ELS/1	32.18	-0.15	627.71<<	1*1.00
16/	27/	ELS/1	-15.76>>	0.15	668.45	1*1.00
16/	32/	ELS/2	-99.05<<	-5.55	1329.17	1*1.00 + 2*1.00
16/	27/	ELS/4	-21.68	9.45>>	971.61	1*1.00 + 4*1.00
16/	27/	ELS/2	-82.63	-5.55<<	1483.59	1*1.00 + 2*1.00
16/	27/	ELS/2	-82.63	-5.55	1483.59>>	1*1.00 + 2*1.00
16/	32/	ELS/1	-32.18	0.15	627.71<<	1*1.00
18/	32/	ELS/1	-63.64>>	0.41	624.77	1*1.00
18/	42/	ELS/2	-246.80<<	-12.71	964.21	1*1.00 + 2*1.00
18/	32/	ELS/4	-87.86	8.92>>	921.40	1*1.00 + 4*1.00
18/	32/	ELS/2	-230.38	-12.71<<	1369.81	1*1.00 + 2*1.00
18/	32/	ELS/2	-230.38	-12.71	1369.81>>	1*1.00 + 2*1.00
18/	42/	ELS/1	-80.07	0.41	502.62<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
19/	42/	ELS/1	-111.40>>	0.50	496.88	1*1.00
19/	47/	ELS/2	-311.11<<	-10.66	521.12	1*1.00 + 2*1.00
19/	42/	ELS/4	-159.22	5.73>>	741.37	1*1.00 + 4*1.00
19/	42/	ELS/3	-173.25	-12.33<<	807.75	1*1.00 + 3*1.00
19/	42/	ELS/2	-294.69	-10.66	1036.05>>	1*1.00 + 2*1.00
19/	47/	ELS/1	-127.82	0.50	293.55<<	1*1.00
20/	47/	ELS/1	-158.96>>	0.32	285.38	1*1.00
20/	52/	ELS/2	-376.62<<	-4.70	-13.22	1*1.00 + 2*1.00
20/	47/	ELS/4	-233.06	2.16>>	416.52	1*1.00 + 4*1.00
20/	47/	ELS/3	-237.12	-6.51<<	427.52	1*1.00 + 3*1.00
20/	47/	ELS/2	-360.20	-4.70	613.08>>	1*1.00 + 2*1.00
20/	52/	ELS/2	-376.62	-4.70	-13.22<<	1*1.00 + 2*1.00
21/	4/	ELS/3	386.60>>	4.11	-13.84	1*1.00 + 3*1.00
21/	9/	ELS/1	158.96<<	0.32	285.38	1*1.00
21/	4/	ELS/3	386.60	4.11>>	-13.84	1*1.00 + 3*1.00
21/	4/	ELS/2	376.62	-4.70<<	-13.22	1*1.00 + 2*1.00
21/	9/	ELS/3	370.18	4.11	629.41>>	1*1.00 + 3*1.00
21/	4/	ELS/3	386.60	4.11	-13.84<<	1*1.00 + 3*1.00
22/	9/	ELS/3	323.33>>	5.69	533.86	1*1.00 + 3*1.00
22/	14/	ELS/1	111.40<<	0.50	496.88	1*1.00
22/	9/	ELS/3	323.33	5.69>>	533.86	1*1.00 + 3*1.00
22/	9/	ELS/2	311.11	-10.66<<	521.12	1*1.00 + 2*1.00
22/	14/	ELS/3	306.90	5.69	1069.55>>	1*1.00 + 3*1.00
22/	9/	ELS/1	127.82	0.50	293.55<<	1*1.00
24/	14/	ELS/3	262.82>>	3.07	992.78	1*1.00 + 3*1.00
24/	24/	ELS/1	63.64<<	0.41	624.77	1*1.00
24/	14/	ELS/3	262.82	3.07>>	992.78	1*1.00 + 3*1.00
24/	14/	ELS/2	246.80	-12.71<<	964.21	1*1.00 + 2*1.00
24/	24/	ELS/3	246.40	3.07	1425.61>>	1*1.00 + 3*1.00
24/	14/	ELS/1	80.07	0.41	502.62<<	1*1.00
25/	24/	ELS/3	106.02>>	0.88	1380.56	1*1.00 + 3*1.00
25/	29/	ELS/1	15.76<<	0.15	668.45	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
25/	24/	ELS/3	106.02	0.88>>	1380.56	1*1.00 + 3*1.00
25/	24/	ELS/2	99.05	-5.55<<	1329.17	1*1.00 + 2*1.00
25/	29/	ELS/3	89.60	0.88	1546.84>>	1*1.00 + 3*1.00
25/	24/	ELS/1	32.18	0.15	627.71<<	1*1.00
26/	29/	ELS/4	15.01>>	-7.66	1030.06	1*1.00 + 4*1.00
26/	34/	ELS/3	-106.02<<	-0.88	1380.56	1*1.00 + 3*1.00
26/	29/	ELS/2	-82.63	5.55>>	1483.59	1*1.00 + 2*1.00
26/	29/	ELS/4	15.01	-7.66<<	1030.06	1*1.00 + 4*1.00
26/	29/	ELS/3	-89.60	-0.88	1546.84>>	1*1.00 + 3*1.00
26/	34/	ELS/1	-32.18	-0.15	627.71<<	1*1.00
28/	34/	ELS/4	-46.72>>	-11.06	1035.08	1*1.00 + 4*1.00
28/	44/	ELS/3	-262.82<<	-3.07	992.78	1*1.00 + 3*1.00
28/	34/	ELS/2	-230.38	12.71>>	1369.81	1*1.00 + 2*1.00
28/	34/	ELS/4	-46.72	-11.06<<	1035.08	1*1.00 + 4*1.00
28/	34/	ELS/3	-246.40	-3.07	1425.61>>	1*1.00 + 3*1.00
28/	44/	ELS/1	-80.07	-0.41	502.62<<	1*1.00
29/	44/	ELS/1	-111.40>>	-0.50	496.88	1*1.00
29/	49/	ELS/3	-323.33<<	-5.69	533.86	1*1.00 + 3*1.00
29/	44/	ELS/2	-294.69	10.66>>	1036.05	1*1.00 + 2*1.00
29/	44/	ELS/4	-194.01	-10.63<<	955.91	1*1.00 + 4*1.00
29/	44/	ELS/3	-306.90	-5.69	1069.55>>	1*1.00 + 3*1.00
29/	49/	ELS/1	-127.82	-0.50	293.55<<	1*1.00
30/	49/	ELS/1	-158.96>>	-0.32	285.38	1*1.00
30/	54/	ELS/4	-399.74<<	-6.11	-8.91	1*1.00 + 4*1.00
30/	49/	ELS/2	-360.20	4.70>>	613.08	1*1.00 + 2*1.00
30/	49/	ELS/4	-383.31	-6.11<<	656.69	1*1.00 + 4*1.00
30/	49/	ELS/4	-383.31	-6.11	656.69>>	1*1.00 + 4*1.00
30/	54/	ELS/3	-386.60	-4.11	-13.84<<	1*1.00 + 3*1.00
31/	5/	ELS/3	367.85>>	0.55	-2.41	1*1.00 + 3*1.00
31/	10/	ELS/1	173.72<<	0.26	308.05	1*1.00
31/	5/	ELS/3	367.85	0.55>>	-2.41	1*1.00 + 3*1.00
31/	5/	ELS/2	250.59	-3.01<<	13.19	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
31/	10/	ELS/3	351.43	0.55	608.98>>	1*1.00 + 3*1.00
31/	5/	ELS/3	367.85	0.55	-2.41<<	1*1.00 + 3*1.00
32/	10/	ELS/3	298.13>>	0.98	588.92	1*1.00 + 3*1.00
32/	15/	ELS/1	121.51<<	0.44	520.37	1*1.00
32/	10/	ELS/3	298.13	0.98>>	588.92	1*1.00 + 3*1.00
32/	10/	ELS/2	184.14	-5.38<<	517.44	1*1.00 + 2*1.00
32/	15/	ELS/3	281.71	0.98	1081.78>>	1*1.00 + 3*1.00
32/	10/	ELS/1	137.93	0.44	299.84<<	1*1.00
34/	15/	ELS/3	228.92>>	0.82	1067.28	1*1.00 + 3*1.00
34/	25/	ELS/1	69.53<<	0.37	646.79	1*1.00
34/	15/	ELS/3	228.92	0.82>>	1067.28	1*1.00 + 3*1.00
34/	15/	ELS/2	115.04	-4.69<<	890.30	1*1.00 + 2*1.00
34/	25/	ELS/3	212.50	0.82	1442.48>>	1*1.00 + 3*1.00
34/	15/	ELS/1	85.95	0.37	514.63<<	1*1.00
35/	25/	ELS/3	90.96>>	0.31	1435.52	1*1.00 + 3*1.00
35/	30/	ELS/1	17.69<<	0.14	687.88	1*1.00
35/	25/	ELS/3	90.96	0.31>>	1435.52	1*1.00 + 3*1.00
35/	25/	ELS/2	44.05	-1.83<<	1115.00	1*1.00 + 2*1.00
35/	30/	ELS/3	74.54	0.31	1576.19>>	1*1.00 + 3*1.00
35/	25/	ELS/1	34.11	0.14	643.85<<	1*1.00
36/	30/	ELS/4	-0.16>>	-0.51	1079.19	1*1.00 + 4*1.00
36/	35/	ELS/3	-90.96<<	-0.31	1435.52	1*1.00 + 3*1.00
36/	30/	ELS/2	-27.63	1.83>>	1175.93	1*1.00 + 2*1.00
36/	30/	ELS/4	-0.16	-0.51<<	1079.19	1*1.00 + 4*1.00
36/	30/	ELS/3	-74.54	-0.31	1576.19>>	1*1.00 + 3*1.00
36/	35/	ELS/1	-34.11	-0.14	643.85<<	1*1.00
38/	35/	ELS/4	-68.66>>	-0.81	1073.02	1*1.00 + 4*1.00
38/	45/	ELS/3	-228.92<<	-0.82	1067.28	1*1.00 + 3*1.00
38/	35/	ELS/2	-98.62	4.69>>	1071.92	1*1.00 + 2*1.00
38/	35/	ELS/3	-212.50	-0.82<<	1442.48	1*1.00 + 3*1.00
38/	35/	ELS/3	-212.50	-0.82	1442.48>>	1*1.00 + 3*1.00
38/	45/	ELS/1	-85.95	-0.37	514.63<<	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
39/	45/	ELS/1	-121.51>>	-0.44	520.37	1*1.00
39/	50/	ELS/3	-298.13<<	-0.98	588.92	1*1.00 + 3*1.00
39/	45/	ELS/2	-167.72	5.38>>	816.52	1*1.00 + 2*1.00
39/	45/	ELS/3	-281.71	-0.98<<	1081.78	1*1.00 + 3*1.00
39/	45/	ELS/3	-281.71	-0.98	1081.78>>	1*1.00 + 3*1.00
39/	50/	ELS/1	-137.93	-0.44	299.84<<	1*1.00
40/	50/	ELS/1	-173.72>>	-0.26	308.05	1*1.00
40/	55/	ELS/4	-370.31<<	-0.35	-0.95	1*1.00 + 4*1.00
40/	50/	ELS/2	-234.17	3.01>>	425.23	1*1.00 + 2*1.00
40/	50/	ELS/3	-351.43	-0.55<<	608.98	1*1.00 + 3*1.00
40/	50/	ELS/4	-353.89	-0.35	614.62>>	1*1.00 + 4*1.00
40/	55/	ELS/3	-367.85	-0.55	-2.41<<	1*1.00 + 3*1.00
41/	3/	ELS/2	0.55>>	0.00	0.06	1*1.00 + 2*1.00
41/	3/	ELS/1	0.22<<	0.00	0.07	1*1.00
41/	3/	ELS/3	0.44	3.22>>	0.09	1*1.00 + 3*1.00
41/	3/	ELS/1	0.22	0.00<<	0.07	1*1.00
41/	8/	ELS/2	0.55	0.00	0.99>>	1*1.00 + 2*1.00
41/	3/	ELS/2	0.55	0.00	0.06<<	1*1.00 + 2*1.00
42/	8/	ELS/2	1.00>>	0.00	0.50	1*1.00 + 2*1.00
42/	8/	ELS/1	0.20<<	0.00	0.52	1*1.00
42/	8/	ELS/3	0.66	3.74>>	0.71	1*1.00 + 3*1.00
42/	8/	ELS/1	0.20	0.00<<	0.52	1*1.00
42/	13/	ELS/2	1.00	0.00	2.21>>	1*1.00 + 2*1.00
42/	8/	ELS/2	1.00	0.00	0.50<<	1*1.00 + 2*1.00
44/	13/	ELS/2	4.37>>	0.00	-1.67	1*1.00 + 2*1.00
44/	13/	ELS/1	0.12<<	0.00	0.88	1*1.00
44/	13/	ELS/3	2.29	2.74>>	-0.05	1*1.00 + 3*1.00
44/	13/	ELS/1	0.12	0.00<<	0.88	1*1.00
44/	23/	ELS/2	4.37	0.00	5.75>>	1*1.00 + 2*1.00
44/	13/	ELS/2	4.37	0.00	-1.67<<	1*1.00 + 2*1.00
45/	23/	ELS/2	1.90>>	0.00	0.86	1*1.00 + 2*1.00
45/	23/	ELS/1	0.04<<	0.00	1.10	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
45/	23/	ELS/3	0.98	1.01>>	1.44	1*1.00 + 3*1.00
45/	23/	ELS/1	0.04	0.00<<	1.10	1*1.00
45/	28/	ELS/2	1.90	0.00	4.09>>	1*1.00 + 2*1.00
45/	23/	ELS/2	1.90	0.00	0.86<<	1*1.00 + 2*1.00
46/	28/	ELS/4	0.21>>	0.21	1.55	1*1.00 + 4*1.00
46/	28/	ELS/2	-1.90<<	0.00	4.09	1*1.00 + 2*1.00
46/	28/	ELS/4	0.21	0.21>>	1.55	1*1.00 + 4*1.00
46/	28/	ELS/3	-0.98	-1.01<<	3.11	1*1.00 + 3*1.00
46/	28/	ELS/2	-1.90	0.00	4.09>>	1*1.00 + 2*1.00
46/	33/	ELS/2	-1.90	0.00	0.86<<	1*1.00 + 2*1.00
48/	33/	ELS/4	1.64>>	-0.49	0.20	1*1.00 + 4*1.00
48/	33/	ELS/2	-4.37<<	-0.00	5.75	1*1.00 + 2*1.00
48/	33/	ELS/1	-0.12	-0.00>>	1.09	1*1.00
48/	33/	ELS/3	-2.29	-2.74<<	3.85	1*1.00 + 3*1.00
48/	33/	ELS/2	-4.37	-0.00	5.75>>	1*1.00 + 2*1.00
48/	43/	ELS/2	-4.37	-0.00	-1.67<<	1*1.00 + 2*1.00
49/	43/	ELS/4	0.91>>	-1.36	0.44	1*1.00 + 4*1.00
49/	43/	ELS/2	-1.00<<	-0.00	2.21	1*1.00 + 2*1.00
49/	43/	ELS/1	-0.20	-0.00>>	0.86	1*1.00
49/	43/	ELS/3	-0.66	-3.74<<	1.83	1*1.00 + 3*1.00
49/	43/	ELS/2	-1.00	-0.00	2.21>>	1*1.00 + 2*1.00
49/	43/	ELS/4	0.91	-1.36	0.44<<	1*1.00 + 4*1.00
50/	48/	ELS/4	1.72>>	-1.59	-1.02	1*1.00 + 4*1.00
50/	48/	ELS/2	-0.55<<	-0.00	0.99	1*1.00 + 2*1.00
50/	48/	ELS/1	-0.22	-0.00>>	0.44	1*1.00
50/	48/	ELS/3	-0.44	-3.22<<	0.84	1*1.00 + 3*1.00
50/	53/	ELS/4	1.72	-1.59	1.90>>	1*1.00 + 4*1.00
50/	48/	ELS/4	1.72	-1.59	-1.02<<	1*1.00 + 4*1.00
51/	1/	ELS/4	12.26>>	-0.63	-7.40	1*1.00 + 4*1.00
51/	2/	ELS/2	-13.13<<	-13.19	-7.83	1*1.00 + 2*1.00
51/	1/	ELS/1	8.69	1.23>>	-5.45	1*1.00
51/	1/	ELS/2	10.01	-13.19<<	-4.63	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
51/	2/	ELS/1	-6.62	1.23	-2.67>>	1*1.00
51/	2/	ELS/2	-13.13	-13.19	-7.83<<	1*1.00 + 2*1.00
52/	2/	ELS/2	13.16>>	0.03	-3.13	1*1.00 + 2*1.00
52/	3/	ELS/3	-4.00<<	-16.17	2.48	1*1.00 + 3*1.00
52/	2/	ELS/1	8.92	0.03>>	-3.00	1*1.00
52/	2/	ELS/3	8.89	-16.17<<	-0.51	1*1.00 + 3*1.00
52/	3/	ELS/2	0.27	0.03	4.99>>	1*1.00 + 2*1.00
52/	2/	ELS/2	13.16	0.03	-3.13<<	1*1.00 + 2*1.00
53/	3/	ELS/1	-0.11>>	-0.03	2.48	1*1.00
53/	4/	ELS/3	-17.33<<	-16.26	-7.42	1*1.00 + 3*1.00
53/	3/	ELS/2	-0.27	-0.03>>	4.99	1*1.00 + 2*1.00
53/	3/	ELS/3	-4.44	-16.26<<	5.70	1*1.00 + 3*1.00
53/	3/	ELS/3	-4.44	-16.26	5.70>>	1*1.00 + 3*1.00
53/	4/	ELS/3	-17.33	-16.26	-7.42<<	1*1.00 + 3*1.00
54/	4/	ELS/2	13.13>>	13.19	-7.83	1*1.00 + 2*1.00
54/	5/	ELS/3	-13.52<<	-2.41	-8.19	1*1.00 + 3*1.00
54/	4/	ELS/2	13.13	13.19>>	-7.83	1*1.00 + 2*1.00
54/	4/	ELS/3	9.62	-2.41<<	-3.31	1*1.00 + 3*1.00
54/	4/	ELS/1	6.62	-1.23	-2.67>>	1*1.00
54/	5/	ELS/3	-13.52	-2.41	-8.19<<	1*1.00 + 3*1.00
55/	51/	ELS/4	12.21>>	1.60	-7.36	1*1.00 + 4*1.00
55/	52/	ELS/2	-13.13<<	13.19	-7.83	1*1.00 + 2*1.00
55/	51/	ELS/2	10.01	13.19>>	-4.63	1*1.00 + 2*1.00
55/	51/	ELS/1	8.69	-1.23<<	-5.45	1*1.00
55/	52/	ELS/1	-6.62	-1.23	-2.67>>	1*1.00
55/	52/	ELS/2	-13.13	13.19	-7.83<<	1*1.00 + 2*1.00
56/	52/	ELS/4	19.57>>	7.96	-7.64	1*1.00 + 4*1.00
56/	53/	ELS/3	-4.00<<	16.17	2.48	1*1.00 + 3*1.00
56/	52/	ELS/3	8.89	16.17>>	-0.51	1*1.00 + 3*1.00
56/	52/	ELS/1	8.92	-0.03<<	-3.00	1*1.00
56/	53/	ELS/4	6.68	7.96	8.16>>	1*1.00 + 4*1.00
56/	52/	ELS/4	19.57	7.96	-7.64<<	1*1.00 + 4*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
57/	53/	ELS/1	-0.11>>	0.03	2.48	1*1.00
57/	54/	ELS/4	-23.12<<	9.86	-10.30	1*1.00 + 4*1.00
57/	53/	ELS/3	-4.44	16.26>>	5.70	1*1.00 + 3*1.00
57/	53/	ELS/2	-0.27	0.03<<	4.99	1*1.00 + 2*1.00
57/	53/	ELS/4	-10.23	9.86	9.76>>	1*1.00 + 4*1.00
57/	54/	ELS/4	-23.12	9.86	-10.30<<	1*1.00 + 4*1.00
58/	54/	ELS/2	13.13>>	-13.19	-7.83	1*1.00 + 2*1.00
58/	55/	ELS/3	-13.52<<	2.41	-8.19	1*1.00 + 3*1.00
58/	54/	ELS/3	9.62	2.41>>	-3.31	1*1.00 + 3*1.00
58/	54/	ELS/2	13.13	-13.19<<	-7.83	1*1.00 + 2*1.00
58/	54/	ELS/1	6.62	1.23	-2.67>>	1*1.00
58/	55/	ELS/3	-13.52	2.41	-8.19<<	1*1.00 + 3*1.00
59/	6/	ELS/4	24.68>>	-6.16	-14.98	1*1.00 + 4*1.00
59/	7/	ELS/2	-23.09<<	-92.21	-12.02	1*1.00 + 2*1.00
59/	6/	ELS/1	17.08	8.20>>	-10.56	1*1.00
59/	6/	ELS/2	23.17	-92.21<<	-12.90	1*1.00 + 2*1.00
59/	7/	ELS/1	-13.53	8.20	-5.68>>	1*1.00
59/	6/	ELS/4	24.68	-6.16	-14.98<<	1*1.00 + 4*1.00
60/	7/	ELS/2	26.00>>	-0.25	-6.06	1*1.00 + 2*1.00
60/	8/	ELS/3	-1.04<<	-115.74	7.72	1*1.00 + 3*1.00
60/	7/	ELS/1	17.61	0.04>>	-5.85	1*1.00
60/	7/	ELS/3	24.74	-115.74<<	-6.61	1*1.00 + 3*1.00
60/	8/	ELS/2	0.23	-0.25	9.79>>	1*1.00 + 2*1.00
60/	7/	ELS/4	25.08	-32.00	-7.14<<	1*1.00 + 4*1.00
61/	8/	ELS/1	0.01>>	-0.04	4.82	1*1.00
61/	9/	ELS/3	-27.04<<	-115.61	-8.86	1*1.00 + 3*1.00
61/	8/	ELS/2	-0.23	0.25>>	9.79	1*1.00 + 2*1.00
61/	8/	ELS/3	-1.26	-115.61<<	8.24	1*1.00 + 3*1.00
61/	8/	ELS/2	-0.23	0.25	9.79>>	1*1.00 + 2*1.00
61/	9/	ELS/3	-27.04	-115.61	-8.86<<	1*1.00 + 3*1.00
62/	9/	ELS/2	23.09>>	92.21	-12.02	1*1.00 + 2*1.00
62/	10/	ELS/3	-26.44<<	-20.06	-15.70	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
62/	9/	ELS/2	23.09	92.21>>	-12.02	1*1.00 + 2*1.00
62/	9/	ELS/3	19.81	-20.06<<	-7.28	1*1.00 + 3*1.00
62/	9/	ELS/1	13.53	-8.20	-5.68>>	1*1.00
62/	10/	ELS/3	-26.44	-20.06	-15.70<<	1*1.00 + 3*1.00
63/	11/	ELS/2	25.82>>	-73.78	-15.95	1*1.00 + 2*1.00
63/	12/	ELS/3	-21.50<<	-35.26	-11.05	1*1.00 + 3*1.00
63/	11/	ELS/1	16.86	5.75>>	-10.30	1*1.00
63/	11/	ELS/2	25.82	-73.78<<	-15.95	1*1.00 + 2*1.00
63/	12/	ELS/1	-13.75	5.75	-5.93>>	1*1.00
63/	11/	ELS/2	25.82	-73.78	-15.95<<	1*1.00 + 2*1.00
64/	12/	ELS/3	29.42>>	-93.16	-11.05	1*1.00 + 3*1.00
64/	13/	ELS/1	-0.04<<	0.01	4.80	1*1.00
64/	12/	ELS/1	17.58	0.01>>	-5.84	1*1.00
64/	12/	ELS/3	29.42	-93.16<<	-11.05	1*1.00 + 3*1.00
64/	13/	ELS/2	1.68	-1.94	10.68>>	1*1.00 + 2*1.00
64/	12/	ELS/3	29.42	-93.16	-11.05<<	1*1.00 + 3*1.00
65/	13/	ELS/3	2.01>>	-91.28	7.91	1*1.00 + 3*1.00
65/	14/	ELS/2	-27.46<<	1.94	-6.92	1*1.00 + 2*1.00
65/	13/	ELS/2	-1.68	1.94>>	10.68	1*1.00 + 2*1.00
65/	13/	ELS/3	2.01	-91.28<<	7.91	1*1.00 + 3*1.00
65/	13/	ELS/2	-1.68	1.94	10.68>>	1*1.00 + 2*1.00
65/	14/	ELS/4	-25.33	-28.09	-7.42<<	1*1.00 + 4*1.00
66/	14/	ELS/4	20.93>>	-9.91	-9.23	1*1.00 + 4*1.00
66/	15/	ELS/3	-25.93<<	-14.50	-15.11	1*1.00 + 3*1.00
66/	14/	ELS/2	20.43	73.78>>	-8.97	1*1.00 + 2*1.00
66/	14/	ELS/3	20.32	-14.50<<	-7.87	1*1.00 + 3*1.00
66/	14/	ELS/1	13.75	-5.75	-5.93>>	1*1.00
66/	15/	ELS/2	-25.82	73.78	-15.95<<	1*1.00 + 2*1.00
71/	21/	ELS/2	27.71>>	-43.08	-18.13	1*1.00 + 2*1.00
71/	22/	ELS/4	-21.22<<	-5.92	-10.22	1*1.00 + 4*1.00
71/	21/	ELS/1	16.72	2.94>>	-10.14	1*1.00
71/	21/	ELS/2	27.71	-43.08<<	-18.13	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
71/	22/	ELS/1	-13.89	2.94	-6.09>>	1*1.00
71/	21/	ELS/2	27.71	-43.08	-18.13<<	1*1.00 + 2*1.00
72/	22/	ELS/2	39.25>>	-2.44	-13.97	1*1.00 + 2*1.00
72/	23/	ELS/1	-0.04<<	0.00	4.80	1*1.00
72/	22/	ELS/1	17.57	0.00>>	-5.84	1*1.00
72/	22/	ELS/3	37.92	-54.42<<	-17.34	1*1.00 + 3*1.00
72/	23/	ELS/2	13.47	-2.44	17.77>>	1*1.00 + 2*1.00
72/	22/	ELS/3	37.92	-54.42	-17.34<<	1*1.00 + 3*1.00
73/	23/	ELS/4	1.27>>	-22.34	7.55	1*1.00 + 4*1.00
73/	24/	ELS/2	-39.25<<	2.44	-13.97	1*1.00 + 2*1.00
73/	23/	ELS/2	-13.47	2.44>>	17.77	1*1.00 + 2*1.00
73/	23/	ELS/3	-1.26	-52.01<<	11.08	1*1.00 + 3*1.00
73/	23/	ELS/2	-13.47	2.44	17.77>>	1*1.00 + 2*1.00
73/	24/	ELS/2	-39.25	2.44	-13.97<<	1*1.00 + 2*1.00
74/	24/	ELS/4	21.15>>	-4.31	-9.49	1*1.00 + 4*1.00
74/	25/	ELS/2	-27.71<<	43.08	-18.13	1*1.00 + 2*1.00
74/	24/	ELS/2	18.55	43.08>>	-6.81	1*1.00 + 2*1.00
74/	24/	ELS/3	20.62	-6.96<<	-8.21	1*1.00 + 3*1.00
74/	24/	ELS/1	13.89	-2.94	-6.09>>	1*1.00
74/	25/	ELS/2	-27.71	43.08	-18.13<<	1*1.00 + 2*1.00
75/	26/	ELS/2	28.40>>	-0.00	-18.94	1*1.00 + 2*1.00
75/	27/	ELS/4	-21.09<<	-3.67	-10.08	1*1.00 + 4*1.00
75/	26/	ELS/1	16.67	-0.00>>	-10.09	1*1.00
75/	26/	ELS/4	25.17	-3.67<<	-15.56	1*1.00 + 4*1.00
75/	27/	ELS/2	-17.85	-0.00	-6.00>>	1*1.00 + 2*1.00
75/	26/	ELS/2	28.40	-0.00	-18.94<<	1*1.00 + 2*1.00
76/	27/	ELS/2	44.47>>	-0.00	-17.10	1*1.00 + 2*1.00
76/	28/	ELS/1	-0.04<<	-0.00	4.80	1*1.00
76/	27/	ELS/1	17.57	-0.00>>	-5.84	1*1.00
76/	27/	ELS/4	27.68	-13.65<<	-9.87	1*1.00 + 4*1.00
76/	28/	ELS/2	18.69	-0.00	20.91>>	1*1.00 + 2*1.00
76/	27/	ELS/3	41.48	-0.00	-19.91<<	1*1.00 + 3*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
77/	28/	ELS/4	1.82>>	-13.41	7.53	1*1.00 + 4*1.00
77/	29/	ELS/2	-44.47<<	-0.00	-17.10	1*1.00 + 2*1.00
77/	28/	ELS/1	0.04	-0.00>>	4.80	1*1.00
77/	28/	ELS/4	1.82	-13.41<<	7.53	1*1.00 + 4*1.00
77/	28/	ELS/2	-18.69	-0.00	20.91>>	1*1.00 + 2*1.00
77/	29/	ELS/2	-44.47	-0.00	-17.10<<	1*1.00 + 2*1.00
78/	29/	ELS/4	21.19>>	2.08	-9.53	1*1.00 + 4*1.00
78/	30/	ELS/2	-28.40<<	0.00	-18.94	1*1.00 + 2*1.00
78/	29/	ELS/4	21.19	2.08>>	-9.53	1*1.00 + 4*1.00
78/	29/	ELS/3	20.72	-0.00<<	-8.32	1*1.00 + 3*1.00
78/	29/	ELS/2	17.85	0.00	-6.00>>	1*1.00 + 2*1.00
78/	30/	ELS/2	-28.40	0.00	-18.94<<	1*1.00 + 2*1.00
79/	31/	ELS/2	27.71>>	43.08	-18.13	1*1.00 + 2*1.00
79/	32/	ELS/4	-21.05<<	0.40	-10.04	1*1.00 + 4*1.00
79/	31/	ELS/2	27.71	43.08>>	-18.13	1*1.00 + 2*1.00
79/	31/	ELS/1	16.72	-2.94<<	-10.14	1*1.00
79/	32/	ELS/1	-13.89	-2.94	-6.09>>	1*1.00
79/	31/	ELS/2	27.71	43.08	-18.13<<	1*1.00 + 2*1.00
80/	32/	ELS/2	39.25>>	2.44	-13.97	1*1.00 + 2*1.00
80/	33/	ELS/1	-0.04<<	-0.00	4.80	1*1.00
80/	32/	ELS/3	37.92	54.42>>	-17.34	1*1.00 + 3*1.00
80/	32/	ELS/4	28.71	-0.20<<	-10.57	1*1.00 + 4*1.00
80/	33/	ELS/2	13.47	2.44	17.77>>	1*1.00 + 2*1.00
80/	32/	ELS/3	37.92	54.42	-17.34<<	1*1.00 + 3*1.00
81/	33/	ELS/4	1.50>>	1.51	7.82	1*1.00 + 4*1.00
81/	34/	ELS/2	-39.25<<	-2.44	-13.97	1*1.00 + 2*1.00
81/	33/	ELS/3	-1.26	52.01>>	11.08	1*1.00 + 3*1.00
81/	33/	ELS/2	-13.47	-2.44<<	17.77	1*1.00 + 2*1.00
81/	33/	ELS/2	-13.47	-2.44	17.77>>	1*1.00 + 2*1.00
81/	34/	ELS/2	-39.25	-2.44	-13.97<<	1*1.00 + 2*1.00
82/	34/	ELS/4	21.03>>	8.06	-9.36	1*1.00 + 4*1.00
82/	35/	ELS/2	-27.71<<	-43.08	-18.13	1*1.00 + 2*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
82/	34/	ELS/4	21.03	8.06>>	-9.36	1*1.00 + 4*1.00
82/	34/	ELS/2	18.55	-43.08<<	-6.81	1*1.00 + 2*1.00
82/	34/	ELS/1	13.89	2.94	-6.09>>	1*1.00
82/	35/	ELS/2	-27.71	-43.08	-18.13<<	1*1.00 + 2*1.00
87/	41/	ELS/2	25.82>>	73.78	-15.95	1*1.00 + 2*1.00
87/	42/	ELS/3	-21.50<<	35.26	-11.05	1*1.00 + 3*1.00
87/	41/	ELS/2	25.82	73.78>>	-15.95	1*1.00 + 2*1.00
87/	41/	ELS/1	16.86	-5.75<<	-10.30	1*1.00
87/	42/	ELS/1	-13.75	-5.75	-5.93>>	1*1.00
87/	41/	ELS/2	25.82	73.78	-15.95<<	1*1.00 + 2*1.00
88/	42/	ELS/4	33.77>>	22.90	-13.38	1*1.00 + 4*1.00
88/	43/	ELS/1	-0.04<<	-0.01	4.80	1*1.00
88/	42/	ELS/3	29.42	93.16>>	-11.05	1*1.00 + 3*1.00
88/	42/	ELS/1	17.58	-0.01<<	-5.84	1*1.00
88/	43/	ELS/4	7.99	22.90	11.79>>	1*1.00 + 4*1.00
88/	42/	ELS/4	33.77	22.90	-13.38<<	1*1.00 + 4*1.00
89/	43/	ELS/3	2.01>>	91.28	7.91	1*1.00 + 3*1.00
89/	44/	ELS/4	-29.78<<	25.46	-9.46	1*1.00 + 4*1.00
89/	43/	ELS/3	2.01	91.28>>	7.91	1*1.00 + 3*1.00
89/	43/	ELS/2	-1.68	-1.94<<	10.68	1*1.00 + 2*1.00
89/	43/	ELS/4	-4.01	25.46	10.92>>	1*1.00 + 4*1.00
89/	44/	ELS/4	-29.78	25.46	-9.46<<	1*1.00 + 4*1.00
90/	44/	ELS/4	20.74>>	11.25	-9.03	1*1.00 + 4*1.00
90/	45/	ELS/3	-25.93<<	14.50	-15.11	1*1.00 + 3*1.00
90/	44/	ELS/3	20.32	14.50>>	-7.87	1*1.00 + 3*1.00
90/	44/	ELS/2	20.43	-73.78<<	-8.97	1*1.00 + 2*1.00
90/	44/	ELS/1	13.75	5.75	-5.93>>	1*1.00
90/	45/	ELS/2	-25.82	-73.78	-15.95<<	1*1.00 + 2*1.00
91/	46/	ELS/4	24.80>>	11.73	-15.16	1*1.00 + 4*1.00
91/	47/	ELS/2	-23.09<<	92.21	-12.02	1*1.00 + 2*1.00
91/	46/	ELS/2	23.17	92.21>>	-12.90	1*1.00 + 2*1.00
91/	46/	ELS/1	17.08	-8.20<<	-10.56	1*1.00

Barra/Nudo/Caso			FZ (kN)	MX (kNm)	MY (kNm)	Definición
91/	47/	ELS/1	-13.53	-8.20	-5.68>>	1*1.00
91/	46/	ELS/4	24.80	11.73	-15.16<<	1*1.00 + 4*1.00
92/	47/	ELS/4	35.97>>	51.95	-14.09	1*1.00 + 4*1.00
92/	48/	ELS/3	-1.04<<	115.74	7.72	1*1.00 + 3*1.00
92/	47/	ELS/3	24.74	115.74>>	-6.61	1*1.00 + 3*1.00
92/	47/	ELS/1	17.61	-0.04<<	-5.85	1*1.00
92/	48/	ELS/4	10.19	51.95	13.72>>	1*1.00 + 4*1.00
92/	47/	ELS/4	35.97	51.95	-14.09<<	1*1.00 + 4*1.00
93/	48/	ELS/1	0.01>>	0.04	4.82	1*1.00
93/	49/	ELS/4	-35.03<<	54.95	-13.19	1*1.00 + 4*1.00
93/	48/	ELS/3	-1.26	115.61>>	8.24	1*1.00 + 3*1.00
93/	48/	ELS/2	-0.23	-0.25<<	9.79	1*1.00 + 2*1.00
93/	48/	ELS/4	-9.25	54.95	13.49>>	1*1.00 + 4*1.00
93/	49/	ELS/4	-35.03	54.95	-13.19<<	1*1.00 + 4*1.00
94/	49/	ELS/2	23.09>>	-92.21	-12.02	1*1.00 + 2*1.00
94/	50/	ELS/3	-26.44<<	20.06	-15.70	1*1.00 + 3*1.00
94/	49/	ELS/3	19.81	20.06>>	-7.28	1*1.00 + 3*1.00
94/	49/	ELS/2	23.09	-92.21<<	-12.02	1*1.00 + 2*1.00
94/	49/	ELS/1	13.53	8.20	-5.68>>	1*1.00
94/	50/	ELS/3	-26.44	20.06	-15.70<<	1*1.00 + 3*1.00

Esfuerzos - Casos: 9 10 : Extremos globales: 1

- Caso: 8 (ELS)

Filtrar	Barra	Caso
Lista completa	1 2 4A6 8A12 14	1A10
Selección	1 2 4A6 8A12 14	8
Número total	76	10
Número seleccionado	76	1

- Casos: 9 10

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	386.60	115.74	1576.19
Barra	21	92	36
Nudo	4	47	30
Caso	ELS/3	ELS/3	ELS/3
MIN	-399.74	-115.74	-19.91
Barra	30	60	76
Nudo	54	7	27
Caso	ELS/4	ELS/3	ELS/3

Esfuerzos - Casos: 6 7 : Extremos globales: 2

- Caso: 5 (ELU)

Filtrar	Barra	Caso
Lista completa	1 2 4A6 8A12 14	1A10
Selección	1 2 4A6 8A12 14	5
Número total	76	10
Número seleccionado	76	1

- Casos: 6 7

	FZ (kN)	MX (kNm)	MY (kNm)
MAX	553.59	173.63	2261.10
Barra	21	92	36
Nudo	4	47	30
Caso	ELU/3	ELU/7	ELU/3
MIN	-573.30	-173.63	-28.99
Barra	30	60	76
Nudo	54	7	27
Caso	ELU/4	ELU/7	ELU/3

8. Dimensionamiento de la sección ELS.

Pretensado

O.F. 5.9. **Cálculos justificativos**

CENTRO TRAMO

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_C=	14.00	m.
Ancho del tablero	2b=	9.00	m.
Número de vigas	N=	2	u.
Canto de la viga	H=	0.90	m.
Canto de la losa	h=	0.20	m.
Voladizo	v=	2.15	m.
Distancia inter-eje	d_{ie}=	4.70	m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

	f_{ck}	f_{ctm}	E_c	
Hormigón vigas =	400	35.09	294449	Kp/cm^2
Hormigón losa =	250	25.65	275431	Kp/cm^2

Acero pasivo

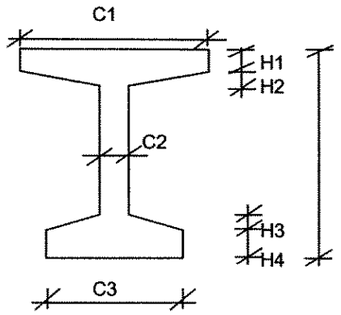
Límite elástico f_y = 5000 Kg/cm^2 E_s = 2100000

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura =	26.00	Tn.
Límite elástico al 0,2	22.10	Tn.
Sección =	140.00	mm^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2%

1.4.- Características geométricas



Viga exenta

Dimensiones:

	H_1=	0.07	m.
	H_2=	0.20	m.
	H_3=	0.00	m.
	H_4=	0.24	m.
	C_1=	1.14	m.
	C_2=	0.30	m.
	C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	34.00	u	4.00 u
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	49.95 kg/m^3

	Pasiva		Activa	
Recubrimiento armadura superior =	3.00	cm	5.00	cm
Recubrimiento armadura inferior =	3.00	cm	10.00	cm

Recubrimiento armadura de pretensado = 0.19 m

Coeficiente de equivalencia (n-1) = 7.13 Viga-Acero

Sección real	S=	0.75	m^2
Sección resistente	:	0.76	m^2
Centro de gravedad		0.53	m.
Inercia prop.	I_p=	0.0200	m^4
Inercia relav	I_r=	0.0517	m^4
Inercia total	I_1=	0.0717	m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 = 7.16 m^{-2}

K_2 = 4.66 m^{-2}

Coeficientes del pretensado

$R_1 = 1/S - K \times d$

$R_2 = 1/S + K \times d$

Para centro viga, resulta:

R_1 = 0.07 m^{-2}

R_2 = 2.04 m^{-2}

Viga homogeneizada

S_2 = 0.79 m^2
d_2 = 0.55 m.
I_2 = 0.0761 m^4

Coeficientes de flexión para centro viga

K_3 = 7.16 m^{-2}
K_4 = 4.66 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.65 m^2
d_3 = 0.21 m.
I_3 = 0.2505 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.76 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 34 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 663.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 663.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en cabeza

N_3 = 538.76 Tn

Esfuerzo final en centro vano

N_4 = 538.76 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 45.86 m.Tn

Tensión borde superior = **375.53** Tn/m^2
Tensión borde inferior = **1139.23** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **366.70** Tn/m^2
Tensión borde inferior = **885.70** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 52.68 m.Tn
M. F. Sobrecargas fijas = 46.35 m.Tn
M. F. sobrecargas de uso = 170.67 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **782.56** Tn/m^2
Tensión borde inferior = **512.34** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **925.03** Tn/m^2
Tensión borde inferior = **41.63** Tn/m^2

O.F. 5.9. **Cálculos justificativos**

CUARTOS DE LUZ

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	14.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2.00 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0,20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

Hormigón vigas f_{ck} = 400 Kg/cm^2
Hormigón losa f_{ck} = 250 Kg/cm^2

Acero pasivo

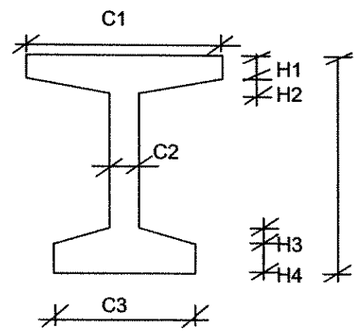
Límite elástico f_y = 5000 Kg/cm^2

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 pulgadas

Carga de rotura = 26.00 Tn.
Límite elástico al 0,2% = 22.10 Tn.
Sección = 140.00 m.m^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2,5%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	26.00	u	4.00
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	

			Activa
Recubrimiento armadura superior =	3.00	cm	5.00
Recubrimiento armadura inferior =	3.00	cm	10.00

Recubrimiento armadura de pretensado = 0.22 m
Coeficiente de equivalencia (n-1) = 6.00

Sección real	S=	0.75	m^2
Sección resistente		0.76	m^2
Centro de gravedad		0.53	m.
Inercia prop.	I_p=	0.0200	m^4
Inercia relav	I_r=	0.0514	m^4
Inercia total	I_1=	0.0715	m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 = 7.26 m^{-2}
K_2 = 4.84 m^{-2}

Coeficientes del pretensado — Para centro viga, resulta:

$R_1 = 1/S - K \times d$ — R_1 = 0.23 m^{-2}
$R_2 = 1/S - K \times d$ — R_2 = 1.99 m^{-2}

Viga homogeneizada

S_2 = 0.78 m^2
d_2 = 0.54 m.
I_2 = 0.0744 m^4

Coeficientes de flexión para centro viga

K_3 = 7.26 m^{-2}
K_4 = 4.84 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.64 m^2
d_3 = 0.20 m.
I_3 = 0.2444 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.85 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 26 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 507.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 507.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en anclajes

N_3 = 412.00 Tn

Esfuerzo final en centro vano

N_4 = 412.00 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 34.40 m.Tn

Tensión borde superior = **368.75** Tn/m^2
Tensión borde inferior = **840.96** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **346.45** Tn/m^2
Tensión borde inferior = **652.15** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 39.51 m.Tn
M. F. Sobrecargas fijas = 34.77 m.Tn
M. F. sobrecargas de uso = 128.00 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **662.27** Tn/m^2
Tensión borde inferior = **361.74** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **769.02** Tn/m^2
Tensión borde inferior = **-2.88** Tn/m^2

O.F. 5.9.

Cálculos justificativos

APOYOS
Sólo se comprueba la de mayor pretensado

1.- TABLERO

1.1.- Generalidades

Luz de cálculo	L_c=	14.00 m.
Ancho del tablero	2b=	9.00 m.
Número de vigas	N=	2.00 u.
Canto de la viga	H=	0.90 m.
Canto de la losa	h=	0.20 m.
Voladizo	v=	2.15 m.
Distancia inter-eje	d_{ie}=	4.70 m.

1.2.- Normas de aplicación

- Instrucción EHE

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera.IAP (O.M. 12/2/98)

1.3.- Características de los materiales

Hormigón

Hormigón vigas f_{ck} =	400 Kg/cm^2
Hormigón losa f_{ck} =	250 Kg/cm^2

Acero pasivo

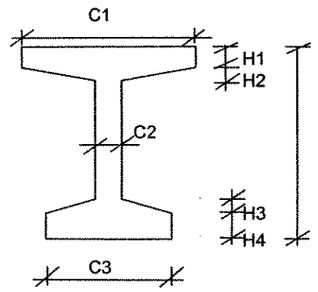
Límite elástico f_y =	5000 Kg/cm^2

Acero activo Y 1860 S7, superestabilizado en torones de 0,6 de pulgada

Carga de rotura =	26.00 Tn.
Límite elástico al 0,2% =	22.10 Tn.
Sección =	140.00 m.m^2

Relajación a 1000 h. y al 70% de la carga de rotura menor del 2,5%

1.4.- Características geométricas



Viga exenta

Dimensiones:

H_1=	0.07	m.
H_2=	0.20	m.
H_3=	0.00	m.
H_4=	0.24	m.
C_1=	1.14	m.
C_2=	0.30	m.
C_3=	1.70	m.

Diámetro de la vaina	0.00	cm	
Número de tendones	1.00	u	De ellos, superiores:
Número de torones por tendón	26.00	u	4.00
Armadura cabeza superior	6.00	cm^2	
Armadura cabeza inferior	5.65	cm^2	

		Activa
Recubrimiento armadura superior =	3.00 cm	5.00
Recubrimiento armadura inferior =	3.00 cm	10.00

Recubrimiento armadura de pretensado =	0.22 cm
Coeficiente de equivalencia (n-1) =	6.00

Sección real	S=	0.75 m^2
Sección resistente		0.76 m^2
Centro de gravedad		0.53 m.
Inercia prop.	I_p=	0.0200 m^4
Inercia relav	I_r=	0.0514 m^4
Inercia total	I_1=	0.0715 m^4

Coeficientes de flexión (Viga homogeneizada)

K_1 =	7.26 m^{-2}
K_2 =	4.84 m^{-2}

Coeficientes del pretensado

Para centro viga, resulta:

R_1 = 1/S - K x d	R_1 = 0.23 m^{-2}
R_2 = 1/S - K x d	R_2 = 1.99 m^{-2}

Viga homogeneizada

S_2 = 0.78 m^2
d_2 = 0.54 m.
I_2 = 0.0744 m^4

Coeficientes de flexión para centro viga

K_3 = 7.26 m^{-2}
K_4 = 4.84 m^{-2}

Viga recrecida Ancho losa = 4.30 m.

S_3 = 1.64 m^2
d_3 = 0.20 m.
I_3 = 0.2444 m^4

Coeficientes de flexión para centro viga

K_5 = 0.83 m^{-2}
K_6 = 2.85 m^{-2}

1.5.- Pretensado

Nº de tendones = 1 ut.
Nº de torones por tendón = 26 ut.

Esfuerzo inicial de tesado efectivo del 75% de la carga de rotura

N_1 = 507.00 Tn

Pérdidas por rozamiento en centro viga (instantáneas)

p_1 = 0.00 %

Esfuerzo inicial en centro vano

N_2 = 507.00 Tn

pérdidas diferidas

Relajación del acero = 2.70 Kg/mm^2
Retracción del hormigón = 5.40 Kg/mm^2
Fluencia y def. elástica = 18.00 Kg/mm^2

Total diferidas = 26.10 Kg/mm^2

Esfuerzo final en anclajes

N_3 = 412.00 Tn

Esfuerzo final en centro vano

N_4 = 412.00 Tn

1.6.- Flexión longitudinal

Viga en taller con pretensado inicial

M. F. p.p.= 0.00 m.Tn

Tensión borde superior = **119.00** Tn/m^2
Tensión borde inferior = **1007.59** Tn/m^2

Viga en taller con pretensado final

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

Viga peor solicitada (puente en servicio)

M. F. p.p. losa = 0.00 m.Tn
M. F. Sobrecargas fijas = 0.00 m.Tn
M. F. sobrecargas de uso = 0.00 m.Tn

Puente en servicio sin sobrecarga

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

Puente en servicio con máxima sobrecarga

Tensión borde superior = **96.70** Tn/m^2
Tensión borde inferior = **818.78** Tn/m^2

9. Dimensionamiento en ELU. Cortante y flexión

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 14/11/2003
Hora: 16:40:18

Cálculo de secciones a cortante

1 Datos

- Materiales

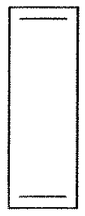
Tipo de hormigón : HA-40
Tipo de acero : B-500-S
fck [MPa] = 40.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 30X90H40
b0 [m] = 0.30
h [m] = 0.90



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.15
ϕ [mm] = 12
nº ramas: 4
Area [cm²/m] = 30.2
ρ [·1.E-3] = 0

Inclinación de las bielas θ[°] = 30.0
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 1766.7
Vu2 [kN] = 1608.9
Vcu [kN] = 0.0
Vsu [kN] = 1608.9

- Resistencia a cortante:

Vu [kN] = 1608.9 > $V_d = 573{,}30\,kN \times 2 = 1146{,}60\,KN$

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 14/11/2003
Hora: 16:40:51

Cálculo de secciones a cortante

1 Datos

- Materiales

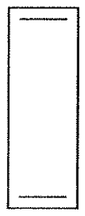
Tipo de hormigón : HA-40
Tipo de acero : B-500-S
fck [MPa] = 40.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 30X90H40
b0 [m] = 0.30
h [m] = 0.90



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.3
ϕ [mm] = 12
nº ramas: 4
Area [cm²/m] = 15.1
p [·1.E-3] = 0

Inclinación de las bielas θ[°] = 26.0
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 1607.5
Vu2 [kN] = 952.3
Vcu [kN] = -0.0
Vsu [kN] = 952.3

- Resistencia a cortante:

Vu [kN] = 952.3 > Vd = 764,44 KN.

P R O G R A M A S E C C I O N

SECCIONES DE HORMIGON ARMADO Y PRETENSADO

VERSION N° 2 FECHA : 11/03/1995

Copyright : J.Díaz del Valle, 1989

E.T.S. de I.C.C. y P. de Santander

DATOS DEL PROYECTO DE LA SECCION

PROYECTO : AVE VILAFRANCA

REFERENCIA : OF_5.9

FECHA DEL CALCULO : nov 03

PROGRAMA DE SECCIONES DE HORMIGON ARMADO Y/O PRETRENSADO

D A T O S D E E N T R A D A

VERTICES CONTORNO EXTER. : 1 2 3 4 5 6 7 8 9 1
11 12 13 14 15 16

VERTICES DEL HUECO N° 1 : 17 18 19 20 21 22

C O O R D E N A D A S D E L O S V E R T I C E S

VERT	X	Y	VERT	X	Y	VERT	X	Y
1	145.000	110.000	2	145.000	90.000	3	145.000	90.000
4	145.000	83.000	5	108.500	70.000	6	96.800	68.000
7	85.000	2.000	8	83.000	0.000	9	-83.000	0.000
10	-85.000	2.000	11	-96.500	68.000	12	-108.500	70.000
13	-145.000	83.000	14	-145.000	90.000	15	-145.000	90.000
16	-145.000	110.000	17	-84.000	90.000	18	-75.800	29.000
19	-70.800	24.000	20	70.800	24.000	21	75.800	29.000
22	84.000	90.000						

Area de la sección de hormigon ..... = 13375.51 cm²
Centro de gravedad de la sección de hormigón .. = 45.80 cm.
Resistencia de cálculo del hormigon ..... fcd = 266.67 Kp/cm²

ARMADURA PASIVA			ARMADURA ACTIVA			
Capa N°	Profund. cm.	Area cm²	Capa N°	Profund. cm.	Area cm²	Defor. neutra.
1	106.0	10.17	1	25.0	5.60	0.0050
			2	100.0	42.00	0.0050

Resistencia de cálculo del acero de armar.. fcd = 4340.0 Kp/cm²
Resist.de cálculo del acero de pretensar....fpd =15454.0 Kp/cm²

FLEXION POSITIVA (DISTANCIAS RESPECTO A LA FIBRA SUPERIOR)

TENSIONES Y DEFORMACIONES

Contribución del hormigón :

Uc = 795.3 t. Mc = 310.0 m.t.

Deformación y tension máxima en el hormigón :

εc = 1.98417E-03 σc = 226.66 kp/cm²

Deformaciones y tensiones de las 1 capas de armadura pasiva :

εs(1) = -9.56421E-03 σs(1) = -4340.00 kp/cm²

Deformaciones y tensiones de las 2 capas de armadura activa :

εp(1) = -7.39502E-04 σp(1) =-10905.05 kp/cm²
εp(2) = -8.91053E-03 σp(2) =-16430.32 kp/cm²

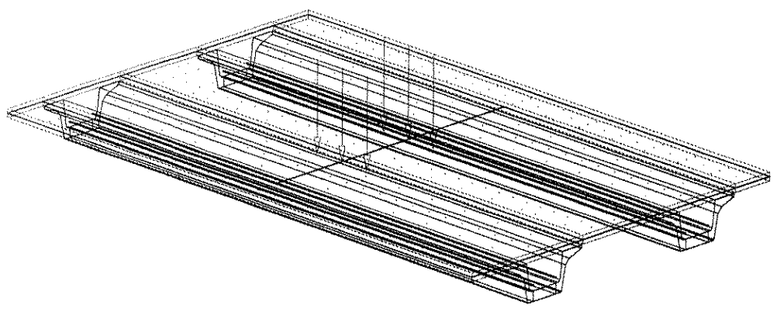
Esfuerzo axíl = 0.00 t. , Momento flector = 697.81 m.t.

Fibra neutra = 18.21 cm. , Curvatura = 1.0895E-02(1/m.)

$M_\mu = 6978,1\ KN > M_d = 4522,2\ KN$

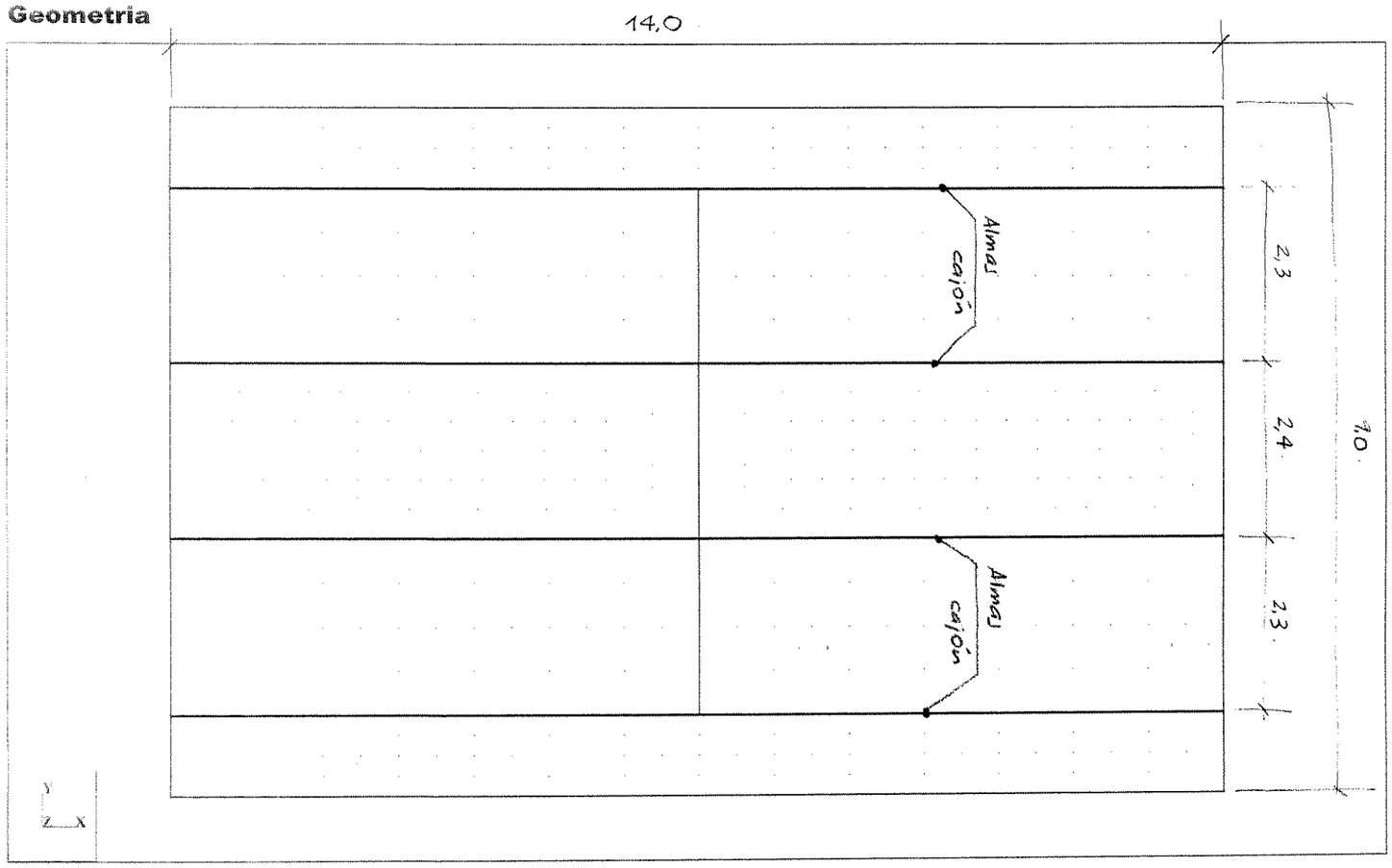
10. Flexión transversal del tablero

Vista - Esquema de analisis



casos: 9 (Carro) Componente 3/7
kN

Geometria



Barras: Valores: 1

Filtrar	Barra	Elemento
Lista compl	2A6 8 11A	141A252
Selección	2A5	141A252
Número tot	4	112
Número sel	4	112

Barra	Nudos	Nudo 2	Sección	Material	Longitud (m)	Gama (Deg)	Tipo
2	6	56	mbig 90x1	HA - 40	14.00	51.0	Barra
3	10	52	mbig 90x1	HA - 40	14.00	51.0	Barra
4	14	48	mbig 90x1	HA - 40	14.00	51.0	Barra
5	44	18	mbig 90x1	HA - 40	14.00	51.0	Barra

Características: Barras: 1

	Nombre de la sección	Lista de barras	SX (cm^2)	SY (cm^2)	SZ (cm^2)	IX (cm^4)	IY (cm^4)	IZ (cm^4)
	mbig 90x145x90	2A5	3638.350	0.0	0.0	0.0	7534242.90	785039.715

Características: Paneles: 1

	Nombre de espesor	Lista de paneles	Material	Tipo de espesor	Espesor (cm)	G1 (cm)	G2 (cm)	G3 (cm)	KZ (kN/m^3)
	ESP20	11A14 17	HA - 25	constante	20.00	No existe	No existe	No existe	0.0

Apoyos: Valores: 1

	Nombre del apoyo	Lista de nudos	Condiciones de apoyo
	Apoyo 2	6A18CA4 44A56CA4	UZ

Cargas: Info: 1

Caso	Nombre del caso	Naturaleza	tipo de análisis
1	CM	permanente	Estático lineal
3	SC1	explotación	Estático lineal
4	SC2	explotación	Estático lineal
6	ELU		Ponderación
7	ELU+		Ponderación
8	ELU-		Ponderación
9	Carro		Análisis de casos de

Cargas - Casos: 1 3 4 6A9 : Valores: 1

Caso	Nombre del caso	Naturaleza	tipo de análisis
1	CM	permanente	Estático lineal
3	SC1	explotación	Estático lineal
4	SC2	explotación	Estático lineal
6	ELU		Ponderación
7	ELU+		Ponderación
8	ELU-		Ponderación
9	Carro		Análisis de casos de

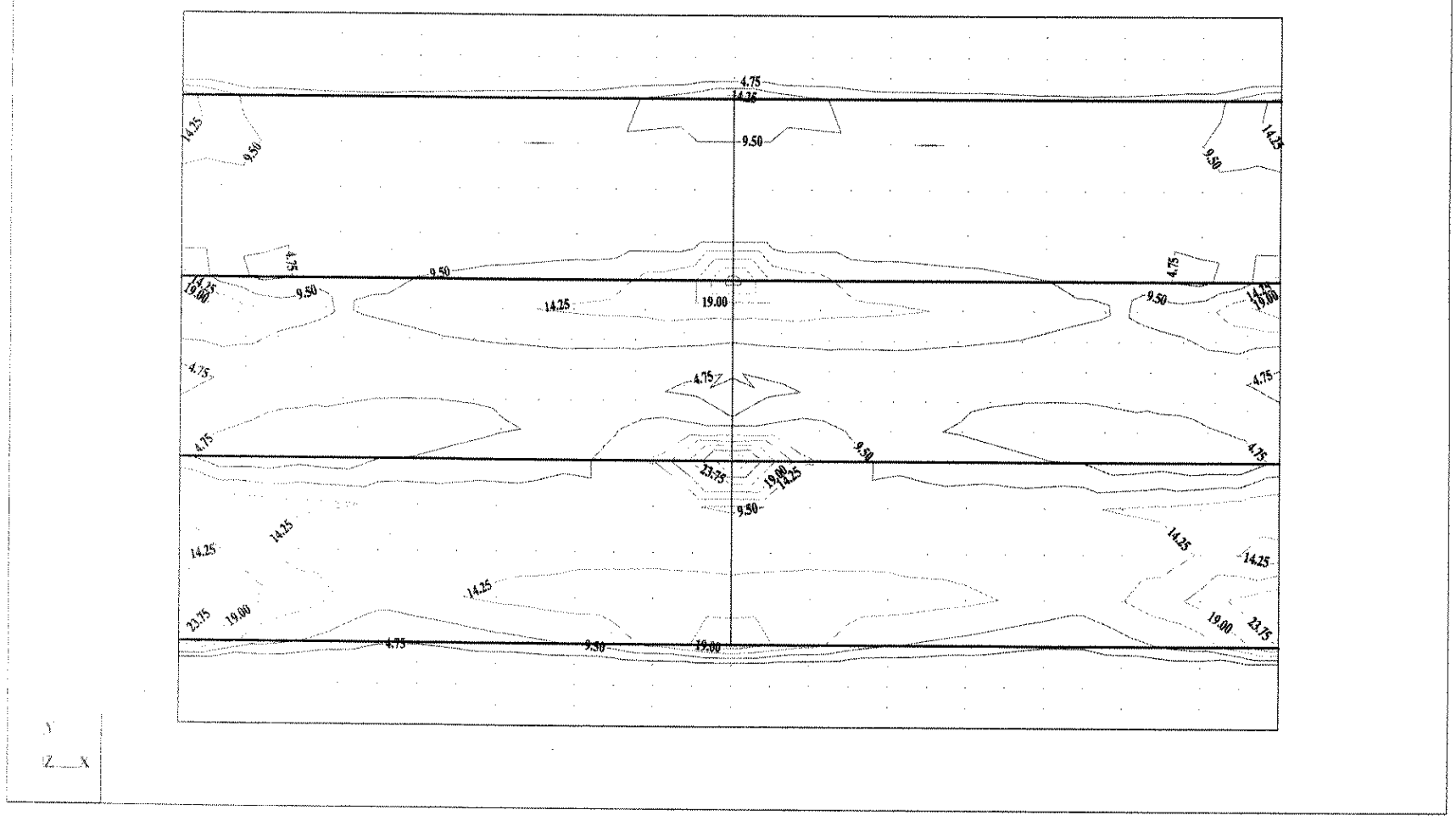
	Caso	Tipo de carga	Lista	Valores de carga
	1	peso propio	2A5	PZ Menos
	1	(EF) superficial 3p (conto		PZ1=-8.34(kPa) P1(-7, 3.45, 0) P2(7, 3.45, 0) P3(7, -3.45, 0) P
	1	(EF) superficial 3p (conto		PZ1=-10.00(kPa) P1(-7, 4.5, 0) P2(-7, 3.45, 0) P3(7, 3.45, 0) P
	1	(EF) superficial 3p (conto		PZ1=-10.00(kPa) P1(-7, -3.45, 0) P2(7, -3.45, 0) P3(7, -4.5, 0)
	3	(EF) superficial 3p (conto		PZ1=-4.00(kPa) P1(-7, 4.5, 0) P2(-7, 3.45, 0) P3(7, 3.45, 0) P4
	3	(EF) superficial 3p (conto		PZ1=-4.00(kPa) P1(-7, 1.15, 0) P2(7, 1.15, 0) P3(7, -1.15, 0) P
	3	(EF) superficial 3p (conto		PZ1=-4.00(kPa) P1(-7, -3.45, 0) P2(7, -3.45, 0) P3(7, -4.5, 0)
	4	(EF) superficial 3p (conto		PZ1=-4.00(kPa) P1(-7, 3.45, 0) P2(7, 3.45, 0) P3(7, 1.15, 0) P
	4	(EF) superficial 3p (conto		PZ1=-4.00(kPa) P1(-7, -1.15, 0) P2(7, -1.15, 0) P3(7, -3.45, 0)

Excentricidades: Valores: 1

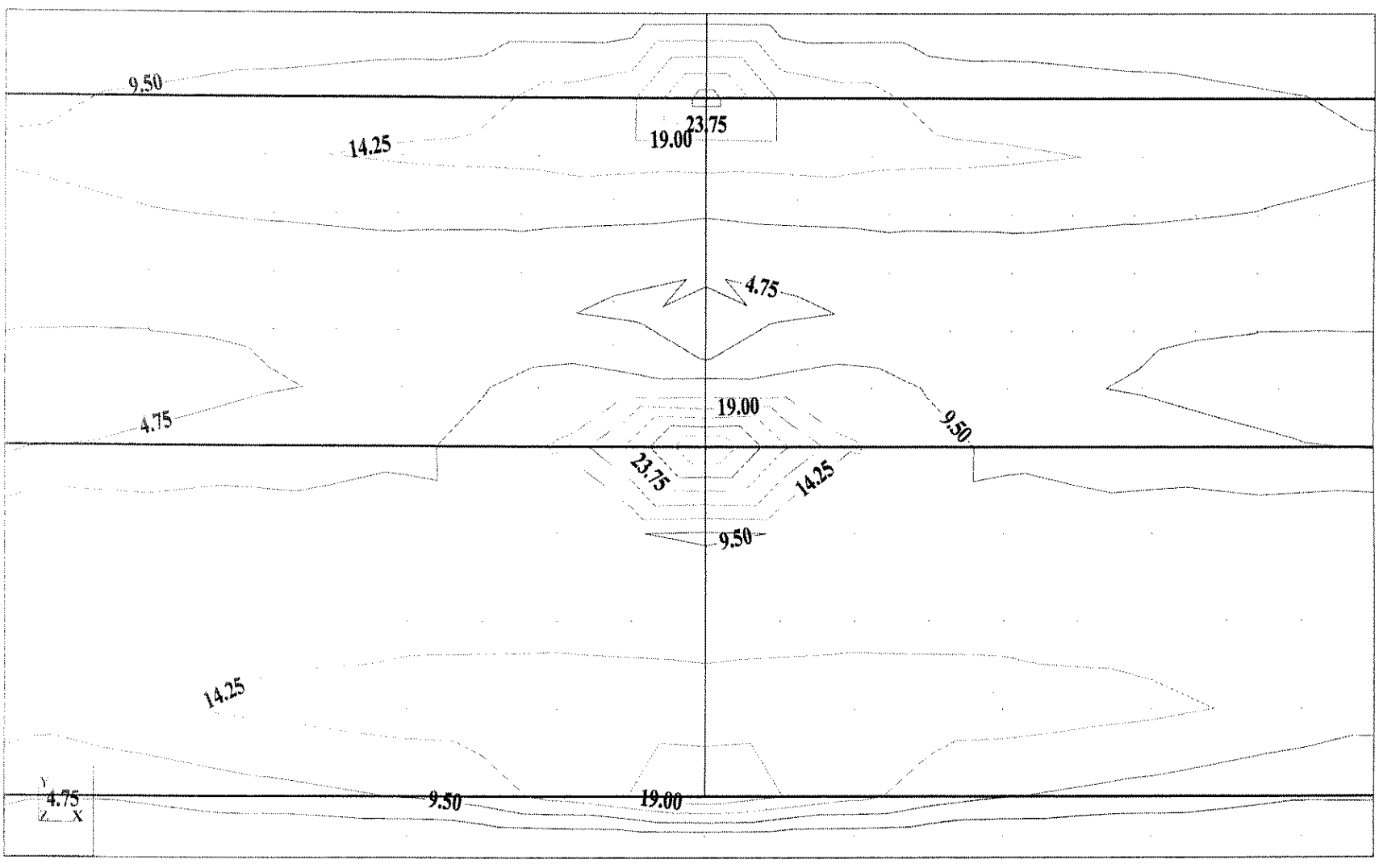
Filtrar	
Lista	1A13
Sele	
Núm	4
Núm	1

	nombre de la excentricidad	Lista de barras	Inicio UX (m)	Inicio UY (m)	Inicio UZ (m)	Extremidad UX (m)	Extremidad UY (m)	Extremidad UZ (m)	Sistema de coordenadas
	EXC_UZ_10	2A5	0.0	0.0	0.10	0.0	0.0	0.10	local

Vista - MYY+ (W&A) casos: 7 (ELU+) 4



Vista - MYY+ (W&A) casos: 7 (ELU+) 5



PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 17/11/2003
Hora: 16:54:58

Dimensionamiento de secciones a flexión simple

1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

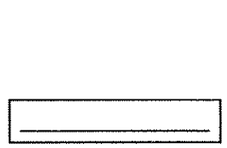
- Sección

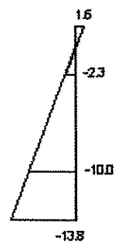
Sección : 100X20H25
b [m] = 1.00
h [m] = 0.20
ri [m] = 0.050
rs [m] = 0.050



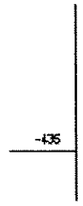
2 Dimensionamiento

Md [kN·m] = 24









Plano de deformación de agotamiento

x [m] = 0.020
1/r [1/m]·1.E-3 = 77.1
εs ·1.E-3 = 1.6
εi ·1.E-3 = -13.8

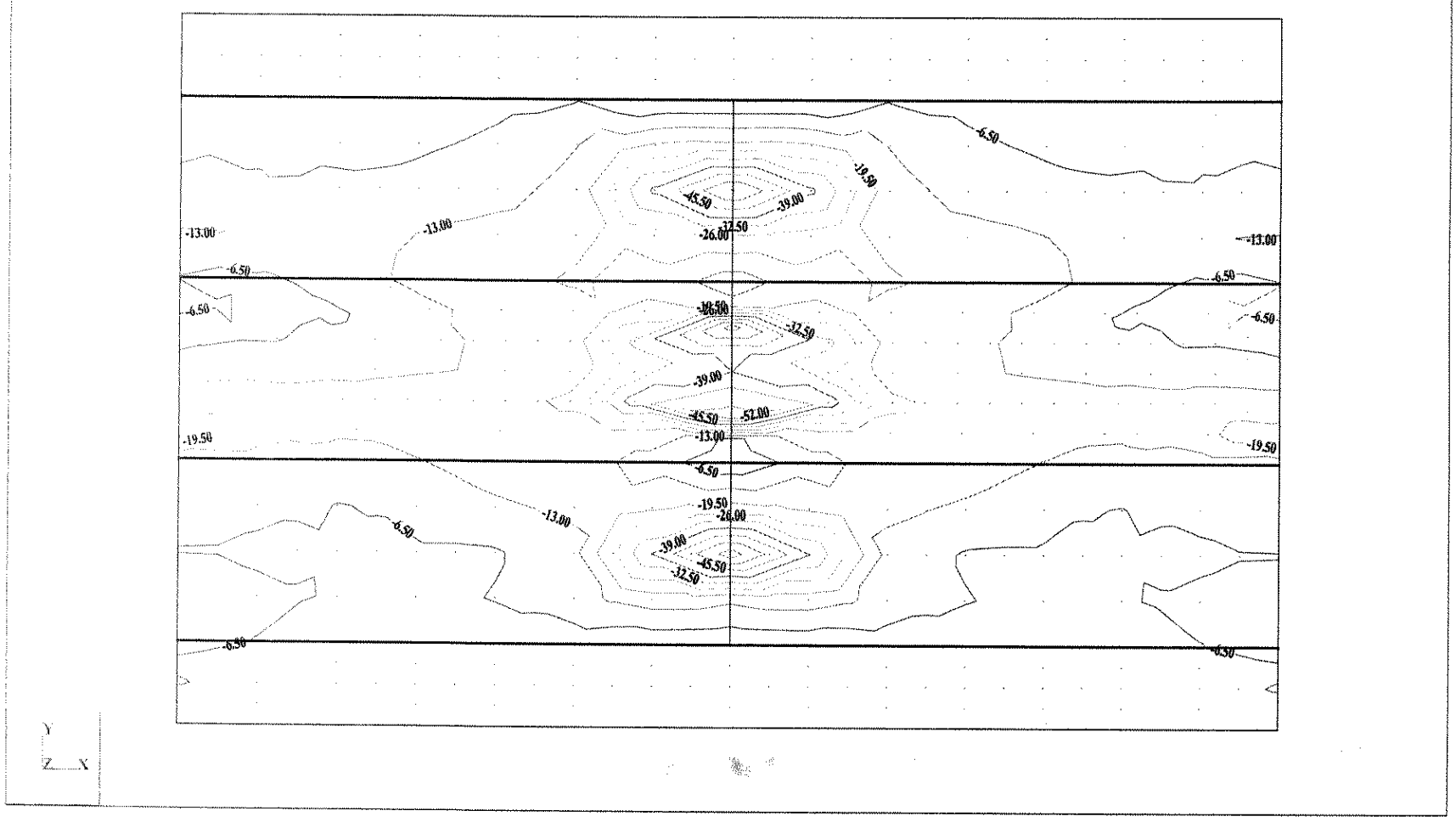
Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	-2.3	0.0
0.150	3.9	-10.0	434.8

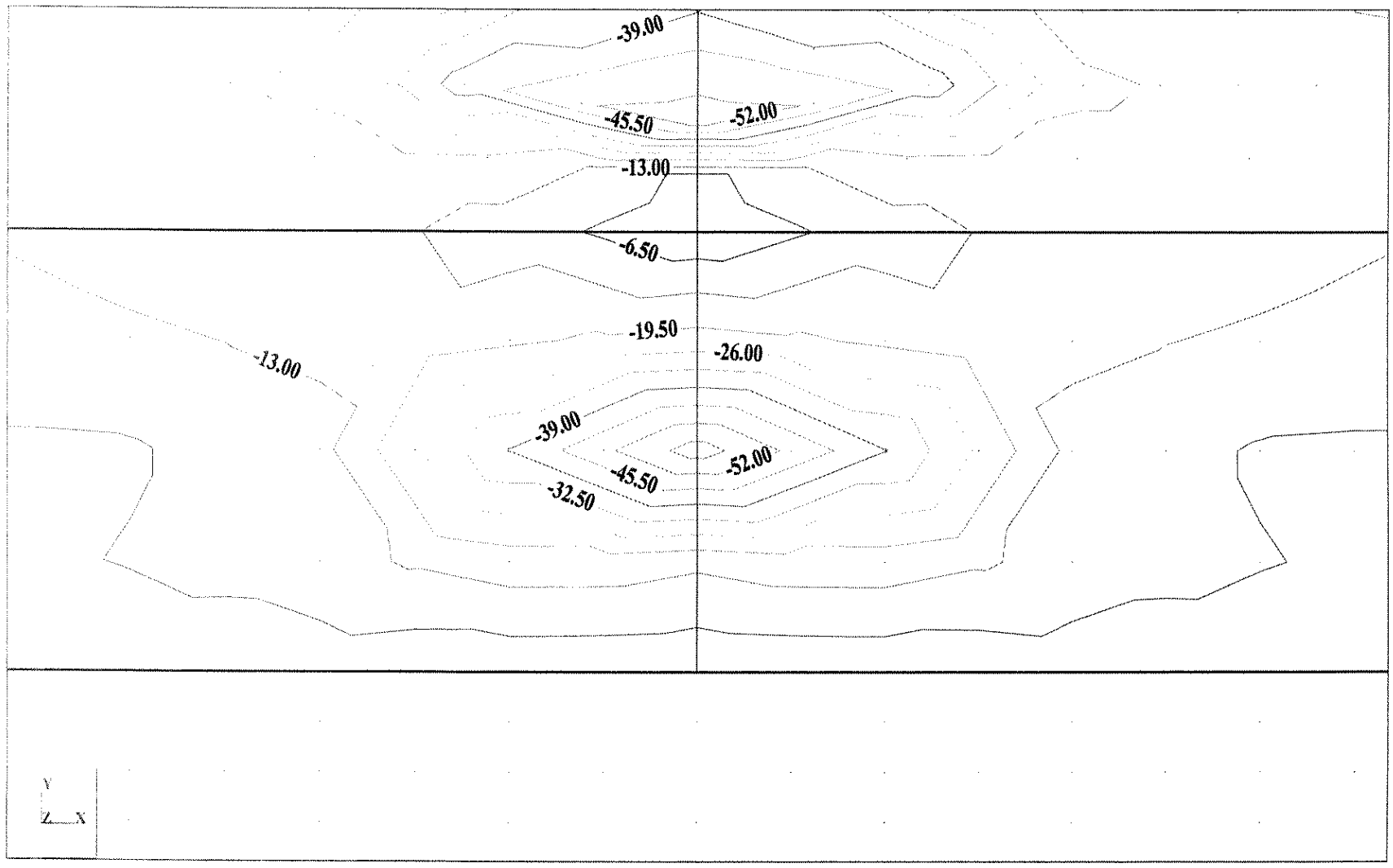
At_est [cm²] = 3.9

ϕ [mm]	12	14	16	20	25
n°ϕ	4	3	3	3	3
n° capas	1	1	1	1	1
At [cm²]	4.5	4.6	6.0	9.4	14.7
wk [mm]	0.18	0.20	0.15	0.10	0.06

Vista - MYY- (W&A) casos: 8 (ELU-) 2



Vista - MYY- (W&A) casos: 8 (ELU-) 3



PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 17/11/2003
Hora: 16:54:10

Dimensionamiento de secciones a flexión simple

1 Datos

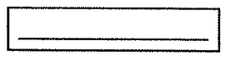
- Materiales

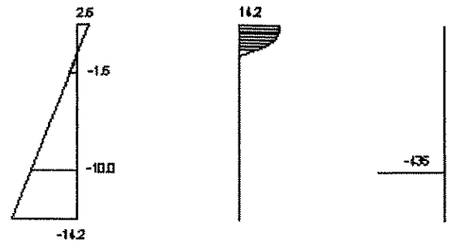
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : 100X20H25
b [m] = 1.00
h [m] = 0.20
ri [m] = 0.050
rs [m] = 0.050







Plano de deformación de agotamiento

x [m] = 0.031
1/r [1/m]·1.E-3 = 84.0
εs ·1.E-3 = 2.6
εi ·1.E-3 = -14.2

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	-1.6	0.0
0.150	7.6	-10.0	434.8

At_est [cm²] = 7.6

ϕ [mm]	12	14	16	20	25
nºϕ	7	5	4	3	3
nº capas	1	1	1	1	1
At [cm²]	7.9	7.7	8.0	9.4	14.7
wk [mm]	0.29	0.35	0.36	0.35	0.23

2 Dimensionamiento

Md [kN·m] = 45.5

A3. Apoyos

DIMENSIONAMIENTO NEOPRENOS

$R_{max} = 618,99$ KN (vano central)

$R_{min} = 190,92$ KN (vanos laterales) } Emparrillados.

$\theta_{max} = 0,004$ rad

$H_F = \frac{1}{20}(17.9.4 + 600) \cdot \frac{1}{4.2} = 7,575$ KN Frenado

* Desplazamientos.

-temp.

$\mu_T = \alpha \cdot \Delta T \cdot l/2 = 10.10^{-6} \cdot 35 \cdot 17/2 = 2,975$ mm

-retracción

$\mu_{cs} = \varepsilon_{cs} \cdot l/2 = 240.10^{-6} \cdot 17/2 = 2,04$ mm

-fluencia.

$\mu_{cr} = \varepsilon_{cr} \cdot l/2 = 4,879.10^{-4} \cdot 17/2 = 4,147$ mm

$\varepsilon_{cr} = \frac{\sigma \cdot \varphi}{E} = \frac{7,183 \cdot 2}{29445} = 4,879 \cdot 10^{-4}$

$\varphi = 2$; $E = 29445$ MPa ; $\sigma = \frac{P}{A} = \frac{5387,6}{0,75} = 7183,46$ KN/m²

-Fuerzas horizontales

$\mu_{FH} = \frac{7575N \cdot 29mm}{200.300.0,9} = 4,068$ mm

-Total

$\mu_H = 2,975 + 2,04 + 4,147 + 4,068 = 13,23$ mm

* Fuerza horizontal

$F_H = H_F + \frac{\mu = 9,162 mm}{\frac{29}{200x300.0,9}} = 7,575 + 17,06 = 24,635$ KN.

PROGRAMA PARA COMPROBACION DE APOYOS DE NEOPRENO ZUNCHADO

********** ********** ********** ********** ********** ********** ********** **********

DATOS DEL PROYECTO

NOMBRE. ..... AVE_VILAFRANCA
ESTRUCTURA..... O.F. 5.9

TIPO DE PUENTE.... 1 1=CARRETERA
2=FFCC

********** ********** ********** ********** ********** ********** ********** **********

DATOS DE LAS CARGAS

CARGA VERTICAL MAX.....	61.9	Tn
CARGA VERTICAL MIN.....	19	Tn
CARGA HORIZONTAL MAX.....	2.5	Tn
CARGA VERTICAL CONCOM....	19	Tn

MOVIMIENTOS

DESPLAZAMIENTO HORIZ.....	13.23	mm
GIRO.....	0.004	RAD

********** ********** ********** ********** ********** ********** ********** **********

CARACTERISTICAS MECANICAS DEL APOYO

MODULO DE ELASTICIDAD TRANSVERSAL
CARGAS LARGA DURACION..... 9 Kg/cm2

MODULO DE ELASTICIDAD TRANSVERSAL
CARGAS CORTA DURACION..... 18 Kg/cm2

TENSION MAX. CHAPA DE ACERO..... 2400 Kg/cm2

********** ********** ********** ********** ********** ********** ********** **********

CARACTERISTICAS GEOMETRICAS DEL APOYO DE NEOPRENO

LARGO.....	30	cm
ANCHO.....	20	cm
ESPESOR NEOPREN	2.9	cm
ESPESOR CHAPA(U	3	mm
NUMERO CAPAS.....	3	

********** ********** ********** ********** ********** ********** ********** **********

COMPROBACION DE TENSIONES MAXIMAS

TENSION MEDIA = 103.1667 Kg/cm2
FACTOR DE FORMA 6.206897

MAXIMA TENSION ADMISIBLE= 111.7241 Kg/cm2

SEGURIDAD AL DESLIZAMIENTO

TENSION MINIMA = 31.66667 Kg/cm2
TENSION MINIMA ADMISIBLE = 30 Kg/cm2

TENSION VERTICAL CONCOMIT. CON H = 31.66667 Kg/cm2
MAXIMA H ADMISIBLE = 5.5 Tn

MAXIMA FUERZA HORIZ. TRANSMITIDA = 4.963517 Tn NO DESLIZA

********** ********** ********** ********** ********** ********** ********** **********

DISTORSION ADMISIBLE

ACCIONES DE LARGA DURACION
Tg G1 = 0.456207 Tg G1 MAX = 0.5 ADMISIBLE

ACCIONES DE CORTA DURACION
tG G2 = 0.687688 Tg G2 MAX = 0.7 ADMISIBLE

********** ********** ********** ********** ********** ********** ********** **********

INESTABILIDAD

a/E = 6.896552 >=5 ADMISIBLE

********** ********** ********** ********** ********** ********** ********** **********

ROTACION ADMISIBLE

MAXIMO GIRO ADMISIBLE = 0.021025 RAD
GIRO MAXIMO = 0.004 RAD

********** ********** ********** ********** ********** ********** ********** **********

PLACAS DE ACERO DE ZUNCHADO

MINIMO ESPESOR ADMISIBLE 0.138511 mm
ESPESOR CHAPA PROYECTO 3 mm ADMISIBLE

********** ********** ********** ********** ********** ********** ********** **********

CARGAS CONCENTRADAS SOBRE MACIZOS
Apoyo: O.F. 5.9 AVE VILAFRANCA

DATOS:

GEOMETRIA

a1 (m)=	0.2	Dim. del apoyo en sentido del eje de la viga (dim. menor)
b1 (m)=	0.3	Dim. del apoyo en sentido perpendicular al eje de la viga (dim. mayor)
a (m)=	0.3	Dim. homotética de a1
b (m)=	0.4	Dim. homotética de b1
h(m)=	0.24	Espesor del elemento de apoyo + banqueta

MATERIALES

fck(MPa)=	40	
fyk(MPa)=	500	
fcd(MPa)=	26.67	
fyd(MPa)=	434.78	

CARGAS

Nd(kN)=	892.65	Carga sobre el apoyo (mayorada)

CALCULOS

ESPESOR MINIMO DEL ELEMENTO DE APOYO:

0.24 >=? 0.13

TENSION DE CONTACTO LOCALIZADA

Nu		Nd
2262.7	>?	892.65
5280.0	>?	892.65

ARMADURAS TRANSVERSALES

Asa(cm2)=	2.05	En sentido paralelo a a
Asb(cm2)=	1.54	En sentido paralelo a b

0.03	hasta	0.3	Rango de Profundidad para el reparto de Asa (m)
0.04	hasta	0.4	Rango de Profundidad para el reparto de Asb (m)

A4. Pilas

1. Cargas aplicadas y obtención de desplazamientos y esfuerzos

Pilas.

Esfuerzos en cabeza

- Fuerza de frenado. $F_{F_1} = \frac{1}{20}(17.9.4+600)\frac{1}{2.2} = 15,15\ KN/pila \Rightarrow F_{F_1} = 8,42\ KN/m$

$F_{F_2} = \frac{1}{20}((14+17).9.4+600)\frac{1}{2.2} = 21,45\ KN/pila \Rightarrow F_{F_2} = 11,92\ KN/m$

- Desplazamientos del tablero. (t amp + retrac. + fluencia)

$u_{vano\ 17} = (\varepsilon_t + \varepsilon_{cs} + \varepsilon_{cr}).17/2 = 1,078.10^{-3}.8,5 = 9,162\ mm$

$u_{vano\ 14} = (\varepsilon_t + \varepsilon_{cs} + \varepsilon_{cr}).14/2 = 1,078.10^{-3}.7 = 7,545\ mm$

$u_{eq} = u_{17} - u_{14} = 9,162 - 7,545 = 1,617\ mm$

$F_u = \frac{u}{\frac{29}{200+300.0,9}} = 3,01\ KN/ap \Rightarrow F_u = 6,02\ KN/pila \Rightarrow F_u = 3,35\ KN/m$

$F_{H_1} = F_{F_1} + F_u = 11,77\ KN.$

$F_{H_2} = F_{F_2} + F_u = 15,27\ KN.$

- Momentos y axiles.

hip 1: $M_{máx}$ → vano central cargado y vano lateral sin carga.

Según emparrillado 17 m: $N_{K\,PP_1} = 238,8\ KN/ap$; $N_{K\,SC_1} = 380,18\ KN/ap$

Según emparrillado 14 m: $N_{K\,PP_2} = 190,92\ KN/ap$

$N_K = (238,8+380,18+190,92)\times 2ap/1,8 = 900\ KN/$

$M_{K\,ap} = (238,8+380,18-190,92).0,4 = 171,22\ KN/ap \Rightarrow$

$M_{K\,pila} = 342,44\ KN/ap \Rightarrow M_K = 190,2\ KN/m$

F_{H_1}

hip 2. $N_{máx}$ → ambos vanos cargados

según emparrillado 14: $N_{K\,SC_2} = 359,45\ KN$

$N_K = 1300\ KN/m$

$M_{K_{ap}} = (238,8+380,18-190,92-359,45)0,4 = 68,61\ KN$

$\Rightarrow M_K = 76,23\ KN/m$

F_{H_2}

** STARTING DATA **

* BOUSSINESQ SURCHARGES NOT FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

	INERTIA PRODUCT EI	CYLINDRICAL RIGIDITY
SECTION NB 1 FROM 0.000 m TO 14.300 m :	1152000. kN.m2/m	0. kPa/m

*** SOIL DESCRIPTION :

LAYER NB 1 FROM 0.000 m TO 11.800 m :

SATURATED UNIT WEIGHT	GH	=	20.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	11.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.307
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.470
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	3.255
COHESION	C	=	6.500 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	32.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	22600.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

LAYER NB 2 FROM 11.800 m TO 15.000 m :

SATURATED UNIT WEIGHT	GH	=	22.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	12.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.361
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.531
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	2.770
COHESION	C	=	25.000 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	28.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	67100.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

** PHASE Nb 1 **

* EXCAVATION IN SOIL 2	TO LEVEL =	9.800 m
* EXCAVATION IN SOIL 1	TO LEVEL =	9.800 m
* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 1	TO LEVEL =	9.800 m
* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2	TO LEVEL =	9.800 m

PHASE 1

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH. ELAST.	STATE	PRE.	SURCH. ELAST.	NB	LOAD
0.000	0.000	0.000	0.00	0.00		0			0				
0.500	0.000	0.000	0.00	0.00		0			0				
1.000	0.000	0.000	0.00	0.00		0			0				
1.500	0.000	0.000	0.00	0.00		0			0				
2.000	0.000	0.000	0.00	0.00		0			0				
2.500	0.000	0.000	0.00	0.00		0			0				
3.000	0.000	0.000	0.00	0.00		0			0				
3.500	0.000	0.000	0.00	0.00		0			0				
4.000	0.000	0.000	0.00	0.00		0			0				
4.500	0.000	0.000	0.00	0.00		0			0				
5.000	0.000	0.000	0.00	0.00		0			0				
5.500	0.000	0.000	0.00	0.00		0			0				
6.000	0.000	0.000	0.00	0.00		0			0				
6.500	0.000	0.000	0.00	0.00		0			0				
7.000	0.000	0.000	0.00	0.00		0			0				
7.500	0.000	0.000	0.00	0.00		0			0				
8.000	0.000	0.000	0.00	0.00		0			0				
8.450	0.000	0.000	0.00	0.00		0			0				
8.900	0.000	0.000	0.00	0.00		0			0				
9.350	0.000	0.000	0.00	0.00		0			0				
9.800	0.000	0.000	0.00	0.00		0			0				
10.300	0.000	0.000	0.00	0.00		2	2.59	22600	2	2.59	22600		
10.800	0.000	0.000	0.00	0.00		2	5.17	22600	2	5.17	22600		
11.300	0.000	0.000	0.00	0.00		2	7.76	22600	2	7.76	22600		
11.800	0.000	0.000	0.00	0.00		2	10.34	22600	2	10.34	22600		
						2	11.67	67100	2	11.67	67100		
12.113	0.000	0.000	0.00	0.00		2	13.66	67100	2	13.66	67100		
12.425	0.000	0.000	0.00	0.00		2	15.65	67100	2	15.65	67100		
12.738	0.000	0.000	0.00	0.00		2	17.64	67100	2	17.64	67100		
13.050	0.000	0.000	0.00	0.00		2	19.63	67100	2	19.63	67100		
13.363	0.000	0.000	0.00	0.00		2	21.62	67100	2	21.62	67100		
13.675	0.000	0.000	0.00	0.00		2	23.61	67100	2	23.61	67100		
13.988	0.000	0.000	0.00	0.00		2	25.60	67100	2	25.60	67100		
14.300	0.000	0.000	0.00	0.00		2	27.59	67100	2	27.59	67100		
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m		kN

MAXIMUM DISPLACEMENT = 0.00 mm
MAXIMUM MOMENT = 0.00 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION
CODIFICATION OF SOIL : 1 = ACTIVE PR., 2 = ELASTIC, 3 = PASSIVE PR.

(3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.102
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.102

** PHASE Nb 2 **

* CONCENTRATED LOAD AT 0.000 m : FORCE = 11.770 kN/m COUPLE = -190.250 kN.m/m

PHASE 2

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE PRE.	SURCH.	ELAST.	STATE PRE.	SURCH.	ELAST.	NB	LOAD
0.000	35.048	-4.069	0.00	0.00		0			0				
0.000	35.048	-4.069	-190.25	11.77		0			0				
0.500	33.034	-3.986	-196.13	11.77		0			0				
1.000	31.063	-3.899	-202.02	11.77		0			0				
1.500	29.135	-3.810	-207.90	11.77		0			0				
2.000	27.253	-3.719	-213.79	11.77		0			0				
2.500	25.417	-3.625	-219.67	11.77		0			0				
3.000	23.629	-3.528	-225.56	11.77		0			0				
3.500	21.890	-3.429	-231.44	11.77		0			0				
4.000	20.201	-3.327	-237.33	11.77		0			0				
4.500	18.563	-3.223	-243.21	11.77		0			0				
5.000	16.978	-3.116	-249.10	11.77		0			0				
5.500	15.447	-3.007	-254.99	11.77		0			0				
6.000	13.972	-2.895	-260.87	11.77		0			0				
6.500	12.553	-2.780	-266.76	11.77		0			0				
7.000	11.192	-2.663	-272.64	11.77		0			0				
7.500	9.891	-2.543	-278.52	11.77		0			0				
8.000	8.649	-2.421	-284.41	11.77		0			0				
8.450	7.585	-2.309	-289.71	11.77		0			0				
8.900	6.571	-2.195	-295.00	11.77		0			0				
9.350	5.610	-2.079	-300.30	11.77		0			0				
9.800	4.701	-1.960	-305.60	11.77		0			0				
						-1			3	23.45	22600		
10.300	3.754	-1.827	-307.80	-4.43		-1			3	41.35	22600		
10.800	2.874	-1.695	-299.67	-29.58		-1			3	59.25	22600		
11.300	2.058	-1.569	-277.68	-57.96		-1			2	54.27	22600		
11.800	1.303	-1.456	-242.52	-81.48		-1			2	39.78	22600		
						-1			2	99.09	67100		
12.113	0.858	-1.394	-212.67	-108.09		-1			2	71.22	67100		
12.425	0.431	-1.341	-175.85	-126.18		-1			2	44.56	67100		
12.738	0.019	-1.299	-134.93	-133.53		2	16.38	67100	2	18.90	67100		
13.050	-0.382	-1.268	-93.85	-126.85		2	45.26	67100	-1				
13.363	-0.775	-1.247	-56.88	-108.28		2	73.60	67100	-1				
13.675	-1.162	-1.236	-27.10	-80.91		2	101.61	67100	-1				
13.988	-1.548	-1.232	-7.23	-44.80		2	129.46	67100	-1				
14.300	-1.933	-1.231	0.00	0.00		2	157.27	67100	-1				
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m		kN

MAXIMUM DISPLACEMENT = 35.05 mm
MAXIMUM MOMENT = -307.80 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION
CODIFICATION OF SOIL : 1 = ACTIVE PR., 2 = ELASTIC, 3 = PASSIVE PR.

(4 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.239
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.259

** PHASE Nb 3 **

* CONCENTRATED LOAD AT 0.000 m : FORCE = 15.270 kN/m COUPLE = -76.230 kN.m/m

PHASE 3

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH. ELAST.	STATE	PRE.	SURCH. ELAST.	NB	LOAD
0.000	26.882	-2.878	0.00	0.00		0			0				
0.000	26.882	-2.878	-76.23	15.27		0			0				
0.500	25.451	-2.843	-83.87	15.27		0			0				
1.000	24.039	-2.805	-91.50	15.27		0			0				
1.500	22.647	-2.764	-99.14	15.27		0			0				
2.000	21.276	-2.719	-106.77	15.27		0			0				
2.500	19.928	-2.671	-114.41	15.27		0			0				
3.000	18.605	-2.620	-122.04	15.27		0			0				
3.500	17.309	-2.565	-129.68	15.27		0			0				
4.000	16.041	-2.507	-137.31	15.27		0			0				
4.500	14.802	-2.446	-144.95	15.27		0			0				
5.000	13.595	-2.381	-152.58	15.27		0			0				
5.500	12.422	-2.313	-160.22	15.27		0			0				
6.000	11.283	-2.242	-167.85	15.27		0			0				
6.500	10.180	-2.168	-175.49	15.27		0			0				
7.000	9.115	-2.090	-183.12	15.27		0			0				
7.500	8.091	-2.009	-190.76	15.27		0			0				
8.000	7.107	-1.924	-198.39	15.27		0			0				
8.450	6.259	-1.846	-205.26	15.27		0			0				
8.900	5.447	-1.764	-212.13	15.27		0			0				
9.350	4.672	-1.680	-219.00	15.27		0			0				
9.800	3.935	-1.593	-225.88	15.27		0			0				
						-1			2	6.15	22600		
10.300	3.163	-1.493	-231.83	6.73		-1			2	28.01	22600		
10.800	2.442	-1.393	-230.80	-12.64		-1			2	49.50	22600		
11.300	1.770	-1.295	-218.36	-36.96		-1			2	47.77	22600		
11.800	1.146	-1.205	-194.39	-57.96		-1			2	36.24	22600		
						-1			2	88.56	67100		
12.113	0.777	-1.155	-172.33	-82.08		-1			2	65.82	67100		
12.425	0.423	-1.112	-143.82	-99.25		-1			2	44.06	67100		
12.738	0.082	-1.077	-111.19	-107.85		2	12.17	67100	2	23.11	67100		
13.050	-0.251	-1.052	-77.68	-104.30		2	36.46	67100	2	2.80	67100		
13.363	-0.577	-1.035	-47.16	-89.61		2	60.31	67100	-1				
13.675	-0.898	-1.026	-22.49	-67.08		2	83.89	67100	-1				
13.988	-1.218	-1.022	-6.00	-37.20		2	107.34	67100	-1				
14.300	-1.537	-1.021	0.00	0.00		2	130.75	67100	-1				
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m		kN

MAXIMUM DISPLACEMENT = 26.88 mm
MAXIMUM MOMENT = -231.83 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.196
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.222

*** END OF CALCULUS

*** MAXIMUM DISPLACEMENT IN PHASE Nb 2 = 35.048 mm IN FINAL PHASE Nb 3 = 26.882 mm

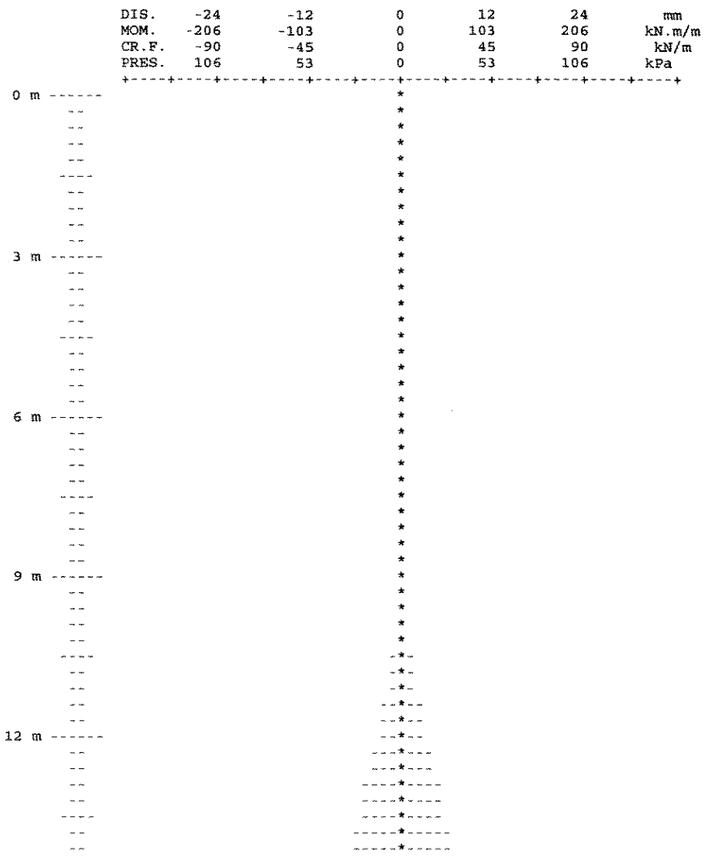
*** MAXIMUM MOMENT IN PHASE Nb 2 = -307.804 kN.m/m IN FINAL PHASE Nb 3 = -231.832 kN.m/m

* ENVELOPE CURVES FROM PHASE 1 TO PHASE 3 *

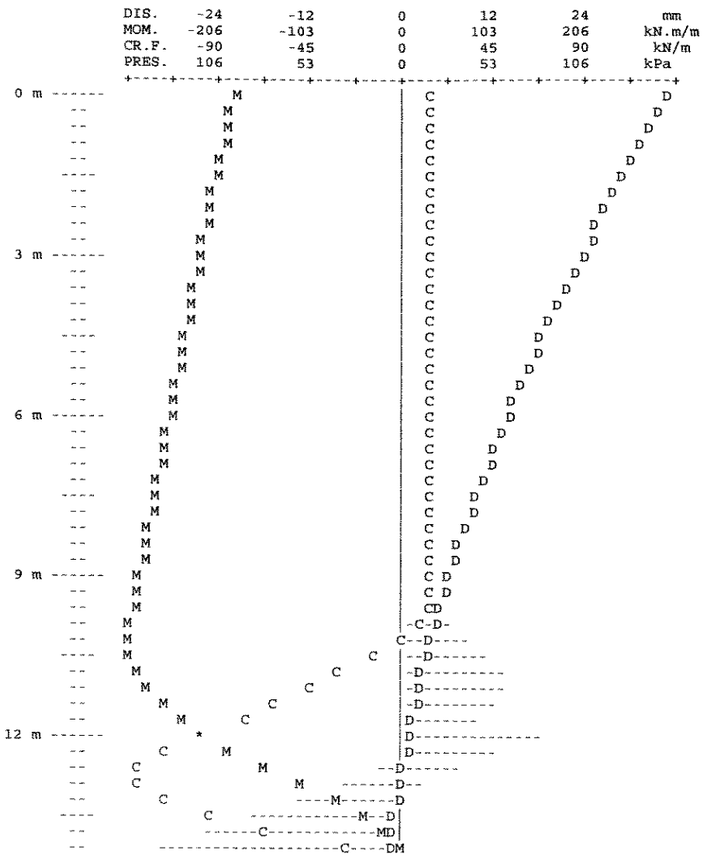
LEVEL	MINI CRO.FO	MAXI CRO.FO
0.000	0.00	15.27
0.500	0.00	15.27
1.000	0.00	15.27
1.500	0.00	15.27
2.000	0.00	15.27
2.500	0.00	15.27
3.000	0.00	15.27
3.500	0.00	15.27
4.000	0.00	15.27
4.500	0.00	15.27
5.000	0.00	15.27
5.500	0.00	15.27
6.000	0.00	15.27
6.500	0.00	15.27
7.000	0.00	15.27
7.500	0.00	15.27
8.000	0.00	15.27
8.450	0.00	15.27
8.900	0.00	15.27
9.350	0.00	15.27
9.800	0.00	15.27
10.300	-4.43	6.73
10.800	-29.58	0.00
11.300	-57.96	0.00
11.800	-81.48	0.00
12.113	-108.09	0.00
12.425	-126.18	0.00
12.738	-133.53	0.00
13.050	-126.85	0.00
13.363	-108.28	0.00
13.675	-80.91	0.00
13.988	-44.80	0.00
14.300	0.00	0.00
m	kN/m	kN/m

LEVEL	MINI MOMENT	MAXI MOMENT
0.000	-190.25	0.00
0.500	-196.13	0.00
1.000	-202.02	0.00
1.500	-207.90	0.00
2.000	-213.79	0.00
2.500	-219.67	0.00
3.000	-225.56	0.00
3.500	-231.44	0.00
4.000	-237.33	0.00
4.500	-243.21	0.00
5.000	-249.10	0.00
5.500	-254.99	0.00
6.000	-260.87	0.00
6.500	-266.76	0.00
7.000	-272.64	0.00
7.500	-278.52	0.00
8.000	-284.41	0.00
8.450	-289.71	0.00
8.900	-295.00	0.00
9.350	-300.30	0.00
9.800	-305.60	0.00
10.300	-307.80	0.00
10.800	-299.67	0.00
11.300	-277.68	0.00
11.800	-242.52	0.00
12.113	-212.67	0.00
12.425	-175.85	0.00
12.738	-134.93	0.00
13.050	-93.85	0.00
13.363	-56.88	0.00
13.675	-27.10	0.00
13.988	-7.23	0.00
14.300	0.00	0.00
m	kN.m/m	kN.m/m

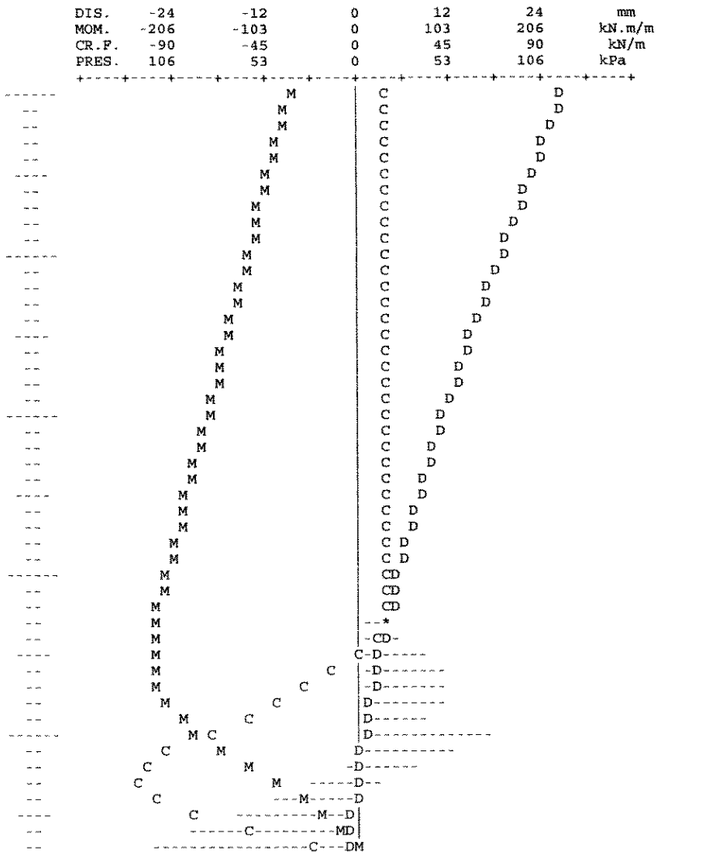
* CURVES TO PHASE Nb 1 *



* CURVES TO PHASE Nb 2 *



* CURVES TO PHASE Nb 3 *



** STARTING DATA **

* BOUSSINESQ SURCHARGES NOT FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

	INERTIA PRODUCT EI	CYLINDRICAL RIGIDITY
SECTION NB 1 FROM 0.000 m TO 16.300 m :	1152000. kN.m2/m	0. kPa/m

*** SOIL DESCRIPTION :

LAYER NB 1 FROM 0.000 m TO 13.800 m :

SATURATED UNIT WEIGHT	GH	=	20.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	11.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.307
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.470
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	3.255
COHESION	C	=	6.500 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	32.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	22600.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

LAYER NB 2 FROM 13.800 m TO 17.000 m :

SATURATED UNIT WEIGHT	GH	=	22.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	12.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.361
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.531
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	2.770
COHESION	C	=	25.000 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	28.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	67100.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

** PHASE Nb 1 **

* EXCAVATION IN SOIL 2	TO LEVEL =	9.800 m
* EXCAVATION IN SOIL 1	TO LEVEL =	9.800 m
* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 1	TO LEVEL =	9.800 m
* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2	TO LEVEL =	9.800 m

PHASE 1

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE. SURCH.	ELAST.	STATE	PRE. SURCH.	ELAST.	NB	LOAD
0.000	0.000	0.000	0.00	0.00		0			0				
0.500	0.000	0.000	0.00	0.00		0			0				
1.000	0.000	0.000	0.00	0.00		0			0				
1.500	0.000	0.000	0.00	0.00		0			0				
2.000	0.000	0.000	0.00	0.00		0			0				
2.500	0.000	0.000	0.00	0.00		0			0				
3.000	0.000	0.000	0.00	0.00		0			0				
3.500	0.000	0.000	0.00	0.00		0			0				
4.000	0.000	0.000	0.00	0.00		0			0				
4.500	0.000	0.000	0.00	0.00		0			0				
5.000	0.000	0.000	0.00	0.00		0			0				
5.500	0.000	0.000	0.00	0.00		0			0				
6.000	0.000	0.000	0.00	0.00		0			0				
6.500	0.000	0.000	0.00	0.00		0			0				
7.000	0.000	0.000	0.00	0.00		0			0				
7.500	0.000	0.000	0.00	0.00		0			0				
8.000	0.000	0.000	0.00	0.00		0			0				
8.450	0.000	0.000	0.00	0.00		0			0				
8.900	0.000	0.000	0.00	0.00		0			0				
9.350	0.000	0.000	0.00	0.00		0			0				
9.800	0.000	0.000	0.00	0.00		0			0				
10.300	0.000	0.000	0.00	0.00		2	2.59	22600	2	2.59	22600		
10.800	0.000	0.000	0.00	0.00		2	5.17	22600	2	5.17	22600		
11.300	0.000	0.000	0.00	0.00		2	7.76	22600	2	7.76	22600		
11.800	0.000	0.000	0.00	0.00		2	10.34	22600	2	10.34	22600		
12.300	0.000	0.000	0.00	0.00		2	12.93	22600	2	12.93	22600		
12.800	0.000	0.000	0.00	0.00		2	15.51	22600	2	15.51	22600		
13.300	0.000	0.000	0.00	0.00		2	18.10	22600	2	18.10	22600		
13.800	0.000	0.000	0.00	0.00		2	20.68	22600	2	20.68	22600		
						2	23.34	67100	2	23.34	67100		
14.112	0.000	0.000	0.00	0.00		2	25.33	67100	2	25.33	67100		
14.425	0.000	0.000	0.00	0.00		2	27.32	67100	2	27.32	67100		
14.737	0.000	0.000	0.00	0.00		2	29.31	67100	2	29.31	67100		
15.050	0.000	0.000	0.00	0.00		2	31.30	67100	2	31.30	67100		
15.362	0.000	0.000	0.00	0.00		2	33.29	67100	2	33.29	67100		
15.675	0.000	0.000	0.00	0.00		2	35.28	67100	2	35.28	67100		
15.987	0.000	0.000	0.00	0.00		2	37.27	67100	2	37.27	67100		
16.300	0.000	0.000	0.00	0.00		2	39.26	67100	2	39.26	67100		
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m		kN

MAXIMUM DISPLACEMENT = 0.00 mm
MAXIMUM MOMENT = 0.00 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.120
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.120

** PHASE Nb 2 **

* CONCENTRATED LOAD AT 0.000 m : FORCE = 11.770 kN/m COUPLE = -190.250 kN.m/m

PHASE 2

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE. SURCH.	ELAST.	STATE	PRE. SURCH.	ELAST.	NB	LOAD
0.000	23.796	-3.169	0.00	0.00		0			0				
0.000	23.796	-3.169	-190.25	11.77		0			0				
0.500	22.232	-3.085	-196.13	11.77		0			0				
1.000	20.711	-2.998	-202.02	11.77		0			0				
1.500	19.234	-2.910	-207.90	11.77		0			0				
2.000	17.802	-2.818	-213.79	11.77		0			0				
2.500	16.417	-2.724	-219.67	11.77		0			0				
3.000	15.079	-2.627	-225.56	11.77		0			0				
3.500	13.790	-2.528	-231.44	11.77		0			0				
4.000	12.551	-2.426	-237.33	11.77		0			0				
4.500	11.364	-2.322	-243.21	11.77		0			0				
5.000	10.229	-2.215	-249.10	11.77		0			0				
5.500	9.149	-2.106	-254.99	11.77		0			0				
6.000	8.124	-1.994	-260.87	11.77		0			0				
6.500	7.155	-1.879	-266.76	11.77		0			0				
7.000	6.245	-1.762	-272.64	11.77		0			0				
7.500	5.393	-1.643	-278.52	11.77		0			0				
8.000	4.602	-1.521	-284.41	11.77		0			0				
8.450	3.943	-1.408	-289.71	11.77		0			0				
8.900	3.335	-1.294	-295.00	11.77		0			0				
9.350	2.779	-1.178	-300.30	11.77		0			0				
9.800	2.275	-1.060	-305.60	11.77		0			0				
						-1			3	23.45	22600		
10.300	1.779	-0.926	-307.80	-4.43		-1			3	41.35	22600		
10.800	1.349	-0.794	-300.66	-23.68		-1			2	35.65	22600		
11.300	0.984	-0.667	-284.59	-40.10		-1			2	29.99	22600		
11.800	0.681	-0.548	-260.97	-54.03		-1			2	25.73	22600		
12.300	0.434	-0.441	-231.00	-65.36		2	3.12	22600	2	22.74	22600		
12.800	0.237	-0.348	-196.24	-72.95		2	10.15	22600	2	20.88	22600		
13.300	0.083	-0.271	-158.71	-76.58		2	16.21	22600	2	19.98	22600		
13.800	-0.036	-0.210	-120.18	-77.11		2	21.50	22600	2	19.86	22600		
						2	25.78	67100	2	20.91	67100		
14.112	-0.097	-0.181	-96.45	-74.30		2	31.86	67100	2	18.80	67100		
14.425	-0.150	-0.158	-73.99	-69.11		2	37.40	67100	2	17.24	67100		
14.737	-0.197	-0.141	-53.47	-61.84		2	42.51	67100	2	16.11	67100		
15.050	-0.239	-0.129	-35.53	-52.71		2	47.32	67100	2	15.28	67100		
15.362	-0.278	-0.121	-20.71	-41.88		2	51.92	67100	2	14.66	67100		
15.675	-0.315	-0.117	-9.52	-29.45		2	56.41	67100	2	14.15	67100		
15.987	-0.351	-0.116	-2.46	-15.49		2	60.84	67100	2	13.70	67100		
16.300	-0.387	-0.115	0.00	0.00		2	65.25	67100	2	13.27	67100		
m	mm	/1000	kN.m/m	kN/m	kPa		kPa kPa	kPa/m		kPa kPa	kPa/m		kN

MAXIMUM DISPLACEMENT = 23.80 mm

MAXIMUM MOMENT = -307.80 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(4 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.137
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.149

** PHASE Nb 3 **

* CONCENTRATED LOAD AT 0.000 m : FORCE = 15.270 kN/m COUPLE = -76.230 kN.m/m

PHASE 3

	WALL					SOIL 1 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 9.80 m WATER LEVEL: 9.80 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH. ELAST.	STATE	PRE.	SURCH. ELAST.	NB	LOAD
0.000	17.293	-2.114	0.00	0.00		0			0				
0.000	17.293	-2.114	-76.23	15.27		0			0				
0.500	16.245	-2.079	-83.87	15.27		0			0				
1.000	15.215	-2.041	-91.50	15.27		0			0				
1.500	14.205	-2.000	-99.14	15.27		0			0				
2.000	13.216	-1.955	-106.77	15.27		0			0				
2.500	12.250	-1.907	-114.41	15.27		0			0				
3.000	11.309	-1.856	-122.04	15.27		0			0				
3.500	10.395	-1.801	-129.68	15.27		0			0				
4.000	9.509	-1.743	-137.31	15.27		0			0				
4.500	8.652	-1.682	-144.95	15.27		0			0				
5.000	7.827	-1.617	-152.58	15.27		0			0				
5.500	7.036	-1.549	-160.22	15.27		0			0				
6.000	6.279	-1.478	-167.85	15.27		0			0				
6.500	5.558	-1.404	-175.49	15.27		0			0				
7.000	4.875	-1.326	-183.12	15.27		0			0				
7.500	4.233	-1.245	-190.76	15.27		0			0				
8.000	3.631	-1.160	-198.39	15.27		0			0				
8.450	3.127	-1.081	-205.26	15.27		0			0				
8.900	2.658	-1.000	-212.13	15.27		0			0				
9.350	2.227	-0.916	-219.00	15.27		0			0				
9.800	1.835	-0.829	-225.88	15.27		0			0				
						-1			2	13.49	22600		
10.300	1.445	-0.730	-230.98	3.45		-1			2	33.81	22600		
10.800	1.105	-0.629	-228.63	-12.54		-1			2	30.15	22600		
11.300	0.815	-0.532	-218.75	-26.62		-1			2	26.17	22600		
11.800	0.572	-0.441	-202.29	-38.98		-1			2	23.27	22600		
12.300	0.373	-0.357	-180.16	-49.02		2	4.50	22600	2	21.36	22600		
12.800	0.213	-0.285	-153.84	-55.64		2	10.70	22600	2	20.32	22600		
13.300	0.086	-0.224	-125.06	-59.02		2	16.15	22600	2	20.05	22600		
13.800	-0.013	-0.176	-95.25	-59.84		2	20.99	22600	2	20.38	22600		
						2	24.24	67100	2	22.44	67100		
14.112	-0.065	-0.153	-76.76	-58.20		2	29.68	67100	2	20.99	67100		
14.425	-0.110	-0.135	-59.09	-54.55		2	34.67	67100	2	19.97	67100		
14.737	-0.149	-0.121	-42.85	-49.12		2	39.33	67100	2	19.29	67100		
15.050	-0.185	-0.111	-28.56	-42.10		2	43.75	67100	2	18.85	67100		
15.362	-0.219	-0.105	-16.69	-33.61		2	48.00	67100	2	18.58	67100		
15.675	-0.251	-0.102	-7.69	-23.74		2	52.16	67100	2	18.41	67100		
15.987	-0.283	-0.101	-1.99	-12.53		2	56.27	67100	2	18.27	67100		
16.300	-0.315	-0.100	0.00	0.00		2	60.36	67100	2	18.16	67100		
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m		kN

MAXIMUM DISPLACEMENT = 17.29 mm

MAXIMUM MOMENT = -230.98 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION
CODIFICATION OF SOIL : 1 = ACTIVE PR., 2 = ELASTIC, 3 = PASSIVE PR.

(3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.130
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.145

*** END OF CALCULUS

*** MAXIMUM DISPLACEMENT IN PHASE Nb 2 = 23.796 mm IN FINAL PHASE Nb 3 = 17.293 mm

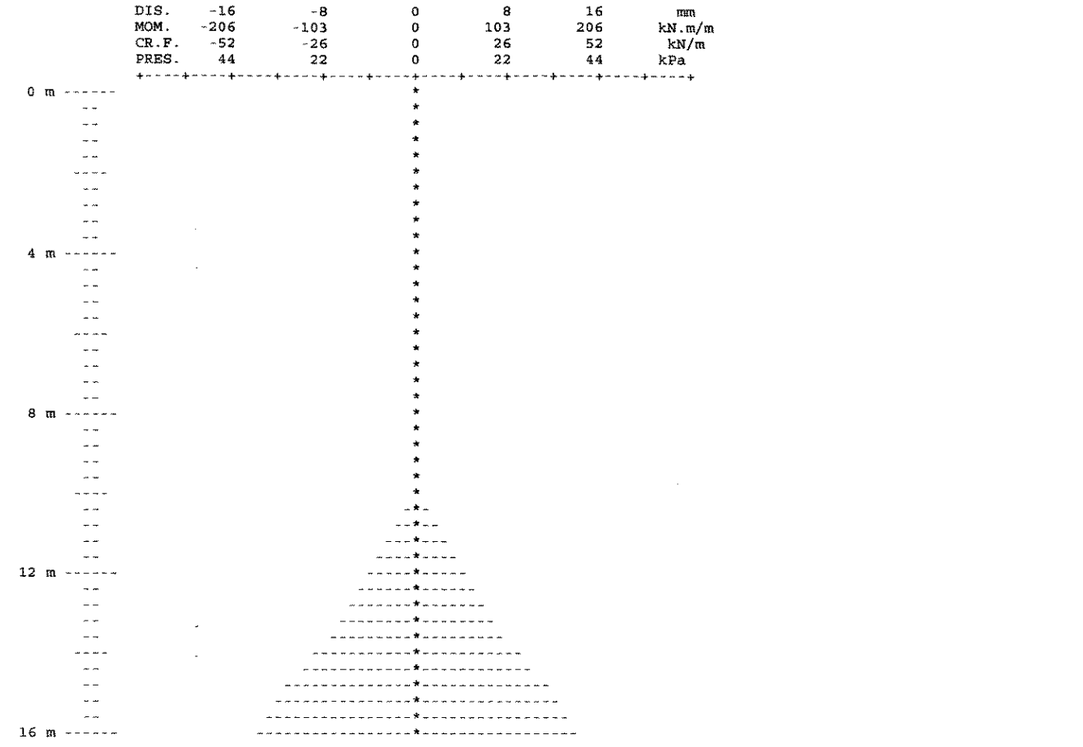
*** MAXIMUM MOMENT IN PHASE Nb 2 = -307.804 kN.m/m IN FINAL PHASE Nb 3 = -230.978 kN.m/m

* ENVELOPE CURVES FROM PHASE 1 TO PHASE 3 *

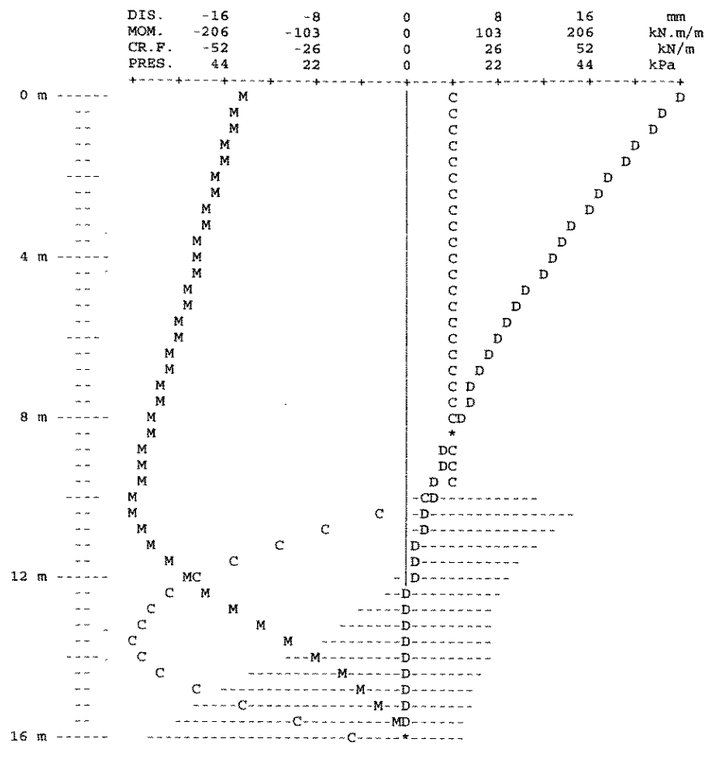
LEVEL	MINI CRO.FO	MAXI CRO.FO
0.000	0.00	15.27
0.500	0.00	15.27
1.000	0.00	15.27
1.500	0.00	15.27
2.000	0.00	15.27
2.500	0.00	15.27
3.000	0.00	15.27
3.500	0.00	15.27
4.000	0.00	15.27
4.500	0.00	15.27
5.000	0.00	15.27
5.500	0.00	15.27
6.000	0.00	15.27
6.500	0.00	15.27
7.000	0.00	15.27
7.500	0.00	15.27
8.000	0.00	15.27
8.450	0.00	15.27
8.900	0.00	15.27
9.350	0.00	15.27
9.800	0.00	15.27
10.300	-4.43	3.45
10.800	-23.68	0.00
11.300	-40.10	0.00
11.800	-54.03	0.00
12.300	-65.36	0.00
12.800	-72.95	0.00
13.300	-76.58	0.00
13.800	-77.11	0.00
14.112	-74.30	0.00
14.425	-69.11	0.00
14.737	-61.84	0.00
15.050	-52.71	0.00
15.362	-41.88	0.00
15.675	-29.45	0.00
15.987	-15.49	0.00
16.300	0.00	0.00
m	kN/m	kN/m

LEVEL	MINI MOMENT	MAXI MOMENT
0.000	-190.25	0.00
0.500	-196.13	0.00
1.000	-202.02	0.00
1.500	-207.90	0.00
2.000	-213.79	0.00
2.500	-219.67	0.00
3.000	-225.56	0.00
3.500	-231.44	0.00
4.000	-237.33	0.00
4.500	-243.21	0.00
5.000	-249.10	0.00
5.500	-254.99	0.00
6.000	-260.87	0.00
6.500	-266.76	0.00
7.000	-272.64	0.00
7.500	-278.52	0.00
8.000	-284.41	0.00
8.450	-289.71	0.00
8.900	-295.00	0.00
9.350	-300.30	0.00
9.800	-305.60	0.00
10.300	-307.80	0.00
10.800	-300.66	0.00
11.300	-284.59	0.00
11.800	-260.97	0.00
12.300	-231.00	0.00
12.800	-196.24	0.00
13.300	-158.71	0.00
13.800	-120.18	0.00
14.112	-96.45	0.00
14.425	-73.99	0.00
14.737	-53.47	0.00
15.050	-35.53	0.00
15.362	-20.71	0.00
15.675	-9.52	0.00
15.987	-2.46	0.00
16.300	0.00	0.00
m	kN.m/m	kN.m/m

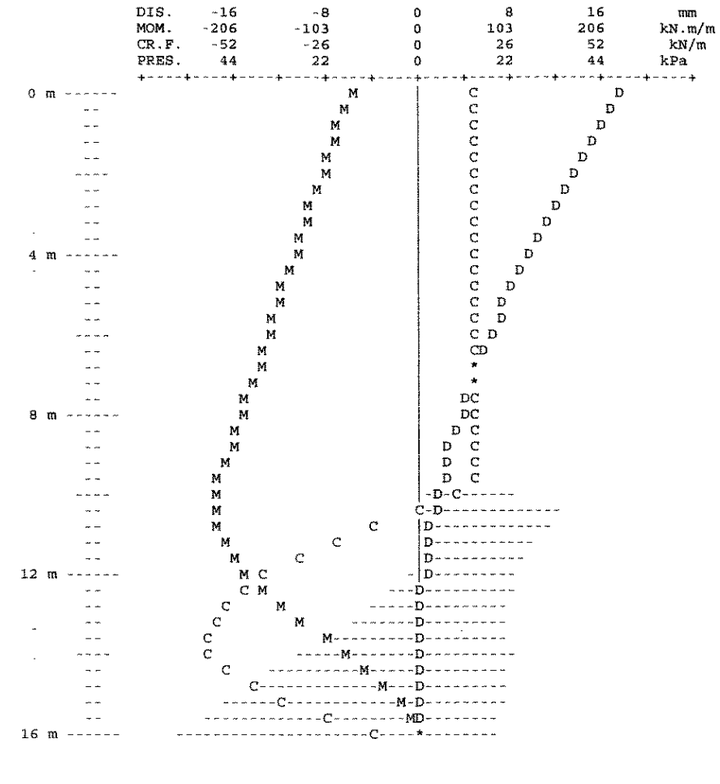
* CURVES TO PHASE Nb 1 *



* CURVES TO PHASE Nb 2 *



* CURVES TO PHASE Nb 3 *



2. Dimensionamiento a flexocompresión y cortante

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 19/11/2003
Hora: 20:48:36

Cálculo de secciones a flexión compuesta recta

1 Datos

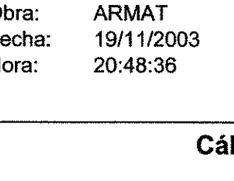
- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : 100X80H25R
b [m] = 1.00
h [m] = 0.80
r [m] = 0.070

nº barras horizontales = 9
nº barras verticales = 2

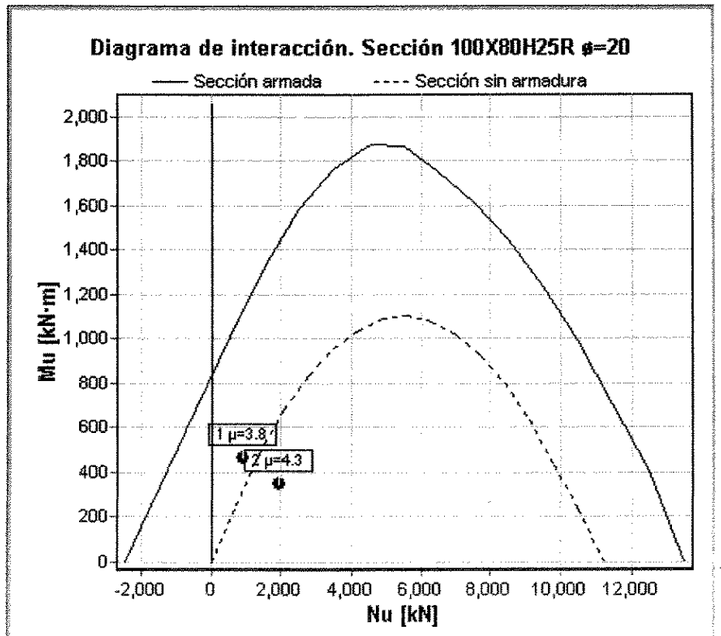


2 Diagrama

ϕ [mm] = 20

Resultados numéricos del diagrama de interacción

x [cm]	1/r [1/m] ·1.E-3	Nu [kN]	Mu [kN·m]
-9999.000	0.0	2458.6	0.0
0.030	14.3	1463.9	333.4
0.086	15.5	469.1	681.2
0.127	16.6	-525.6	1011.8
0.165	17.7	-1520.4	1319.6
0.220	15.9	-2515.1	1587.9
0.306	11.4	-3509.8	1768.3
0.393	8.9	-4504.6	1877.0
0.469	7.5	-5499.3	1871.0
0.526	6.6	-6494.1	1750.9
0.588	6.0	-7488.8	1611.2
0.654	5.4	-8483.6	1443.2
0.722	4.8	-9478.3	1239.2
0.793	4.4	-10473.1	992.6
0.904	3.6	-11467.8	701.7
1.156	2.5	-12462.6	406.8
9999.000	0.7	-13457.3	0.0



Coeficientes de seguridad de los pares de esfuerzos de cálculo

Punto	Nd [kN]	Md [kN·m]	γ
1	900	461.7	3.81
2	1300	347.75	4.26

Comprobación de la inestabilidad de soportes aislados

Para soportes con esbeltez mecánica comprendida entre 35 y 100 puede aplicarse el método aproximado de la EHE.

La esbeltez mecánica se define como el cociente entre la longitud de pandeo y el radio de giro de la sección. En este caso la longitud de pandeo se considera 1,7 veces la longitud hasta el empotramiento que se produce aproximadamente a una profundidad de unos 11 metros, y el radio de giro es de 0,23 metros, lo que implica una esbeltez mecánica de 81,3.

Método aproximado. Flexión compuesta recta

Para soportes de sección y armadura constante deberá dimensionarse la sección para una excentricidad total igual a la que se indica:

$$e_{tot} = e_e + e_a \geq e_2$$

$$e_a = (1 + 0{,}12\beta)(\varepsilon_y + \varepsilon)\frac{h + 20e_e}{h + 10e_e}\frac{l_0^2}{50 i_c}$$

donde:

e_a Excentricidad ficticia utilizada para representar los efectos de segundo orden.

e_e Excentricidad de cálculo de primer orden equivalente.
$e_e = e_2$ para soportes traslacionales.

e_2 Excentricidad de cálculo máxima de primer orden, tomada con signo positivo.
Para un momento de 461,7 kNm y un axil de 900 kN resulta ser de 0,513

l_0 Longitud de pandeo.

i_c Radio de giro de la sección de hormigón en la dirección considerada.

h Canto total de la sección de hormigón.

e_y Deformación del acero para la tensión de cálculo f_{yd}, es decir,

$$\varepsilon_y = \frac{f_{yd}}{E_s}$$

e Parámetro auxiliar para tener en cuenta los efectos de la fluencia:
e = 0,003 cuando el axil cuasipermanente no supera el 70% del axil total.
e = 0,004 cuando el axil cuasipermanente es mayor que el 70% del axil total.

ß Factor de armado, dado por

$$\beta = \frac{(d - d')^2}{4 i_s^2}$$

siendo i_s el radio de giro de las armaduras. Para este caso resulta β = 3.

$$e_a = (1 + 0{,}12 \cdot 3)\left(\frac{435}{200000} + 0{,}003\right)\frac{0{,}8 + 20 \cdot 0{,}513}{0{,}8 + 10 \cdot 0{,}513}\frac{(1{,}7 \cdot 11)^2}{50 \cdot 0{,}23} = 0{,}395$$

$$e_{tot} = 0{,}513 + 0{,}395 = 0{,}908$$

Md' = 0,908*Nd = 817,2 kNm

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 08/03/2004
Hora: 21:36:55

Cálculo de secciones a flexión compuesta recta

1 Datos

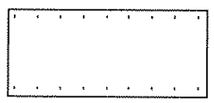
- Materiales

Tipo de hormigón : HA-30
Tipo de acero : B-500-S
fck [MPa] = 30.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : 100X80H25R
b [m] = 1.80
h [m] = 0.80
r [m] = 0.070

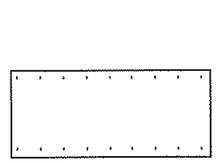
nº barras horizontales = 9
nº barras verticales = 2

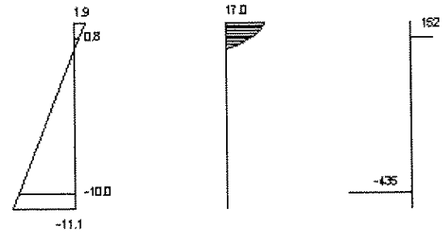


2 Comprobación

ϕ [mm] = 20
Nd [kN] = 900
Md [kN·m] = 817.2

Nu [kN] = 1510.3
Mu [kN·m] = 1371.4
γ = 1.68





Plano de deformación de agotamiento

x [m] = 0.117
1/r [1/m]·1.E-3 = 16.3
εs ·1.E-3 = 1.9
εi ·1.E-3 = -11.1

Deformación y tensión de armaduras superior e inferior

Profundidad [m]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.8	-151.9
0.730	-10.0	434.8

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 15:01:21

Cálculo de secciones a cortante

1 Datos

- Materiales

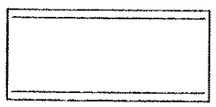
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 180X80H25
b0 [m] = 1.80
h [m] = 0.80



2 Dimensionamiento

[illegible] [kN] = 1662.5

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
α [1 E-3] = 2
[illegible] [kN] = 0.0
[illegible] = 0.0
[illegible] [E-3] = 0
[illegible] = 0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	----	----	----	----	----	----
ø 8	0.10	4	20.1	2	530.8	----
ø 10	0.20	4	15.7	2	414.7	----
ø 12	0.25	4	18.1	2	477.7	----

Área estricta [cm²/m] = 15.0
(Cuantía mínima)
Vu1 [kN] = 6570.0
Vcu [kN] = 342.3

VERIFICACIÓN CAPACIDAD PORTANTE BAJO PILARES INTERMEDIOS

Pantalla empotrada 3. e en arcilita. ≃ 2,4 m.

$q_u = 20$ kp/cm².

Fuste del empotramiento:

$$r_f = \frac{1}{2} q_u$$

Dimensiones de la pantalla: 1,80 × 0,8.

P = 5,20 m.

h = 2,4 m.

$$r_f = \frac{1}{2} \cdot 2000 \frac{kN}{m^2} \cdot 5,20 \cdot 2,4 = 12480 \text{ kN}$$

$$F_S = 3 \qquad r_{f\,adm} = \frac{r_f}{F_S} = 4160 \text{ kN}$$

Carga sobre el terreno.

$$2(g_3 + g_2 + q_3 + q_2) + P \cdot P_{ant} = 2926 \text{ kN} := N_k$$

214 260 312 380 → 2332.

16,5 · 0,8 · 1,8 · 25 → 594

$$\frac{4160}{2926} = 1,42 - \text{Factor de seguridad adicional.}$$

4. Coronación

CARGAS CONCENTRADAS SOBRE MACIZOS
Apoyo: O.F. 5.9 AVE VILAFRANCA

DATOS:

GEOMETRIA

a1 (m)=	0.2	Dim. del apoyo en sentido del eje de la viga (dim. menor)
b1 (m)=	0.3	Dim. del apoyo en sentido perpendicular al eje de la viga (dim. mayor)
a (m)=	0.4	Dim. homotética de a1
b (m)=	0.5	Dim. homotética de b1
h(m)=	0.8	Espesor del elemento de apoyo + banqueta

MATERIALES

fck(MPa)=	25	
fyk(MPa)=	500	
fcd(MPa)=	16.67	
fyd(MPa)=	434.78	

CARGAS

Nd(kN)=	892.65	Carga sobre el apoyo (mayorada)

CALCULOS

ESPESOR MINIMO DEL ELEMENTO DE APOYO:

0.8 >=? 0.18

TENSION DE CONTACTO LOCALIZADA

Nu		Nd
1825.7	>?	892.65
3300.0	>?	892.65

ARMADURAS TRANSVERSALES

Asa(cm2)=	3.08	En sentido paralelo a a
Asb(cm2)=	2.46	En sentido paralelo a b

0.04	hasta	0.4	Rango de Profundidad para el reparto de Asa (m)
0.05	hasta	0.5	Rango de Profundidad para el reparto de Asb (m)

A5. Estribo 1

1. Cargas aplicadas y obtención de desplazamientos y esfuerzos

Estribos

- Esfuerzos en cabeza

$F_F = \frac{1}{20}(14.9.4 + 600)/2 = 27,6\ KN/estribo \rightarrow F_F = 3,07\ KN/m$

- Desplazamientos del tablero (temp + retrac. + fluencia)

$u = (\varepsilon_t + \varepsilon_{cs} + \varepsilon_{cr})\,14/2 = 7,545\ mm$

$F_u = \frac{u}{\frac{29}{200.300.0,9}} = 14,05\ KN/ap \rightarrow F_u = 6,24\ KN/m$

$F_H = F_F + F_u = 9,31\ KN/m$

- Reacciones

según emparrillado 14m

$N_{k\,pp} = 190,92\ KN/ap \rightarrow N_{k_{pp}} = 84,85\ KN/m$

$N_{k\,SC} = 359,45\ KN/ap \rightarrow N_{k_{SC}} = 159,76\ KN/m$

** STARTING DATA **

* BOUSSINESQ SURCHARGES NOT FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

	INERTIA PRODUCT EI	CYLINDRICAL RIGIDITY
SECTION NB 1 FROM 0.000 m TO 13.000 m :	1152000. kN.m2/m	0. kPa/m

*** SOIL DESCRIPTION :

LAYER NB 1 FROM 0.000 m TO 8.000 m :

SATURATED UNIT WEIGHT	GH	=	20.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	11.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.307
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.470
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	3.255
COHESION	C	=	6.500 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	32.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	22600.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

LAYER NB 2 FROM 8.000 m TO 15.000 m :

SATURATED UNIT WEIGHT	GH	=	22.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	12.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.361
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.531
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	2.770
COHESION	C	=	25.000 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	28.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	67100.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

** PHASE Nb 1 **

* EXCAVATION IN SOIL 2

TO LEVEL = 6.200 m
WITH BERM AT LEVEL = 10.200 m A = 0.000 m B = 10.000 m
SIMULATION WITH BOUSSINESQ SURCHARGES

PHASE 1

	WALL					SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 6.20 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE. SURCH.	ELAST.	STATE	PRE. SURCH.	ELAST.	NB	LOAD
0.000	13.598	-1.466	0.00	0.00		-1			0				
0.300	13.158	-1.466	0.00	0.00		-1			0				
0.600	12.718	-1.466	0.00	0.00		-1			0				
0.900	12.279	-1.466	0.00	0.00		-1			0				
1.200	11.839	-1.466	0.00	0.03		1	0.17	22600	0				
1.513	11.381	-1.466	-0.05	0.38		1	2.09	22600	0				
1.825	10.922	-1.466	-0.30	1.33		1	4.01	22600	0				
2.137	10.464	-1.466	-0.94	2.88		1	5.93	22600	0				
2.450	10.006	-1.465	-2.17	5.04		1	7.85	22600	0				
2.762	9.549	-1.465	-4.15	7.79		1	9.77	22600	0				
3.075	9.091	-1.463	-7.10	11.14		1	11.69	22600	0				
3.387	8.634	-1.461	-11.18	15.10		1	13.61	22600	0				
3.700	8.178	-1.457	-16.59	19.65		1	15.53	22600	0				
4.012	7.724	-1.451	-23.52	24.80		1	17.45	22600	0				
4.325	7.271	-1.444	-32.16	30.56		1	19.37	22600	0				
4.637	6.822	-1.434	-42.68	36.91		1	21.29	22600	0				
4.950	6.375	-1.421	-55.29	43.86		1	23.21	22600	0				
5.262	5.934	-1.404	-70.16	51.42		1	25.13	22600	0				
5.575	5.499	-1.382	-87.49	59.57		1	27.05	22600	0				
5.887	5.071	-1.356	-107.46	68.33		1	28.97	22600	0				
6.200	4.652	-1.324	-130.26	77.68		1	30.89	22600	0				
						1	30.89	22600	3	19.22	22600		
6.650	4.069	-1.266	-166.21	81.74		1	33.66	22600	3	27.31	22600		
7.100	3.515	-1.194	-203.29	82.27		1	36.42	22600	3	40.38	22600		
7.550	2.996	-1.107	-239.55	78.04		1	39.19	22600	3	54.04	22600		
8.000	2.520	-1.007	-272.90	69.61		1	41.96	22600	2	64.58	22600		
						1	27.72	67100	3	114.82	67100		
8.275	2.252	-0.940	-288.68	44.92		1	28.91	67100	3	121.41	67100		
8.550	2.003	-0.870	-297.50	19.16		1	30.11	67100	3	124.91	67100		
8.825	1.774	-0.798	-299.15	-7.28		1	31.30	67100	3	128.83	67100		
9.100	1.564	-0.728	-293.64	-32.17		1	32.49	67100	2	115.96	67100		
9.375	1.374	-0.659	-281.81	-53.28		1	33.68	67100	2	103.74	67100		
9.650	1.202	-0.593	-264.66	-70.89		1	34.87	67100	2	92.81	67100		
9.925	1.047	-0.533	-243.11	-85.32		1	36.06	67100	2	83.08	67100		
10.200	0.908	-0.478	-218.00	-96.80		2	37.95	67100	2	74.45	67100		
10.550	0.752	-0.417	-182.33	-105.76		2	50.66	67100	2	65.35	67100		
10.900	0.615	-0.367	-144.82	-107.48		2	62.07	67100	2	57.25	67100		
11.250	0.494	-0.329	-107.85	-102.77		2	72.44	67100	2	50.29	67100		
11.600	0.384	-0.301	-73.55	-92.27		2	82.05	67100	2	44.21	67100		
11.950	0.282	-0.283	-43.88	-76.48		2	91.12	67100	2	38.75	67100		
12.300	0.184	-0.274	-20.60	-55.73		2	99.88	67100	2	33.68	67100		
12.650	0.089	-0.270	-5.42	-30.20		2	108.49	67100	2	28.84	67100		
13.000	-0.005	-0.270	0.00	0.00		2	117.05	67100	2	24.11	67100		
m	mm	/1000	kN.m/m	kN/m	kPa		kPa kPa	kPa/m		kPa kPa	kPa/m		kN

MAXIMUM DISPLACEMENT = 13.60 mm

MAXIMUM MOMENT = -299.15 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(6 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.083
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.503

** PHASE Nb 2 **

* CONCENTRATED LOAD AT 1.200 m : FORCE = 9.310 kN/m COUPLE = 0.000 kN.m/m

* CAQUOT SURCHARGE ON SOIL 1 = 10.000 kPa

PHASE 2

	WALL					SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: 8.00 m CAQUOT SURC.: 10.00 kPa				SOIL 2 EXCAVATION: 6.20 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa				STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH.	ELAST.	STATE	PRE.	SURCH.	ELAST.	NB	LOAD
0.000	32.575	-3.349	0.00	0.00		-1				0					
0.300	31.570	-3.349	0.00	0.00		-1				0					
0.600	30.565	-3.349	0.00	0.00		-1				0					
0.900	29.561	-3.349	-0.02	0.21		1	1.40	1.40	22600	0					
1.200	28.556	-3.349	-0.17	0.91		1	3.24	3.07	22600	0					
				10.22		1	3.24	3.07	22600	0					
1.513	27.510	-3.348	-3.56	11.53		1	5.16	3.07	22600	0					
1.825	26.464	-3.347	-7.44	13.44		1	7.08	3.07	22600	0					
2.137	25.418	-3.344	-12.02	15.95		1	9.00	3.07	22600	0					
2.450	24.374	-3.340	-17.48	19.07		1	10.92	3.07	22600	0					
2.762	23.331	-3.334	-24.00	22.78		1	12.84	3.07	22600	0					
3.075	22.290	-3.327	-31.78	27.09		1	14.76	3.07	22600	0					
3.387	21.252	-3.317	-40.99	32.01		1	16.68	3.07	22600	0					
3.700	20.217	-3.304	-51.84	37.52		1	18.60	3.07	22600	0					
4.012	19.187	-3.289	-64.51	43.63		1	20.52	3.07	22600	0					
4.325	18.162	-3.269	-79.18	50.35		1	22.44	3.07	22600	0					
4.637	17.144	-3.246	-96.04	57.66		1	24.36	3.07	22600	0					
4.950	16.134	-3.217	-115.28	65.58		1	26.29	3.07	22600	0					
5.262	15.134	-3.183	-137.09	74.09		1	28.21	3.07	22600	0					
5.575	14.146	-3.142	-161.65	83.20		1	30.13	3.07	22600	0					
5.887	13.171	-3.095	-189.15	92.92		1	32.05	3.07	22600	0					
6.200	12.212	-3.039	-219.78	103.23		1	33.97	3.07	22600	0					
						1	33.97	3.07	22600	3	19.22		22600		
6.650	10.865	-2.944	-267.55	108.67		1	36.73	3.07	22600	3	27.31		22600		
7.100	9.565	-2.830	-317.06	110.59		1	39.50	3.07	22600	3	40.38		22600		
7.550	8.321	-2.697	-366.37	107.74		1	42.26	3.07	22600	3	54.04		22600		
8.000	7.141	-2.544	-413.27	99.85		1	45.03	3.07	22600	3	68.31		22600		
						1	31.33	3.61	67100	3	114.82		67100		
8.275	6.455	-2.443	-437.51	76.15		1	32.52	3.61	67100	3	121.41		67100		
8.550	5.798	-2.336	-455.06	51.39		1	33.72	3.61	67100	3	124.91		67100		
8.825	5.171	-2.226	-465.71	25.94		1	34.91	3.61	67100	3	128.83		67100		
9.100	4.574	-2.114	-469.25	-0.32		1	36.10	3.61	67100	3	133.14		67100		
9.375	4.008	-2.002	-465.45	-27.49		1	37.29	3.61	67100	3	137.81		67100		
9.650	3.473	-1.893	-454.04	-55.65		1	38.48	3.61	67100	3	142.82		67100		
9.925	2.967	-1.786	-434.74	-84.91		1	39.67	3.61	67100	3	148.13		67100		
10.200	2.490	-1.686	-407.23	-115.35		1	40.86	3.61	67100	3	153.74		67100		
10.550	1.920	-1.569	-360.18	-152.84		1	42.38	3.61	67100	2	143.76		67100		
10.900	1.390	-1.468	-301.22	-182.01		1	43.90	3.61	67100	2	109.21		67100		
11.250	0.891	-1.386	-234.32	-197.96		2	51.12	5.31	67100	2	76.92		67100		
11.600	0.417	-1.326	-164.77	-195.69		2	85.15	5.31	67100	2	46.41		67100		
11.950	-0.040	-1.286	-99.92	-171.26		2	118.01	5.31	67100	2	17.16		67100		
12.300	-0.486	-1.264	-47.16	-127.34		2	150.15	5.31	67100	-1					
12.650	-0.926	-1.255	-12.44	-69.22		2	181.94	5.31	67100	-1					
13.000	-1.365	-1.254	0.00	0.00		2	213.63	5.31	67100	-1					
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa	kPa/m		kPa	kPa	kPa/m		kN

MAXIMUM DISPLACEMENT = 32.57 mm

MAXIMUM MOMENT = -469.25 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(6 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 43.09 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.092
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.610

*** END OF CALCULUS

*** MAXIMUM DISPLACEMENT IN PHASE Nb 2 = 32.575 mm IN FINAL PHASE Nb 2 = 32.575 mm

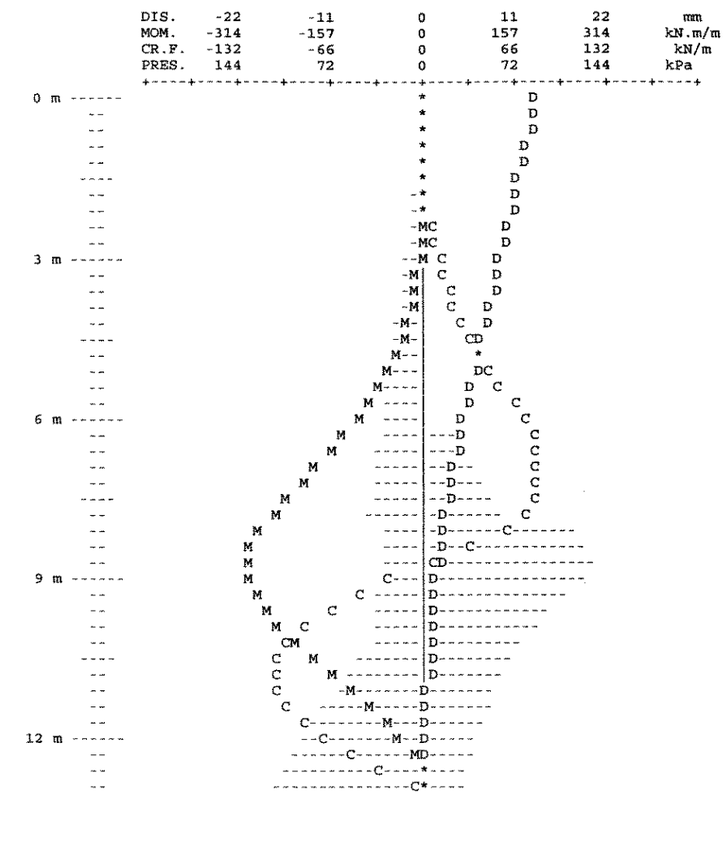
*** MAXIMUM MOMENT IN PHASE Nb 2 = -469.253 kN.m/m IN FINAL PHASE Nb 2 = -469.253 kN.m/m

* ENVELOPE CURVES FROM PHASE 1 TO PHASE 2 *

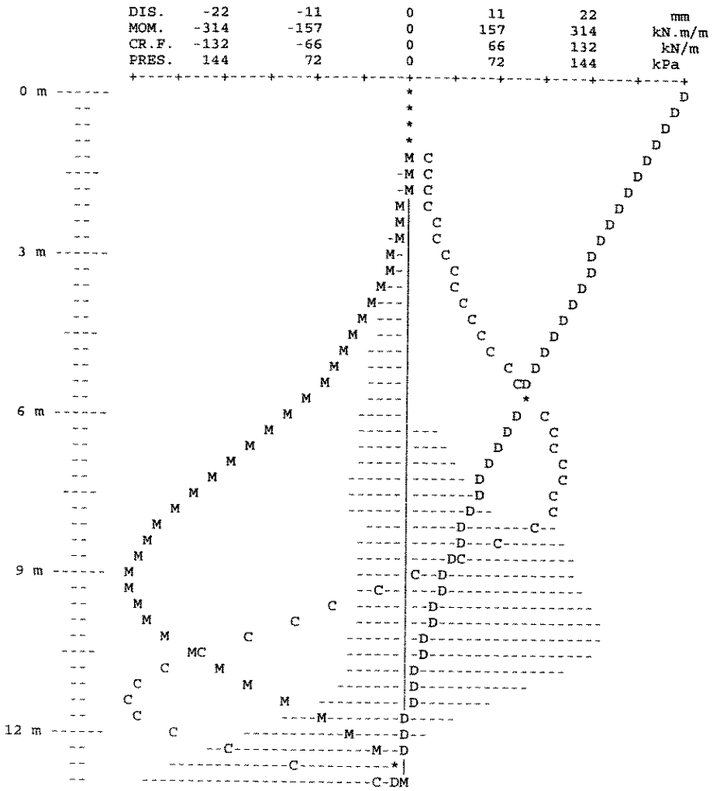
LEVEL	MINI CRO.FO	MAXI CRO.FO
0.000	0.00	0.00
0.300	0.00	0.00
0.600	0.00	0.00
0.900	0.00	0.21
1.200	0.00	0.91
	0.00	10.22
1.513	0.00	11.53
1.825	0.00	13.44
2.137	0.00	15.95
2.450	0.00	19.07
2.762	0.00	22.78
3.075	0.00	27.09
3.387	0.00	32.01
3.700	0.00	37.52
4.012	0.00	43.63
4.325	0.00	50.35
4.637	0.00	57.66
4.950	0.00	65.58
5.262	0.00	74.09
5.575	0.00	83.20
5.887	0.00	92.92
6.200	0.00	103.23
6.650	0.00	108.67
7.100	0.00	110.59
7.550	0.00	107.74
8.000	0.00	99.85
8.275	0.00	76.15
8.550	0.00	51.39
8.825	-7.28	25.94
9.100	-32.17	0.00
9.375	-53.28	0.00
9.650	-70.89	0.00
9.925	-85.32	0.00
10.200	-115.35	0.00
10.550	-152.84	0.00
10.900	-182.01	0.00
11.250	-197.96	0.00
11.600	-195.69	0.00
11.950	-171.26	0.00
12.300	-127.34	0.00
12.650	-69.22	0.00
13.000	0.00	0.00
m	kN/m	kN/m

LEVEL	MINI MOMENT	MAXI MOMENT
0.000	0.00	0.00
0.300	0.00	0.00
0.600	0.00	0.00
0.900	-0.02	0.00
1.200	-0.17	0.00
	-0.17	0.00
1.513	-3.56	0.00
1.825	-7.44	0.00
2.137	-12.02	0.00
2.450	-17.48	0.00
2.762	-24.00	0.00
3.075	-31.78	0.00
3.387	-40.99	0.00
3.700	-51.84	0.00
4.012	-64.51	0.00
4.325	-79.18	0.00
4.637	-96.04	0.00
4.950	-115.28	0.00
5.262	-137.09	0.00
5.575	-161.65	0.00
5.887	-189.15	0.00
6.200	-219.78	0.00
6.650	-267.55	0.00
7.100	-317.06	0.00
7.550	-366.37	0.00
8.000	-413.27	0.00
8.275	-437.51	0.00
8.550	-455.06	0.00
8.825	-465.71	0.00
9.100	-469.25	0.00
9.375	-465.45	0.00
9.650	-454.04	0.00
9.925	-434.74	0.00
10.200	-407.23	0.00
10.550	-360.18	0.00
10.900	-301.22	0.00
11.250	-234.32	0.00
11.600	-164.77	0.00
11.950	-99.92	0.00
12.300	-47.16	0.00
12.650	-12.44	0.00
13.000	0.00	0.00
m	kN.m/m	kN.m/m

* CURVES TO PHASE Nb 1 *



* CURVES TO PHASE Nb 2 *



PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:09:33

Dimensionamiento de secciones a flexión simple

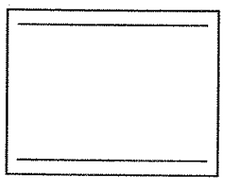
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

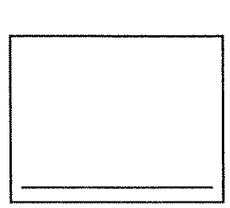
- Sección

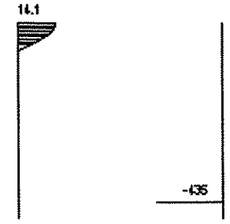
Sección : 100X80H25
b [m] = 1.00
h [m] = 0.80
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 703.9





Plano de deformación de agotamiento

x [m] = 0.114
1/r [1/m]·1.E-3 = 16.2
εs ·1.E-3 = 1.8
εi ·1.E-3 = -11.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	0.7	0.0
0.730	23.5	-10.0	434.8

At_est [cm²] = 23.5

ϕ [mm]	12	14	16	20	25
nºϕ	21	16	12	8	5
nº capas	2	1	1	1	1
At [cm²]	23.8	24.6	24.1	25.1	24.5
wk [mm]	0.35	0.36	0.39	0.41	0.50

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:10:49

Cálculo de secciones a cortante

1 Datos

- Materiales

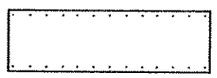
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 260X80H25R
b0 [m] = 2.60
h [m] = 0.80



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 772

Inclinación de las bielas [º] = 45
Inclinación de los cercos [º] = 90.0
ρ [·1.E-3] = 1
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [º] = 45.0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	----	----	----	----	----	----
ø 8	----	----	----	----	----	----
ø 10	0.10	4	31.4	2	829.4	----
ø 12	0.20	4	22.6	2	597.2	----

Área estricta [cm²/m] = 21.7
(Cuantía mínima)
Vu1 [kN] = 9490.0
Vcu [kN] = 392.4

** STARTING DATA **

* BOUSSINESQ SURCHARGES NOT FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

	INERTIA PRODUCT EI	CYLINDRICAL RIGIDITY
SECTION NB 1 FROM 0.000 m TO 10.000 m :	205000. kN.m2/m	0. kPa/m

*** SOIL DESCRIPTION :

LAYER NB 1 FROM 0.000 m TO 8.000 m :

SATURATED UNIT WEIGHT	GH	=	20.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	11.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.307
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.470
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	3.255
COHESION	C	=	6.500 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	32.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	40100.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

LAYER NB 2 FROM 8.000 m TO 20.000 m :

SATURATED UNIT WEIGHT	GH	=	22.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	12.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.361
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.531
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	2.770
COHESION	C	=	25.000 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	28.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	119400.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

** PHASE Nb 1 **

* EXCAVATION IN SOIL 2 TO LEVEL = 5.500 m

PHASE 1

LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa — STATE	PRE.	SURCH.	ELAST.	SOIL 2 EXCAVATION: 5.50 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa — STATE	PRE.	SURCH.	ELAST.	STRUTS/ ANCHORS NB	LOAD
0.000	20.716	-2.897	0.00	0.00		-1				0					
0.344	19.721	-2.897	0.00	0.00		-1				0					
0.688	18.725	-2.897	0.00	0.00		-1				0					
1.031	17.729	-2.897	0.00	0.00		-1				0					
1.375	16.733	-2.897	-0.02	0.21		1	1.24		40100	0					
1.719	15.738	-2.896	-0.21	1.00		1	3.36		40100	0					
2.062	14.742	-2.896	-0.80	2.52		1	5.47		40100	0					
2.406	13.747	-2.893	-2.03	4.76		1	7.58		40100	0					
2.750	12.753	-2.888	-4.16	7.73		1	9.69		40100	0					
3.094	11.762	-2.879	-7.43	11.43		1	11.81		40100	0					
3.438	10.775	-2.863	-12.10	15.85		1	13.92		40100	0					
3.781	9.795	-2.837	-18.41	21.00		1	16.03		40100	0					
4.125	8.826	-2.800	-26.61	26.87		1	18.14		40100	0					
4.469	7.872	-2.747	-36.96	33.47		1	20.26		40100	0					
4.812	6.939	-2.675	-49.71	40.80		1	22.37		40100	0					
5.156	6.036	-2.579	-65.09	48.85		1	24.48		40100	0					
5.500	5.170	-2.455	-83.37	57.63		1	26.59		40100	0					
						1	26.59		40100	3	23.45		40100		
5.812	4.424	-2.314	-101.24	55.73		1	28.51		40100	3	43.79		40100		
6.125	3.726	-2.147	-117.60	48.07		1	30.43		40100	3	64.13		40100		
6.438	3.085	-1.957	-130.68	34.66		1	32.35		40100	3	84.48		40100		
6.750	2.505	-1.751	-138.67	15.50		1	34.27		40100	3	104.82		40100		
7.062	1.991	-1.538	-140.27	-4.64		1	36.19		40100	2	94.53		40100		
7.375	1.544	-1.326	-136.25	-20.23		1	38.11		40100	2	79.53		40100		
7.688	1.161	-1.124	-128.14	-30.93		1	40.03		40100	2	67.13		40100		
8.000	0.840	-0.937	-117.34	-37.54		1	41.96		40100	2	57.17		40100		
						1	27.72		119400	2	126.77		119400		
8.500	0.438	-0.682	-88.39	-73.85		2	35.80		119400	2	81.98		119400		
9.000	0.143	-0.515	-48.63	-79.32		2	74.22		119400	2	49.92		119400		
9.500	-0.093	-0.440	-14.35	-53.12		2	105.50		119400	2	25.01		119400		
10.000	-0.308	-0.428	0.00	0.00		2	134.44		119400	2	2.44		119400		
m	mm	/1000	kN.m/m	kN/m	kPa	kPa	kPa	kPa/m		kPa	kPa	kPa/m		kN	

MAXIMUM DISPLACEMENT = 20.72 mm

MAXIMUM MOMENT = -140.27 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(6 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.086
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.378

** PHASE Nb 2 **

* CAQUOT SURCHARGE ON SOIL 1 = 10.000 kPa

PHASE 2

	WALL					SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: 8.00 m CAQUOT SURC.: 10.00 kPa				SOIL 2 EXCAVATION: 5.50 m WATER LEVEL: 8.00 m CAQUOT SURC.: 0.00 kPa				STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH.	ELAST.	STATE	PRE.	SURCH.	ELAST.	NB	LOAD
0.000	31.516	-4.375	0.00	0.00		-1				0					
0.344	30.012	-4.375	0.00	0.00		-1				0					
0.688	28.508	-4.375	0.00	0.02		1	0.09	0.09	40100	0					
1.031	27.004	-4.375	-0.05	0.41		1	2.20	2.20	40100	0					
1.375	25.501	-4.374	-0.37	1.53		1	4.32	3.07	40100	0					
1.719	23.997	-4.373	-1.19	3.38		1	6.43	3.07	40100	0					
2.062	22.494	-4.370	-2.77	5.95		1	8.54	3.07	40100	0					
2.406	20.993	-4.363	-5.36	9.25		1	10.65	3.07	40100	0					
2.750	19.495	-4.351	-9.21	13.27		1	12.77	3.07	40100	0					
3.094	18.003	-4.331	-14.57	18.03		1	14.88	3.07	40100	0					
3.438	16.519	-4.301	-21.69	23.50		1	16.99	3.07	40100	0					
3.781	15.047	-4.258	-30.82	29.71		1	19.10	3.07	40100	0					
4.125	13.594	-4.197	-42.20	36.64		1	21.22	3.07	40100	0					
4.469	12.164	-4.115	-56.09	44.29		1	23.33	3.07	40100	0					
4.812	10.768	-4.007	-72.73	52.67		1	25.44	3.07	40100	0					
5.156	9.413	-3.869	-92.38	61.78		1	27.55	3.07	40100	0					
5.500	8.112	-3.695	-115.29	71.62		1	29.66	3.07	40100	0					
						1	29.66	3.07	40100	3	23.45		40100		
5.812	6.986	-3.503	-137.67	70.68		1	31.59	3.07	40100	3	43.79		40100		
6.125	5.926	-3.276	-158.87	63.99		1	33.51	3.07	40100	3	64.13		40100		
6.438	4.942	-3.020	-177.07	51.54		1	35.43	3.07	40100	3	84.48		40100		
6.750	4.041	-2.739	-190.48	33.33		1	37.35	3.07	40100	3	104.82		40100		
7.062	3.232	-2.442	-197.30	9.37		1	39.27	3.07	40100	3	125.16		40100		
7.375	2.515	-2.141	-196.17	-16.13		1	41.19	3.07	40100	2	118.50		40100		
7.688	1.892	-1.848	-187.74	-36.55		1	43.11	3.07	40100	2	96.45		40100		
8.000	1.359	-1.572	-174.05	-50.03		1	45.03	3.07	40100	2	77.99		40100		
						1	31.33	3.61	119400	2	188.75		119400		
8.500	0.672	-1.192	-132.73	-108.50		1	33.50	3.61	119400	2	109.96		119400		
9.000	0.145	-0.939	-73.31	-120.39		2	79.19	5.31	119400	2	50.26		119400		
9.500	-0.291	-0.828	-21.08	-79.87		2	134.48	5.31	119400	2	1.33		119400		
10.000	-0.699	-0.811	0.00	0.00		2	186.33	5.31	119400	-1					
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa	kPa/m		kPa	kPa	kPa/m		kN

MAXIMUM DISPLACEMENT = 31.52 mm

MAXIMUM MOMENT = -197.30 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(6 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 31.01 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.093
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.444

*** END OF CALCULUS

*** MAXIMUM DISPLACEMENT IN PHASE Nb 2 = 31.516 mm IN FINAL PHASE Nb 2 = 31.516 mm

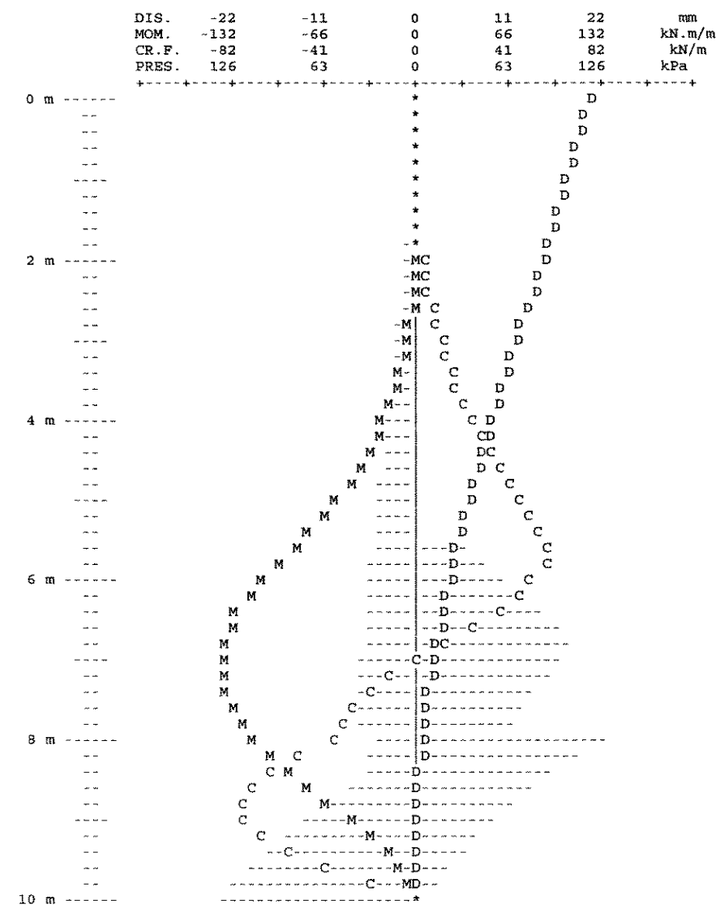
*** MAXIMUM MOMENT IN PHASE Nb 2 = -197.298 kN.m/m IN FINAL PHASE Nb 2 = -197.298 kN.m/m

* ENVELOPE CURVES FROM PHASE 1 TO PHASE 2 *

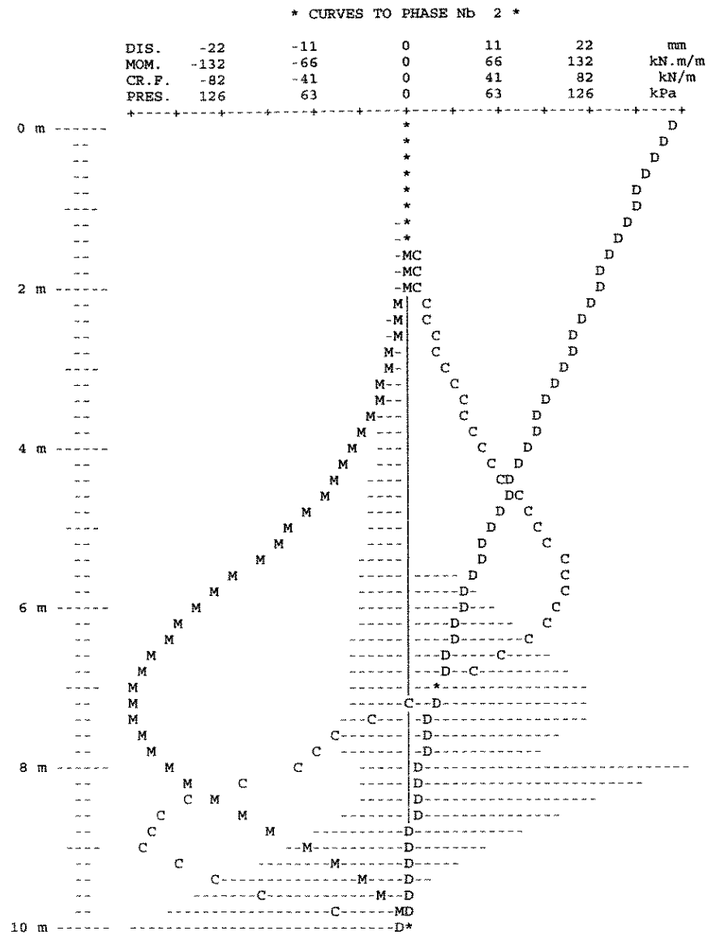
LEVEL	MINI CRO.FO	MAXI CRO.FO
0.000	0.00	0.00
0.344	0.00	0.00
0.688	0.00	0.02
1.031	0.00	0.41
1.375	0.00	1.53
1.719	0.00	3.38
2.062	0.00	5.95
2.406	0.00	9.25
2.750	0.00	13.27
3.094	0.00	18.03
3.438	0.00	23.50
3.781	0.00	29.71
4.125	0.00	36.64
4.469	0.00	44.29
4.812	0.00	52.67
5.156	0.00	61.78
5.500	0.00	71.62
5.812	0.00	70.68
6.125	0.00	63.99
6.438	0.00	51.54
6.750	0.00	33.33
7.062	-4.64	9.37
7.375	-20.23	0.00
7.688	-36.55	0.00
8.000	-50.03	0.00
8.500	-108.50	0.00
9.000	-120.39	0.00
9.500	-79.87	0.00
10.000	0.00	0.00
m	kN/m	kN/m

LEVEL	MINI MOMENT	MAXI MOMENT
0.000	0.00	0.00
0.344	0.00	0.00
0.688	0.00	0.00
1.031	-0.05	0.00
1.375	-0.37	0.00
1.719	-1.19	0.00
2.062	-2.77	0.00
2.406	-5.36	0.00
2.750	-9.21	0.00
3.094	-14.57	0.00
3.438	-21.69	0.00
3.781	-30.82	0.00
4.125	-42.20	0.00
4.469	-56.09	0.00
4.812	-72.73	0.00
5.156	-92.38	0.00
5.500	-115.29	0.00
5.812	-137.67	0.00
6.125	-158.87	0.00
6.438	-177.07	0.00
6.750	-190.48	0.00
7.062	-197.30	0.00
7.375	-196.17	0.00
7.688	-187.74	0.00
8.000	-174.05	0.00
8.500	-132.73	0.00
9.000	-73.31	0.00
9.500	-21.08	0.00
10.000	0.00	0.00
m	kN.m/m	kN.m/m

* CURVES TO PHASE Nb 1 *



* CURVES TO PHASE Nb 2 *



PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:14:32

Dimensionamiento de secciones a flexión simple

1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

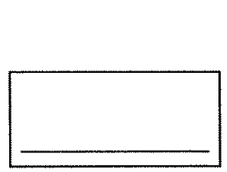
- Sección

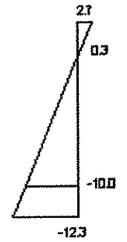
Sección : 100X45H25
b [m] = 1.00
h [m] = 0.45
ri [m] = 0.070
rs [m] = 0.070

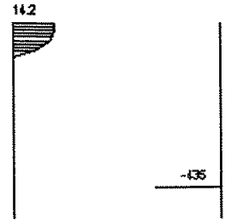


2 Dimensionamiento

Md [kN·m] = 296







Plano de deformación de agotamiento

x [m] = 0.080
1/r [1/m]·1.E-3 = 33.2
εs ·1.E-3 = 2.7
εi ·1.E-3 = -12.3

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	0.3	0.0
0.380	19.5	-10.0	434.8

At_est [cm²] = 19.5

ϕ [mm]	12	14	16	20	25
n°ϕ	18	13	10	7	4
n° capas	1	1	1	1	1
At [cm²]	20.4	20.0	20.1	22.0	19.6
wk [mm]	0.35	0.38	0.40	0.40	0.55

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:15:47

Cálculo de secciones a cortante

1 Datos

- Materiales

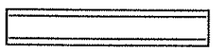
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 260X45H25
b0 [m] = 2.60
h [m] = 0.45



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 469.5

Inclinación de las bielas [º] = 45
Inclinación de los cercos [º] = 90.0
ρ [·1.E-3] = 1
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [º] = 45.0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	----	----	----	----	----	----
ø 8	----	----	----	----	----	----
ø 10	0.10	4	31.4	2	427.3	----
ø 12	0.20	4	22.6	2	307.6	----

Área estricta [cm²/m] = 21.7
(Cuantía mínima)
Vu1 [kN] = 4940.0
Vcu [kN] = 231.4

** STARTING DATA **

* BOUSSINESQ SURCHARGES NOT FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

	INERTIA PRODUCT EI	CYLINDRICAL RIGIDITY
SECTION NB 1 FROM 0.000 m TO 7.000 m :	205000. kN.m2/m	0. kPa/m

*** SOIL DESCRIPTION :

LAYER NB 1 FROM 0.000 m TO 8.000 m :

SATURATED UNIT WEIGHT	GH	=	20.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	11.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.307
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.470
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	3.255
COHESION	C	=	6.500 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	32.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	40100.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

LAYER NB 2 FROM 8.000 m TO 10.000 m :

SATURATED UNIT WEIGHT	GH	=	22.000 kN/m3
SUBMERGED UNIT WEIGHT	GD	=	12.000 kN/m3
HOR. ACTIVE PRESSURE COEFFICIENT	KA	=	0.361
HOR. AT REST PRESSURE COEFFICIENT	K0	=	0.531
HOR. PASSIVE PRESSURE COEFFICIENT	KP	=	2.770
COHESION	C	=	25.000 kPa
ANGLE OF INTERNAL FRICTION	PHI	=	28.000 DEGREES
FOR ACTIVE PRESS. DELTA/PHI		=	0.000
FOR PASSIVE PRESS. DELTA/PHI		=	0.000
ELASTIC REACTION COEFFICIENT (AT P=0)		=	119400.000 kPa/m
INCR. OF THIS COEFF. WITH PRESSURE		=	0.000 1/m

** PHASE Nb 1 **

* EXCAVATION IN SOIL 2 TO LEVEL = 3.500 m

PHASE 1

	WALL					SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: 10.00 m CAQUOT SURC.: 0.00 kPa			SOIL 2 EXCAVATION: 3.50 m WATER LEVEL: 10.00 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE	PRE.	SURCH. ELAST.	STATE	PRE.	SURCH. ELAST.	NB LOAD
0.000	2.542	-0.431	0.00	0.00		-1			0			
0.438	2.353	-0.431	0.00	0.00		-1			0			
0.875	2.164	-0.431	0.00	0.00		-1			0			
1.312	1.976	-0.431	-0.03	0.19		1	0.86	40100	0			
1.750	1.787	-0.431	-0.28	1.15		1	3.55	40100	0			
2.188	1.599	-0.430	-1.21	3.29		1	6.24	40100	0			
2.625	1.412	-0.425	-3.33	6.61		1	8.93	40100	0			
3.062	1.228	-0.414	-7.16	11.10		1	11.61	40100	0			
3.500	1.051	-0.393	-13.22	16.77		1	14.30	40100	0			
						1	14.30	40100	3	23.45	40100	
3.938	0.886	-0.358	-19.25	9.81		1	16.99	40100	2	39.64	40100	
4.375	0.739	-0.313	-21.52	0.88		1	19.68	40100	2	37.86	40100	
4.812	0.612	-0.268	-20.28	-6.27		1	22.37	40100	2	36.87	40100	
5.250	0.503	-0.229	-16.37	-11.08		2	29.17	40100	2	36.64	40100	
5.688	0.410	-0.199	-11.05	-12.71		2	37.03	40100	2	37.01	40100	
6.125	0.327	-0.182	-5.70	-11.24		2	44.47	40100	2	37.80	40100	
6.562	0.250	-0.174	-1.62	-6.97		2	51.69	40100	2	38.80	40100	
7.000	0.174	-0.173	0.00	0.00		2	58.84	40100	2	39.87	40100	
m	mm	/1000	kN.m/m	kN/m	kPa		kPa	kPa kPa/m		kPa	kPa kPa/m	kN

MAXIMUM DISPLACEMENT = 2.54 mm
MAXIMUM MOMENT = -21.52 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR.
CODIFICATION OF SOIL : 2 = ELASTIC, 3 = PASSIVE PR.

(5 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 0.00 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.074
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.270

** PHASE Nb 2 **

* CAQUOT SURCHARGE ON SOIL 1 = 10.000 kPa

PHASE 2

LEVEL	DISPLAC.	ROTATION	MOMENT	CR.FO.	SH LOAD	STATE PRE.	SURCH.	ELAST.	STATE PRE.	SURCH.	ELAST.	NB	LOAD
	W A L L					S O I L 1 EXCAVATION: 0.00 m WATER LEVEL: 10.00 m CAQUOT SURC.: 10.00 kPa			S O I L 2 EXCAVATION: 3.50 m WATER LEVEL: 10.00 m CAQUOT SURC.: 0.00 kPa			STRUTS/ ANCHORS	
0.000	4.590	-0.825	0.00	0.00		-1			0				
0.438	4.229	-0.825	0.00	0.00		-1			0				
0.875	3.868	-0.825	-0.04	0.27		1 1.24	1.24	40100	0				
1.312	3.507	-0.825	-0.36	1.40		1 3.93	3.07	40100	0				
1.750	3.146	-0.823	-1.44	3.71		1 6.62	3.07	40100	0				
2.188	2.787	-0.818	-3.78	7.20		1 9.31	3.07	40100	0				
2.625	2.431	-0.806	-7.91	11.86		1 12.00	3.07	40100	0				
3.062	2.083	-0.783	-14.33	17.70		1 14.69	3.07	40100	0				
3.500	1.749	-0.743	-23.56	24.71		1 17.37	3.07	40100	0				
						1 17.37	3.07	40100	3 23.45		40100		
3.938	1.437	-0.682	-32.97	16.41		1 20.06	3.07	40100	3 51.93		40100		
4.375	1.155	-0.606	-37.10	2.49		1 22.75	3.07	40100	2 54.53		40100		
4.812	0.907	-0.528	-35.42	-9.56		1 25.44	3.07	40100	2 48.71		40100		
5.250	0.692	-0.458	-29.24	-18.16		1 28.13	3.07	40100	2 44.19		40100		
5.688	0.504	-0.405	-20.18	-22.28		2 37.97	4.70	40100	2 40.77		40100		
6.125	0.335	-0.372	-10.60	-20.54		2 48.87	4.70	40100	2 38.10		40100		
6.562	0.175	-0.358	-3.05	-13.03		2 59.36	4.70	40100	2 35.83		40100		
7.000	0.019	-0.356	0.00	0.00		2 69.73	4.70	40100	2 33.69		40100		
m	mm	/1000	kN.m/m	kN/m	kPa	kPa	kPa	kPa/m	kPa	kPa	kPa/m		kN

MAXIMUM DISPLACEMENT = 4.59 mm
MAXIMUM MOMENT = -37.10 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

(5 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 21.18 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 1 = 0.075
MOBILIZED PRESSURE TO PASSIVE PRESSURE RATIO FOR SOIL NB 2 = 0.312

*** END OF CALCULUS

*** MAXIMUM DISPLACEMENT IN PHASE Nb 2 = 4.590 mm IN FINAL PHASE Nb 2 = 4.590 mm

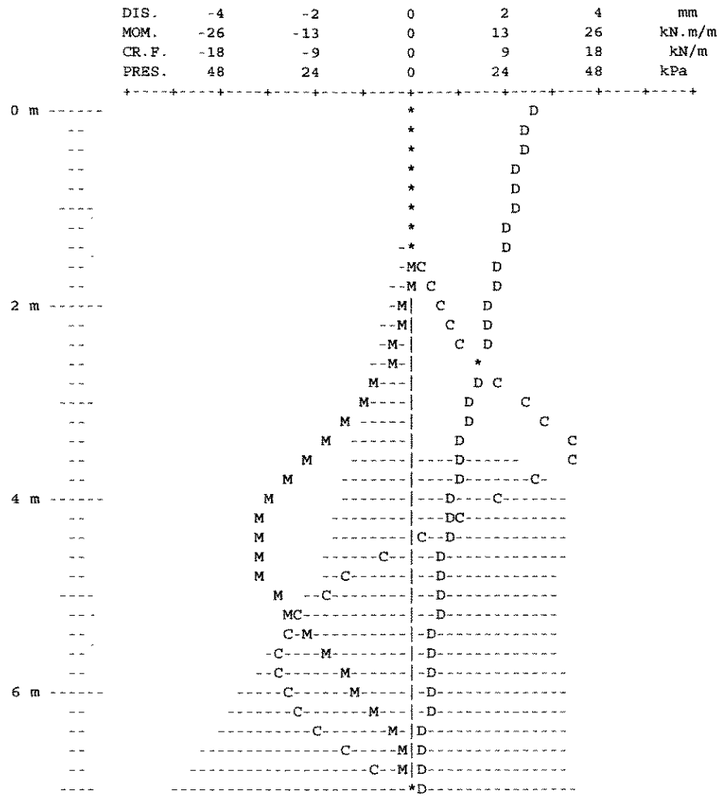
*** MAXIMUM MOMENT IN PHASE Nb 2 = -37.101 kN.m/m IN FINAL PHASE Nb 2 = -37.101 kN.m/m

* ENVELOPE CURVES FROM PHASE 1 TO PHASE 2 *

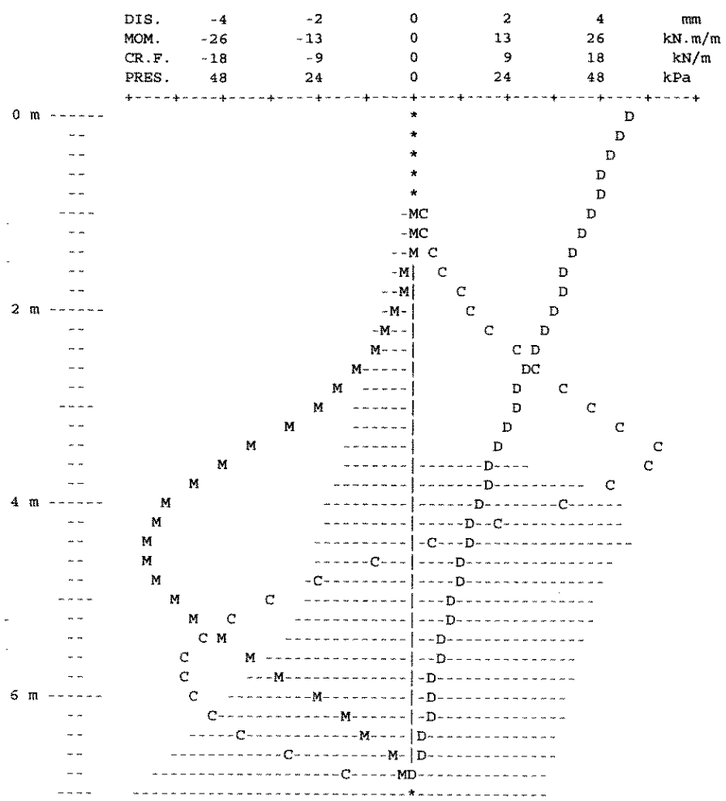
LEVEL	MINI CRO.FO	MAXI CRO.FO
m	kN/m	kN/m
0.000	0.00	0.00
0.438	0.00	0.00
0.875	0.00	0.27
1.312	0.00	1.40
1.750	0.00	3.71
2.188	0.00	7.20
2.625	0.00	11.86
3.062	0.00	17.70
3.500	0.00	24.71
3.938	0.00	16.41
4.375	0.00	2.49
4.812	-9.56	0.00
5.250	-18.16	0.00
5.688	-22.28	0.00
6.125	-20.54	0.00
6.562	-13.03	0.00
7.000	0.00	0.00

LEVEL	MINI MOMENT	MAXI MOMENT
m	kN.m/m	kN.m/m
0.000	0.00	0.00
0.438	0.00	0.00
0.875	-0.04	0.00
1.312	-0.36	0.00
1.750	-1.44	0.00
2.188	-3.78	0.00
2.625	-7.91	0.00
3.062	-14.33	0.00
3.500	-23.56	0.00
3.938	-32.97	0.00
4.375	-37.10	0.00
4.812	-35.42	0.00
5.250	-29.24	0.00
5.688	-20.18	0.00
6.125	-10.60	0.00
6.562	-3.05	0.00
7.000	0.00	0.00

* CURVES TO PHASE Nb 1 *



* CURVES TO PHASE Nb 2 *



PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:17:29

Dimensionamiento de secciones a flexión simple

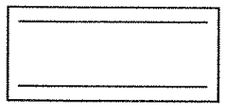
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

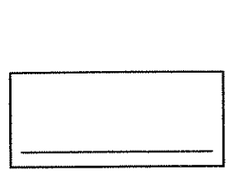
- Sección

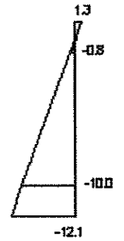
Sección : 100X45H25
b [m] = 1.00
h [m] = 0.45
ri [m] = 0.070
rs [m] = 0.070

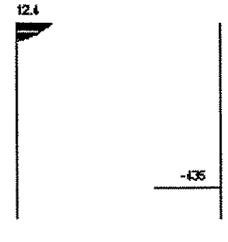


2 Dimensionamiento

Md [kN·m] = 55.7







Plano de deformación de agotamiento

x [m] = 0.044
1/r [1/m]·1.E-3 = 29.7
εs ·1.E-3 = 1.3
εi ·1.E-3 = -12.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-0.8	0.0
0.380	7.2	-10.0	434.8

At_est [cm²] = 7.2

ϕ [mm]	12	14	16	20	25
nºϕ	7	5	4	3	3
nº capas	1	1	1	1	1
At [cm²]	7.9	7.7	8.0	9.4	14.7
wk [mm]	0.11	0.13	0.13	0.13	0.08

Obra: ARMAT
Fecha: 20/11/2003
Hora: 17:18:14

Cálculo de secciones a cortante

1 Datos

- Materiales

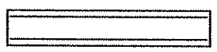
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : 260X45H25
b0 [m] = 2.60
h [m] = 0.45



2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 96.4

Inclinación de las bielas [º] = 45
Inclinación de los cercos [º] = 90.0
ρ [·1.E-3] = 1
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [º] = 45.0

ϕ [mm]	Separación [mm]	nº ramas	Area [cm²/m]	Tipo	Vsu [kN]	Vu2 [kN]
ø 6	---	---	---	---	---	---
ø 8	---	---	---	---	---	---
ø 10	0.10	4	31.4	2	427.3	---
ø 12	0.20	4	22.6	2	307.6	---

Área estricta [cm²/m] = 21.7
(Cuantía mínima)
Vu1 [kN] = 4940.0
Vcu [kN] = 231.4

Retaining wall : mur1

1. Calculation parameters:

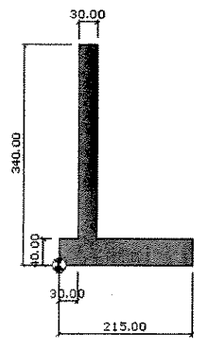
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 1.50
  - Overturning g = 1.80
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

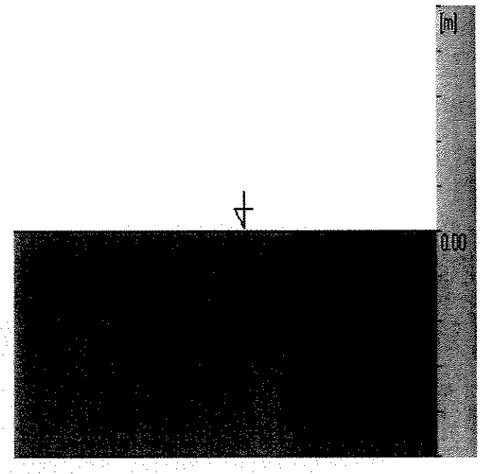


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 340.00 (cm)
- **Original layers:**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m3]*
1.	Argila	0.00	-	6.50	32.00	20.00	400.00



- **Soils (behind the wall):**

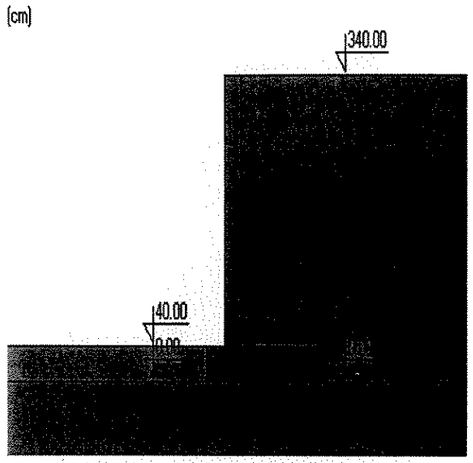
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	reblert	340.00	340.00	0.00	30.00	20.00

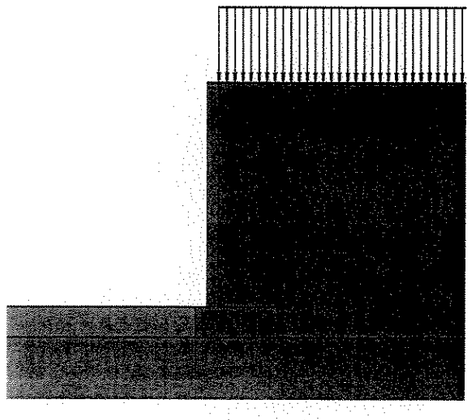
- **Soils (before the wall):**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	reblert	40.00	40.00	0.00	30.00	20.00



4. Loads



- **Load report**

1 uniform
a1 live x = 0.00 (m) P = 10.00 (kN/m2)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		340.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.12
  pressure 0.01

Soils (before the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.	reblert	40.00	30.00	0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	0.76	0.29	0.00	-42.24	Self-weight of a retaining wall
2.	P'a	0.23	0.13	2.49	0.00	Soil pressure (before the wall)
3.	P'T	0.23	0.25	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.23	1.13	-38.53	0.00	Soil pressure (behind the wall)
5.	PT	1.38	0.25	0.00	-93.00	Soil weight (behind the wall)
6.	C	0.23	0.25	0.00	0.00	Soil cohesion
7.	a1	1.38	1.70	-11.33	-15.38	Live load

CAPACITY

- Soil type under footing: not layered
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-150.62 (kN/m) My=-69.49 (kN*m) Fx=-47.38 (kN/m)
  Safety factor: 3.09 > 0.80

OVERTURNING

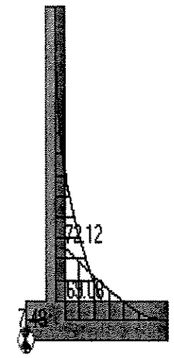
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-150.62 (kN/m) Fx=-47.37 (kN/m)
- Overturning moment: Mo= 62.80 (kN*m)
- Moment preventing foundation overturning: M_{uf} = 179.77 (kN*m)
- Safety factor: 2.90 > 1.80

SLIDING

- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-150.62 (kN/m) My=-69.49 (kN*m) Fx=-47.38 (kN/m)
- Equivalent footing dimension: A = 215.00 (cm)
- Friction coefficient:
  - of soil (on the settlement level): f = 0.60
- Soil cohesion reduction factor = 100.00 %
- Cohesion: C = 6.50 (kN/m2)
- Sliding force value: Q_{tr} = 47.38 (kN/m)
- Value of force preventing wall sliding:
  $Q_{tf} = N * f + C * A$
  - on the foundation level: Q_{tf} = 104.34 (kN/m)
- Safety factor: 2.20 > 1.50

6. Results of RC design

- Moments



[kN*m]

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	69.08	40.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.50*a1
Wall	minimum	-0.00	340.00	1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
Footing	maximum	7.52	30.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	minimum	-72.88	60.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 19/11/2003
Hora: 18:19:51

Dimensionamiento de secciones a flexión simple

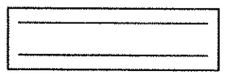
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

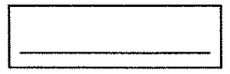
- Sección

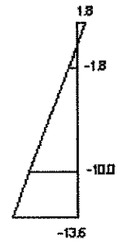
Sección : 100X30H25
b [m] = 1.00
h [m] = 0.30
ri [m] = 0.070
rs [m] = 0.070

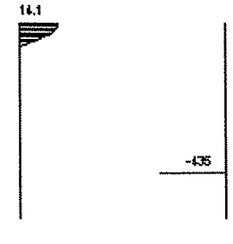


2 Dimensionamiento

Md [kN·m] = 69.08







Plano de deformación de agotamiento

x [m] = 0.036
1/r [1/m]·1.E-3 = 51.3
εs ·1.E-3 = 1.8
εi ·1.E-3 = -13.6

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-1.8	0.0
0.230	7.3	-10.0	434.8

At_est [cm²] = 7.3

ϕ [mm]	12	14	16	20	25
nºϕ	7	5	4	3	3
nº capas	1	1	1	1	1
At [cm²]	7.9	7.7	8.0	9.4	14.7
wk [mm]	0.24	0.29	0.29	0.28	0.18

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 19/11/2003
Hora: 18:23:25

Dimensionamiento de secciones a flexión simple

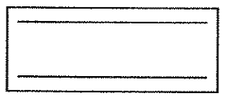
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

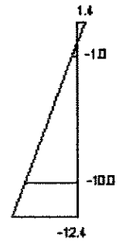
- Sección

Sección : 100X40H25
b [m] = 1.00
h [m] = 0.40
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 72.88







Plano de deformación de agotamiento

x [m] = 0.041
1/r [1/m]·1.E-3 = 34.6
εs ·1.E-3 = 1.4
εi ·1.E-3 = -12.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-1.0	0.0
0.330	7.2	-10.0	434.8

At_est [cm²] = 7.2

ϕ [mm]	12	14	16	20	25
nºϕ	7	5	4	3	3
nº capas	1	1	1	1	1
At [cm²]	7.9	7.7	8.0	9.4	14.7
wk [mm]	0.16	0.19	0.19	0.18	0.12

Retaining wall : mur2

1. Calculation parameters:

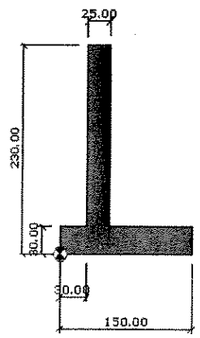
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 1.50
  - Overturning g = 1.80
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

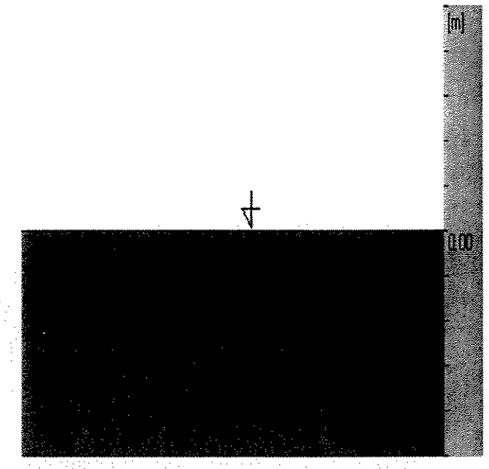


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 230.00 (cm)
- **Original layers:**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m3]*
1.	Argila	0.00	-	6.50	32.00	20.00	400.00



- **Soils (behind the wall):**

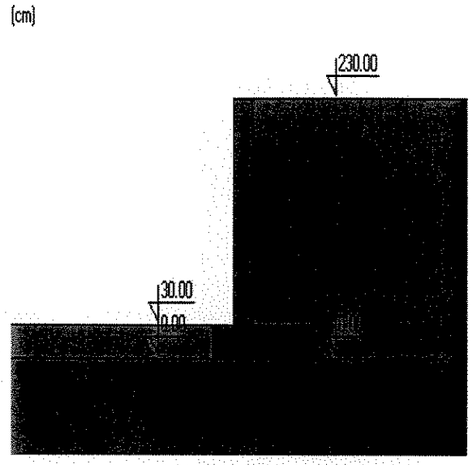
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	reblert	230.00	230.00	0.00	30.00	20.00

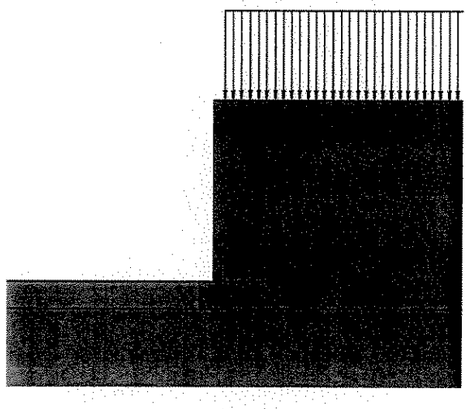
- **Soils (before the wall):**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	reblert	30.00	30.00	0.00	30.00	20.00



4. Loads



- **Load report**

1 uniform
a1 live x = 0.00 (m) P = 10.00 (kN/m2)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		230.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Soils (before the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.	reblert	30.00	30.00	0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	0.58	0.20	0.00	-22.80	Self-weight of a retaining wall
2.	P'a	0.18	0.10	1.41	0.00	Soil pressure (before the wall)
3.	P'T	0.18	0.17	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.18	0.77	-17.63	0.00	Soil pressure (behind the wall)
5.	PT	1.02	0.17	0.00	-38.00	Soil weight (behind the wall)
6.	C	0.18	0.17	0.00	0.00	Soil cohesion
7.	a1	1.02	1.15	-7.67	-9.38	Live load

CAPACITY

- Soil type under footing: not layered
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-70.18 (kN/m) My=-16.91 (kN*m) Fx=-23.89 (kN/m)
  Safety factor: 4.64 > 0.80

OVERTURNING

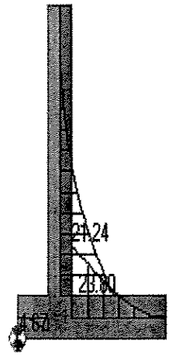
- Design combination: 1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
- Reduced design load:
  N=-70.18 (kN/m) Fx=-23.89 (kN/m)
- Overturning moment: Mo= 22.40 (kN*m)
- Moment preventing foundation overturning: M_{uf} = 61.69 (kN*m)
- Safety factor: 2.75 > 1.80

SLIDING

- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-70.18 (kN/m) My=-16.91 (kN*m) Fx=-23.89 (kN/m)
- Equivalent footing dimension: A = 150.00 (cm)
- Friction coefficient:
  - of soil (on the settlement level): f = 0.60
- Soil cohesion reduction factor = 100.00 %
- Cohesion: C = 6.50 (kN/m2)
- Sliding force value: Q_{tr} = 23.89 (kN/m)
- Value of force preventing wall sliding:
  $Q_{tf} = N * f + C * A$
  - on the foundation level: Q_{tf} = 51.86 (kN/m)
- Safety factor: 2.17 > 1.50

6. Results of RC design

- Moments



[kN*m]

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	23.80	30.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.50*a1
Wall	minimum	-0.00	230.00	1.00*PM + 1.00*P'a + 0.85*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	maximum	4.76	30.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	minimum	-21.59	55.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 1.49*PT + 1.00*C + 1.50*a1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 19/11/2003
Hora: 18:47:34

Dimensionamiento de secciones a flexión simple

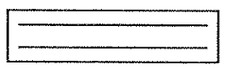
1 Datos

- Materiales

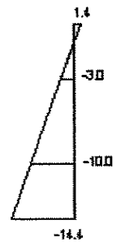
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

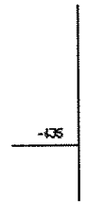
Sección : 100X25H25
b [m] = 1.00
h [m] = 0.25
ri [m] = 0.070
rs [m] = 0.070











Plano de deformación de agotamiento

x [m] = 0.023
1/r [1/m]·1.E-3 = 63.4
εs ·1.E-3 = 1.4
εi ·1.E-3 = -14.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-3.0	0.0
0.180	4.0	-10.0	434.8

At_est [cm²] = 4.0

ϕ [mm]	12	14	16	20	25
nºϕ	4	3	3	3	3
nº capas	1	1	1	1	1
At [cm²]	4.5	4.6	6.0	9.4	14.7
wk [mm]	0.18	0.20	0.15	0.10	0.06

2 Dimensionamiento

Md [kN·m] = 23.8

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 19/11/2003
Hora: 18:41:51

Comprobación de secciones a flexión simple

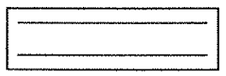
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

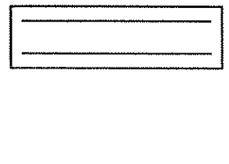
- Sección

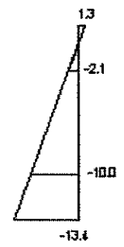
Sección : 100X30H25
b [m] = 1.00
h [m] = 0.30
ri [m] = 0.070
rs [m] = 0.070



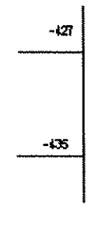
2 Comprobación

At [cm²] = 3.4 > A_{min}: 2,7
Ac [cm²] = 1.0
Mu [kN·m] = 35.1 < M_d = 21,59









Plano de deformación de agotamiento

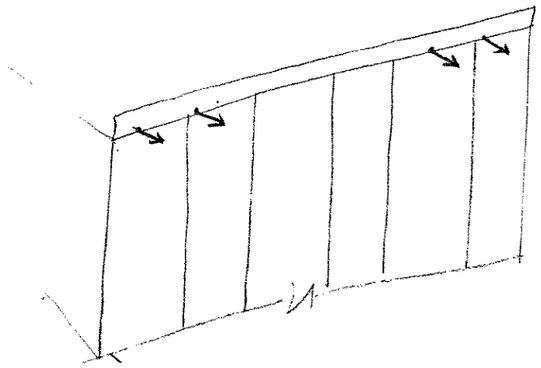
x [m] = 0.026
1/r [1/m]·1.E-3 = 49.1
εs ·1.E-3 = 1.3
εi ·1.E-3 = -13.4

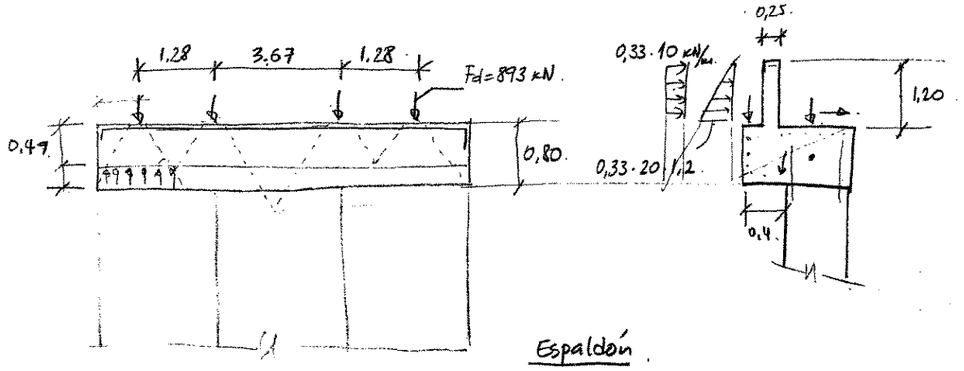
Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	1.0	-2.1	427.4
0.230	3.4	-10.0	434.8

4. Elementos de coronación

MODELO PARA LA ESTIMACIÓN DE LA FLEXIÓN TRANSVERSAL DEL CARGADERO.





Espaldón.

$$Md = 0{,}6m \cdot 3{,}3 \cdot 1{,}20 + 0{,}4 \cdot \frac{0{,}33 \cdot 20 \cdot 1{,}2^2}{2}$$

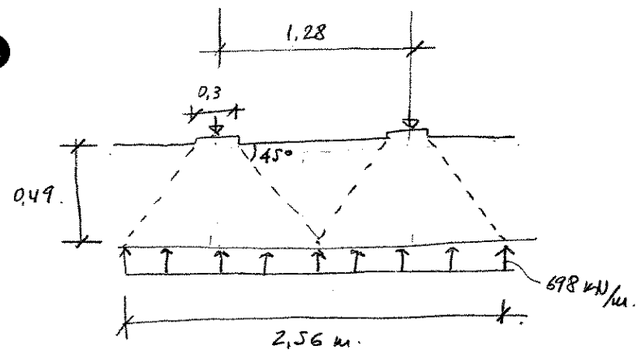
2,58 + 1,9

Md = 4,28 kNm.

A_s = 0,54 cm². necesaria →

A_s min 0,9 ‰ → 2,25 cm²

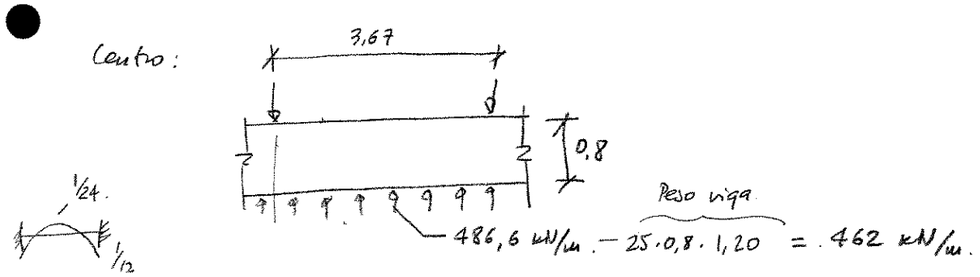
A_s = ϕ10 e0,20 (3,9 cm²).



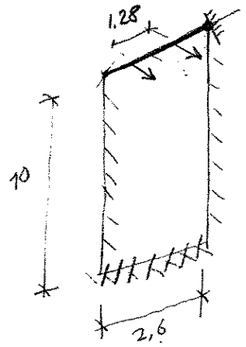
Vd = 8,72 kN → V_u = 89 kN.

$A_s f_{yd}$ = 446 kN. A_s = 1 cm² (superior necesaria)

Centro:



$Id = \frac{pl^2}{12}$ (realista). Md = 518 kNm. → As nec = 18 cm² → As real = 5ϕ16 + 4ϕ20 = 22,6 cm²

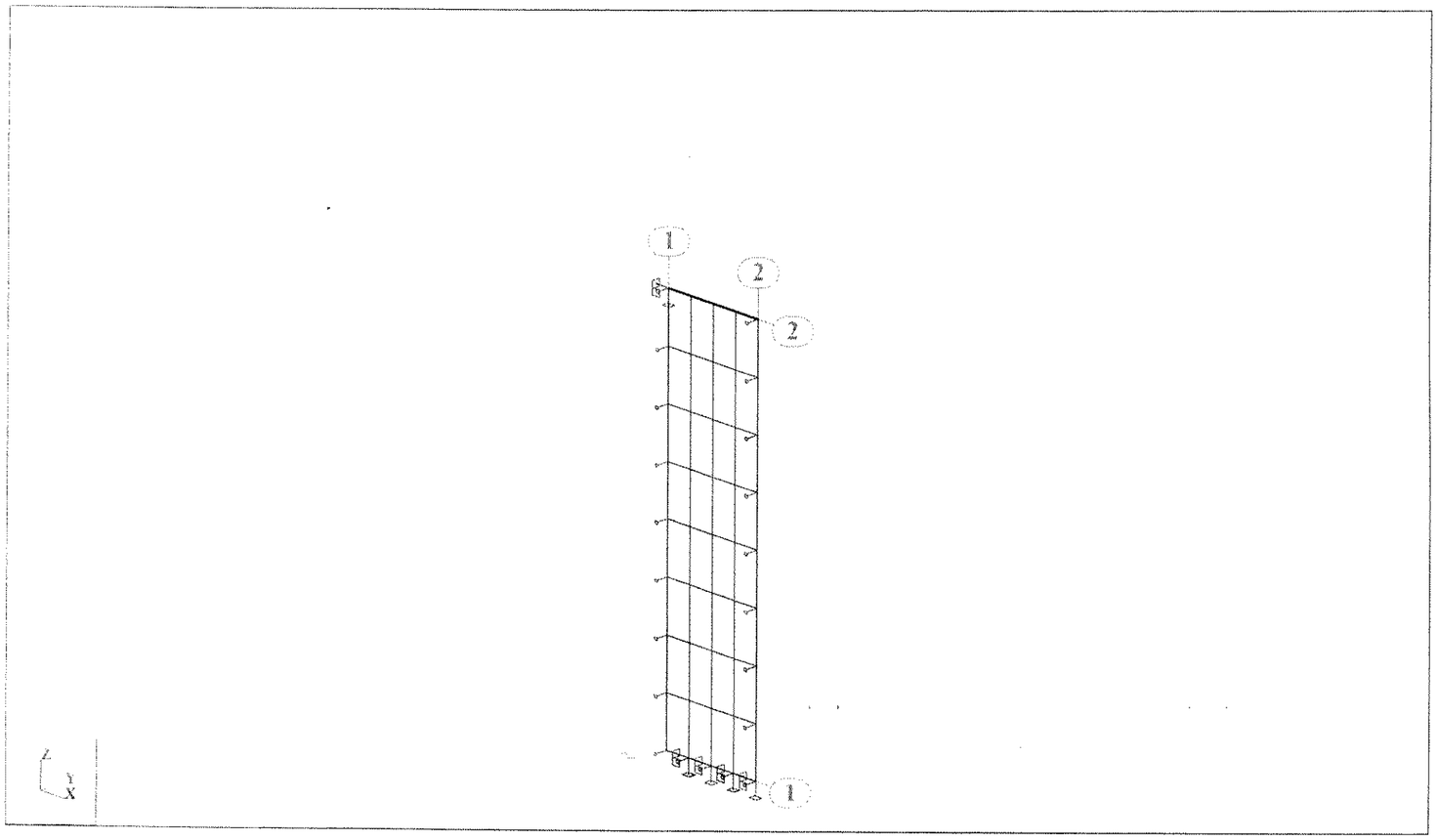


Frenado: 27,6 kN/4 = 6,9 kN

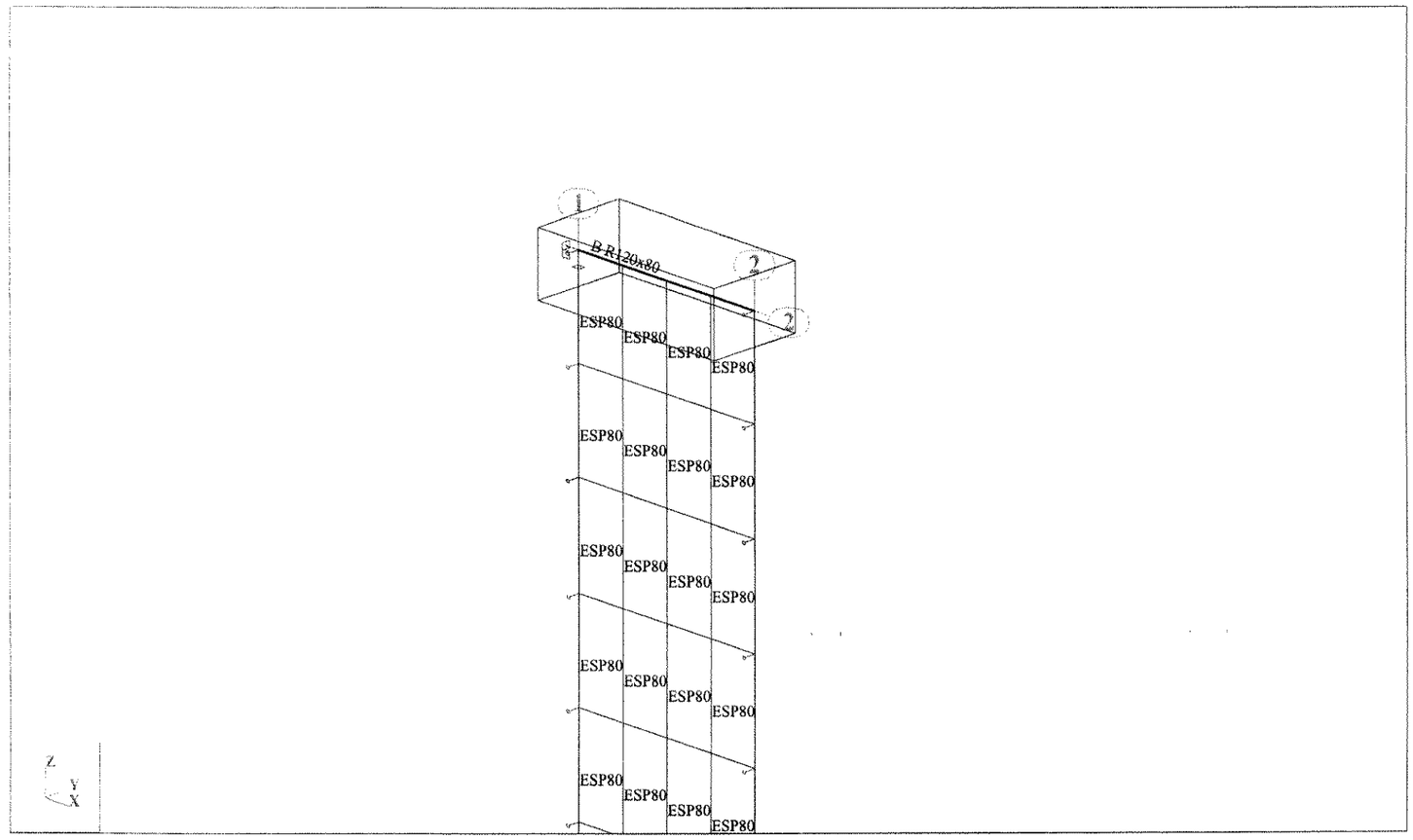
Diferidas: 14,5 kN

21,4 kN.

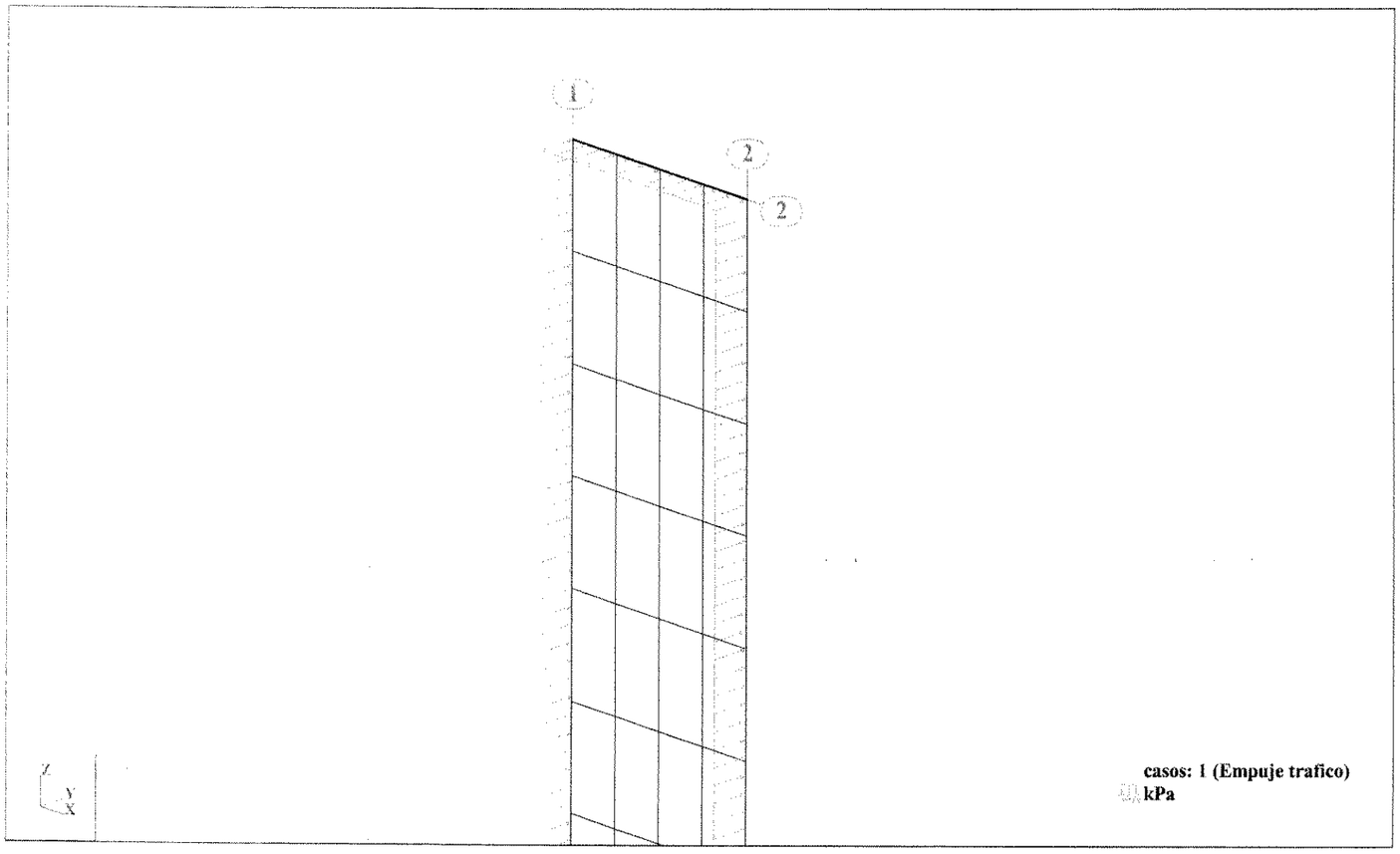
Vista - geometria



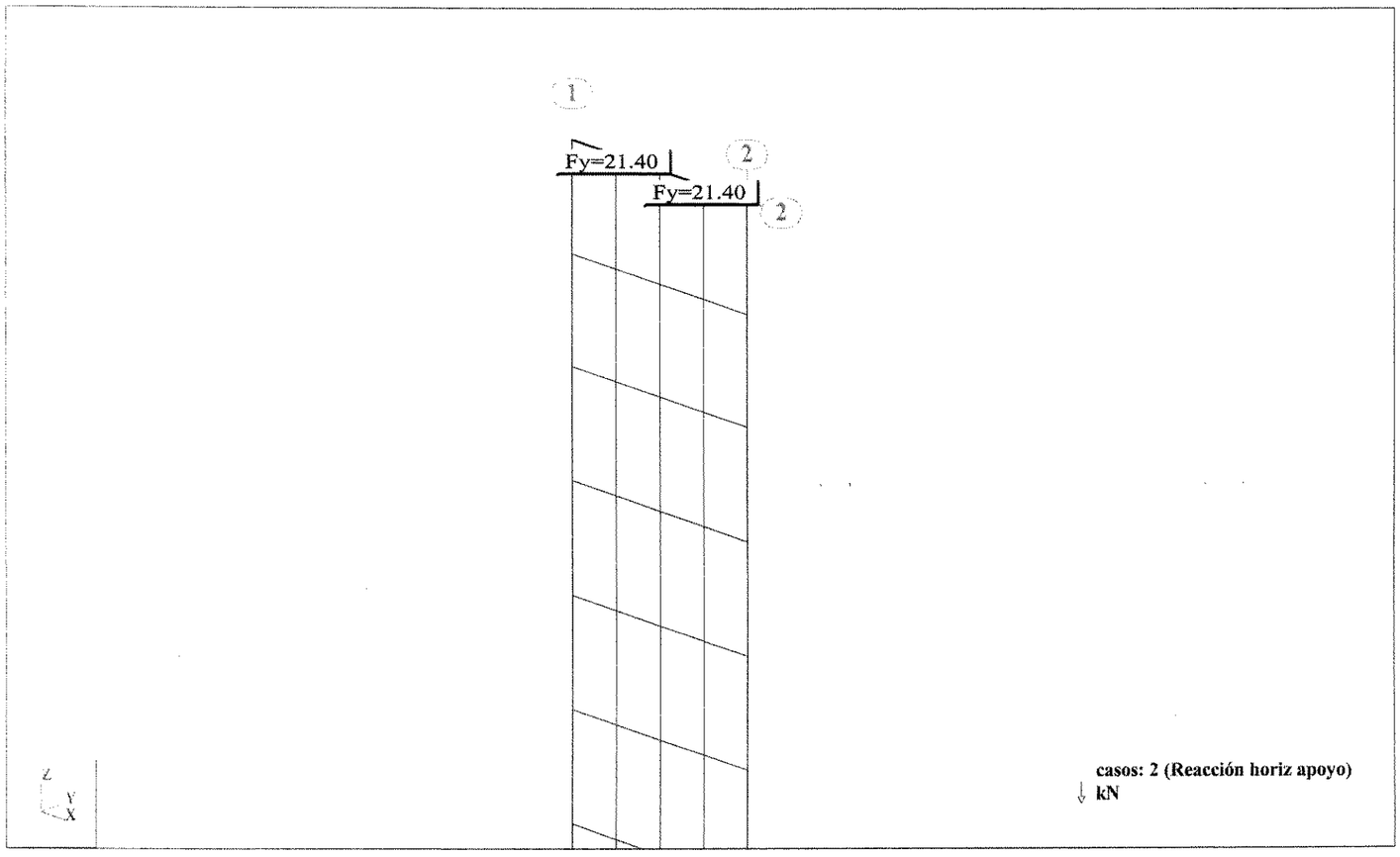
Viga de atado



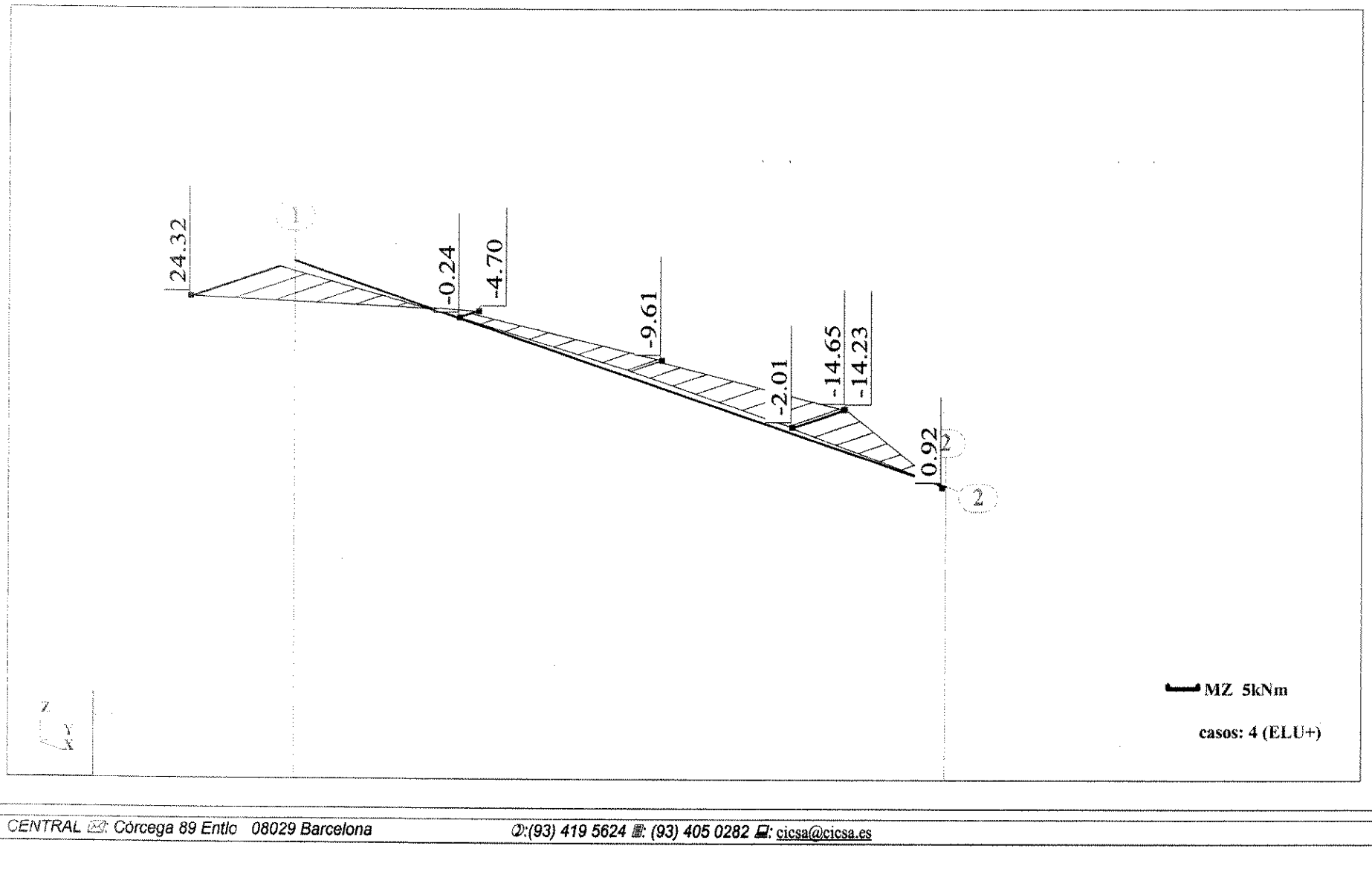
Vista - casos: 1 (Empuje trafico)



Vista - casos: 2 (Reacción horiz apoyo)



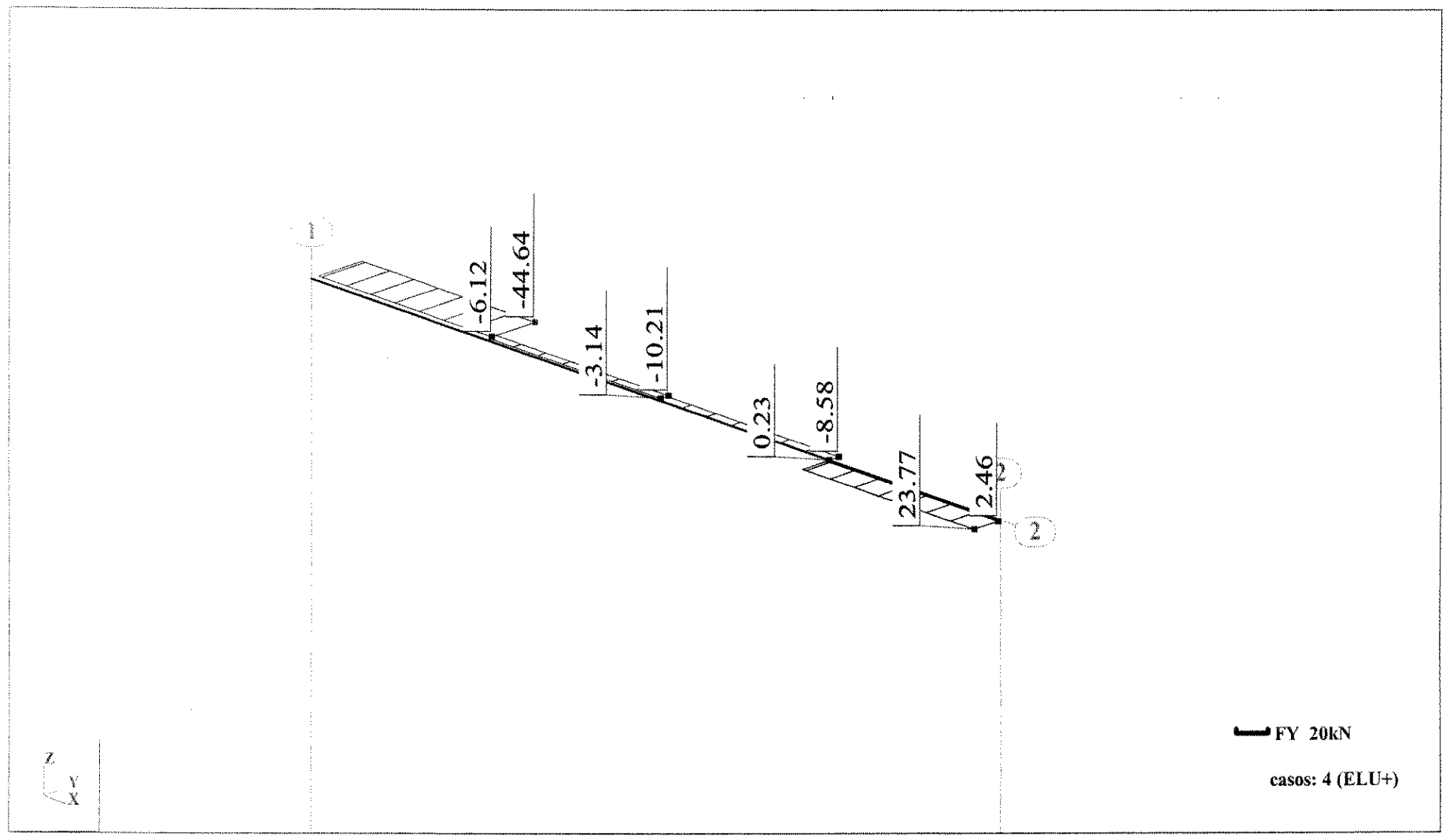
Vista:1 - MZ; casos: 4 (ELU+)



CENTRAL ✉: Córcega 89 Entlo 08029 Barcelona *✆:(93) 419 5624 🖷: (93) 405 0282 🖳: cicsa@cicsa.es*

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Fecha : 24/11/03

Vista:1 - FY; casos: 4 (ELU+)



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Obra: Obras
Fecha: 24/11/2003
Hora: 19:33:38

Cálculo de secciones a cortante

1 Datos

- Materiales

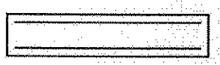
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento sin armadura a cortante

- Sección

Sección : LOSA_25
b0 [m] = 1.20
h [m] = 0.25



2 Comprobación

ρl [·1.E-3] = 1.5
Nd [kN] = 0.0
Vu [kN] = 89.5

Obra: Obras
Fecha: 24/11/2003
Hora: 20:55:40

Comprobación de secciones a flexión simple

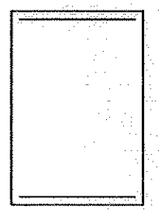
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

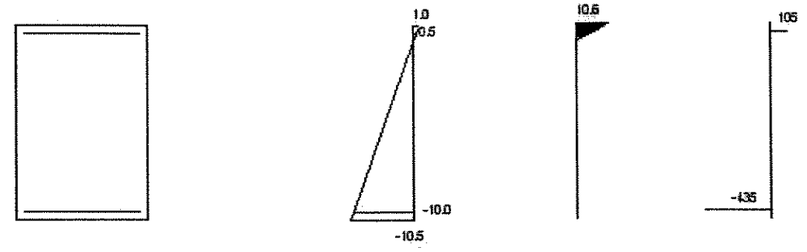
Sección : CARGADERO
b [m] = 0.80
h [m] = 1.20
ri [m] = 0.050
rs [m] = 0.050



2 Comprobación

At [cm²] = 15.0
Ac [cm²] = 15.0

Mu [kN·m] = 724.0



Plano de deformación de agotamiento

x [m] = 0.105

1/r [1/m]·1.E-3 = 9.6

εs ·1.E-3 = 1.0

εi ·1.E-3 = -10.5

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	15.0	0.5	-105.0
1.150	15.0	-10.0	434.8

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Obras
Fecha: 24/11/2003
Hora: 20:56:31

Cálculo de secciones a cortante

1 Datos

- Materiales

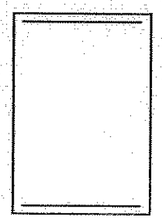
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : CARGADERO
b0 [m] = 0.80
h [m] = 1.20



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.20
ϕ [mm] = 10
nº ramas: 2
Area [cm²/m] = 7.9
ρ [·1.E-3] = 1.7

Inclinación de las bielas θ[°] = 45
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 4600.0
Vu2 [kN] = 537.9
Vcu [kN] = 211.2
Vsu [kN] = 326.7

- Resistencia a cortante:

Vu [kN] = 537.9

CARGAS CONCENTRADAS SOBRE MACIZOS
Apoyo: O.F. 5.9 AVE VILAFRANCA

DATOS:

GEOMETRIA

a1 (m)=	0.2	Dim. del apoyo en sentido del eje de la viga (dim. menor)
b1 (m)=	0.3	Dim. del apoyo en sentido perpendicular al eje de la viga (dim. mayor)
a (m)=	0.4	Dim. homotética de a1
b (m)=	0.5	Dim. homotética de b1
h(m)=	0.8	Espesor del elemento de apoyo + banqueta

MATERIALES

fck(MPa)=	25	
fyk(MPa)=	500	
fcd(MPa)=	16.67	
fyd(MPa)=	434.78	

CARGAS

Nd(kN)=	892.65	Carga sobre el apoyo (mayorada)

CALCULOS

ESPESOR MINIMO DEL ELEMENTO DE APOYO:

0.8 >=? 0.18

TENSION DE CONTACTO LOCALIZADA

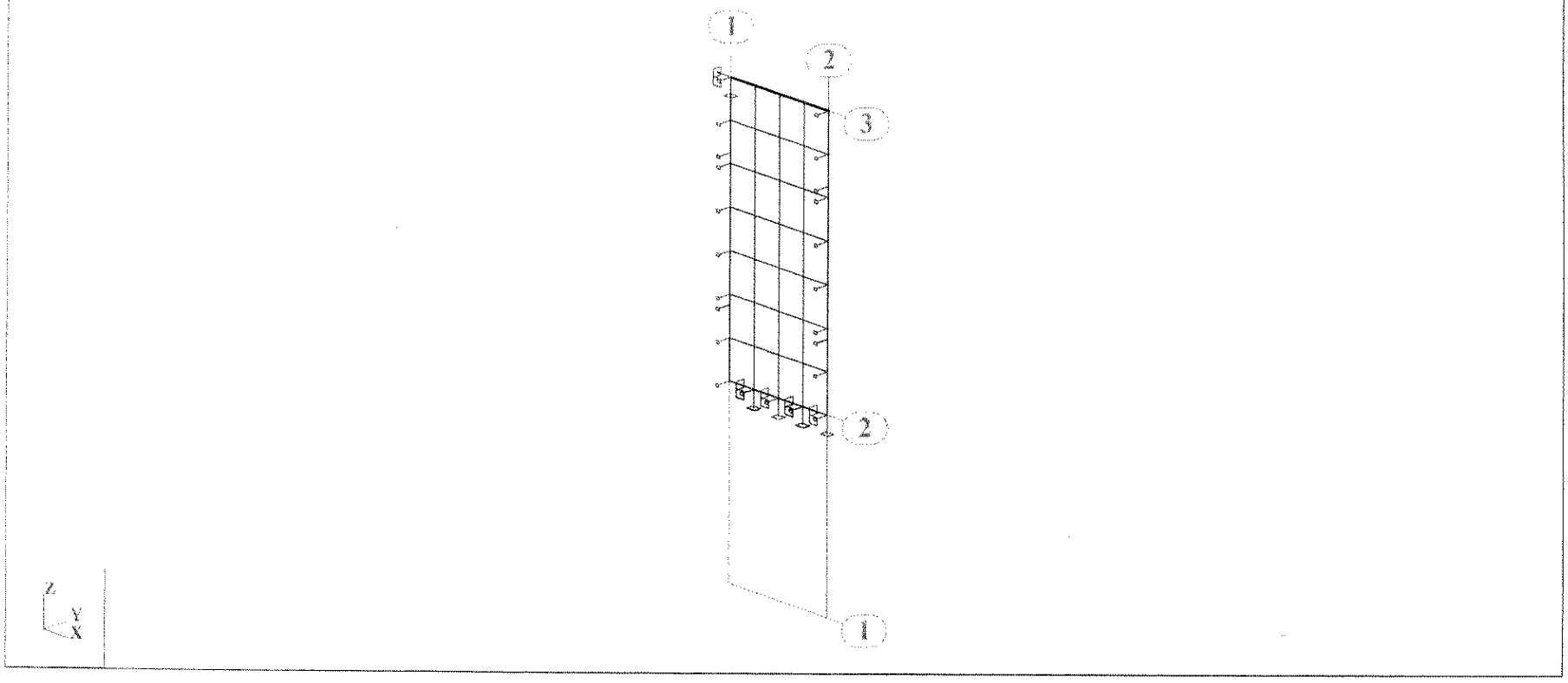
Nu		Nd
1825.7	>?	892.65
3300.0	>?	892.65

ARMADURAS TRANSVERSALES

Asa(cm2)=	3.08	En sentido paralelo a a
Asb(cm2)=	2.46	En sentido paralelo a b

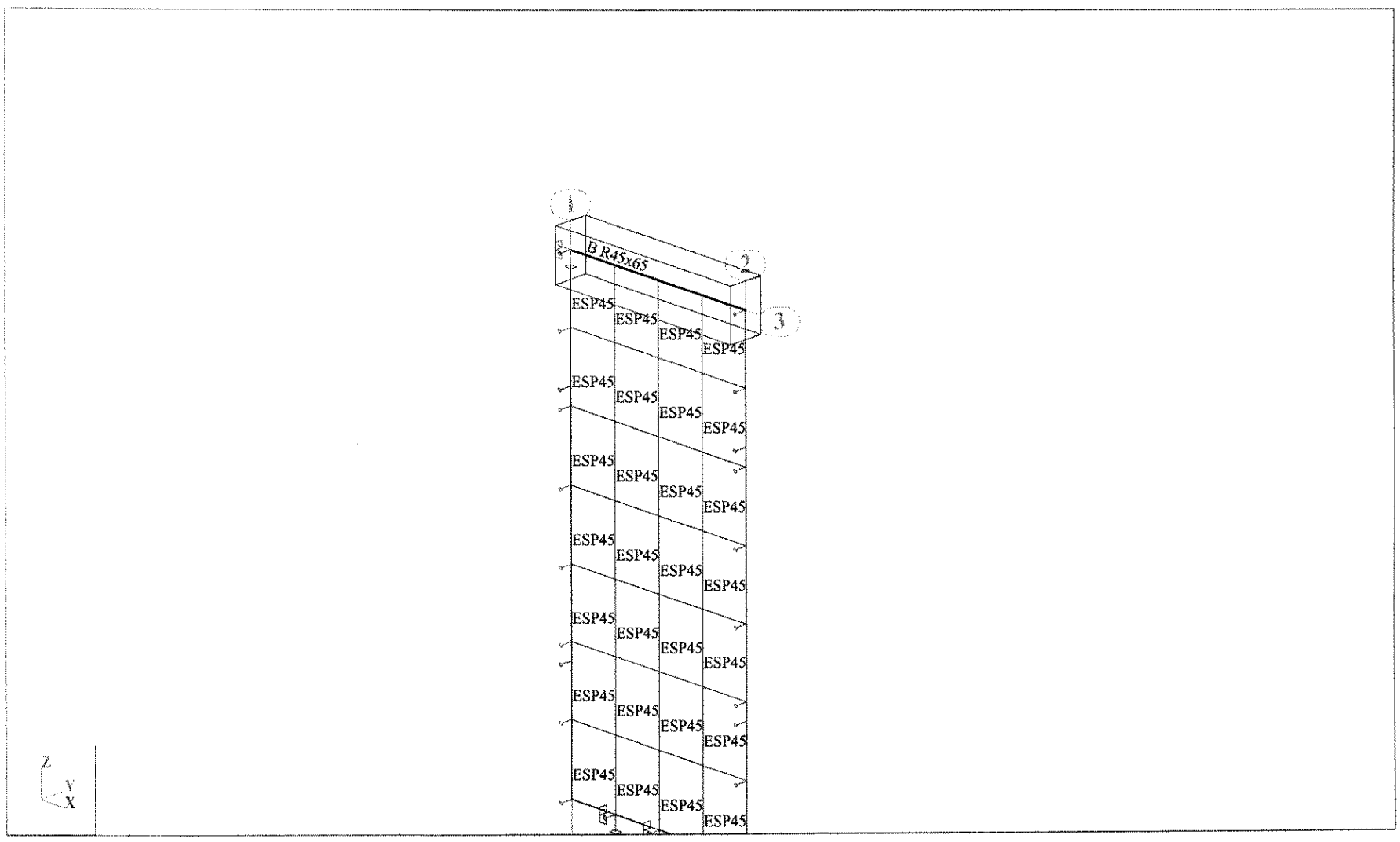
0.04	hasta	0.4	Rango de Profundidad para el reparto de Asa (m)
0.05	hasta	0.5	Rango de Profundidad para el reparto de Asb (m)

Vista - geometria

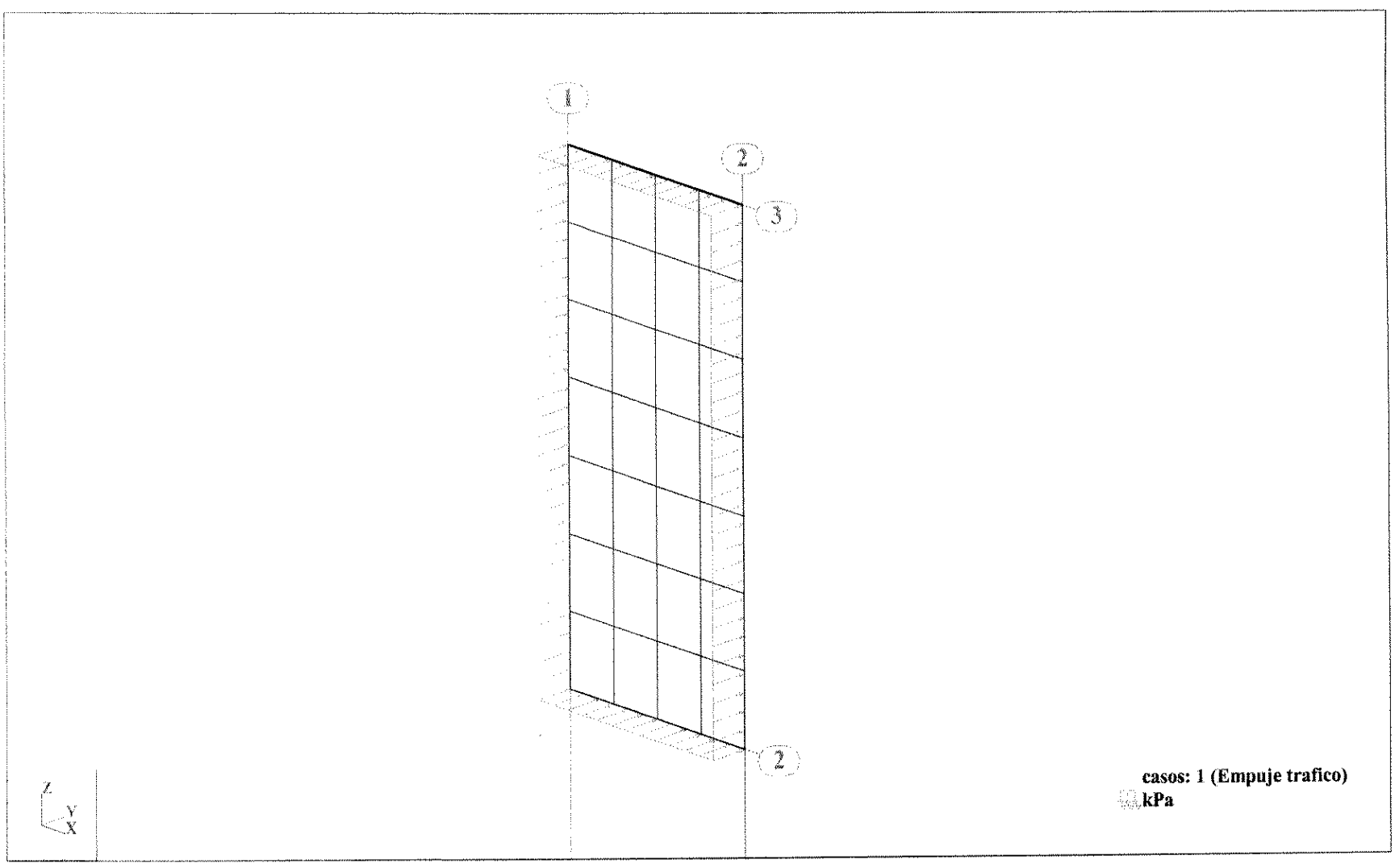


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Fecha : 24/11/03

Viga de atado



Vista - casos: 1 (Empuje trafico)



Cargas - Casos: 1 3A8 : Valores: 1

Caso	Nombre del caso	Naturaleza	tipo de análisis
1	Empuje trafico	explotación	Estático lineal
3	ELU		Ponderación
4	ELU+		Ponderación
5	ELU-		Ponderación
6	ELS		Ponderación
7	ELS+		Ponderación
8	ELS-		Ponderación

	Caso	Tipo de carga	Lista	Valores de carga
	1	(EF) uniforme	1	PY=3.30(kPa)

Definiciones de las ponderaciones - Casos: 3 6 [EUROCODE] [EUROCODE]: Valores: 1

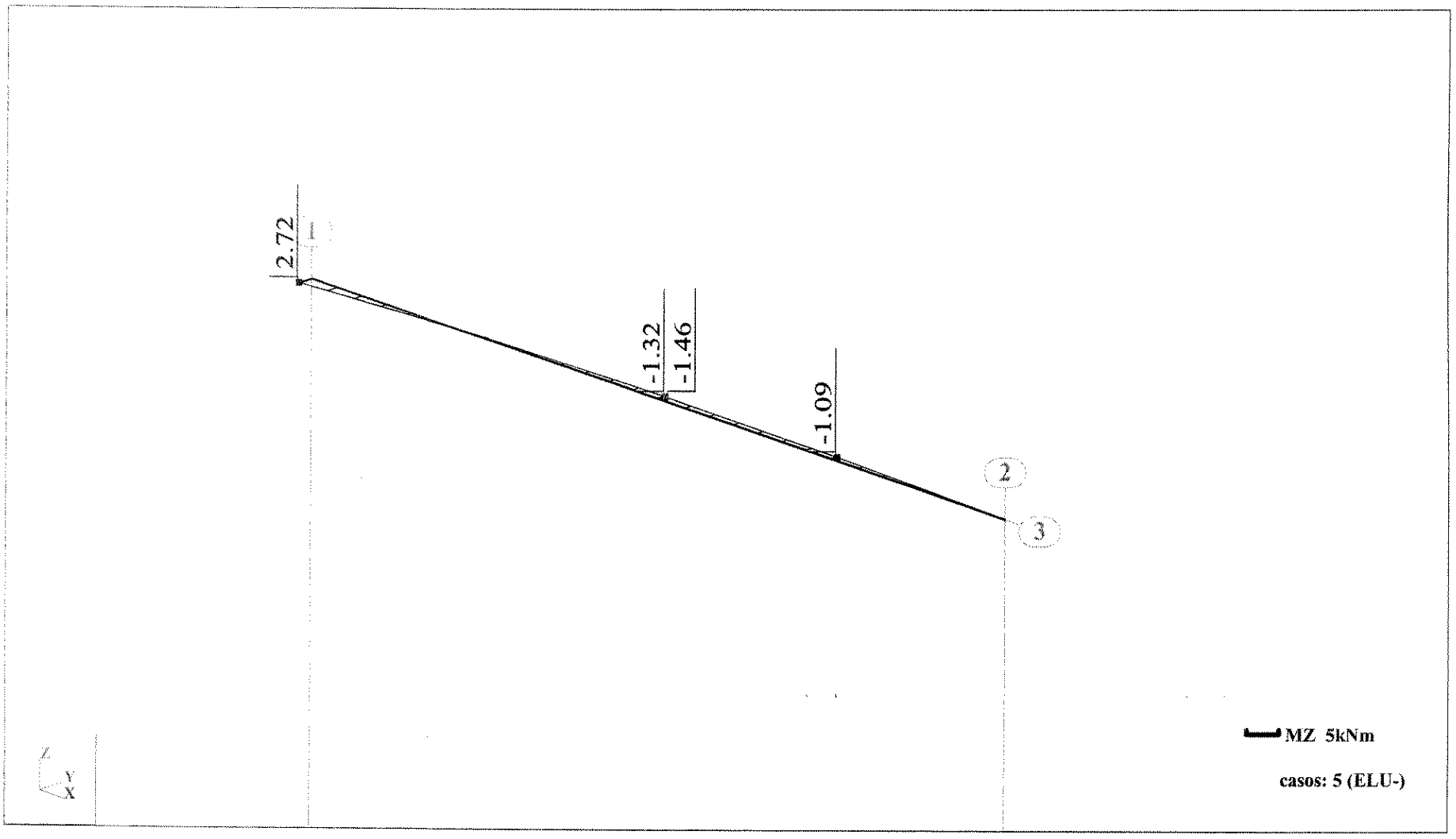
- Casos: 3 6 [EUROCODE]

Filtrar	Ponderaciones
Lista completa	3 6
Selección	3 6
Número total	2
Número seleccionado	2

- Casos: 3 6 [EUROCODE]

Combinación/Componente	Definición
ELU/ 1	1*1.50
ELS/ 1	1*1.00
ELS/ 2	1*0.50

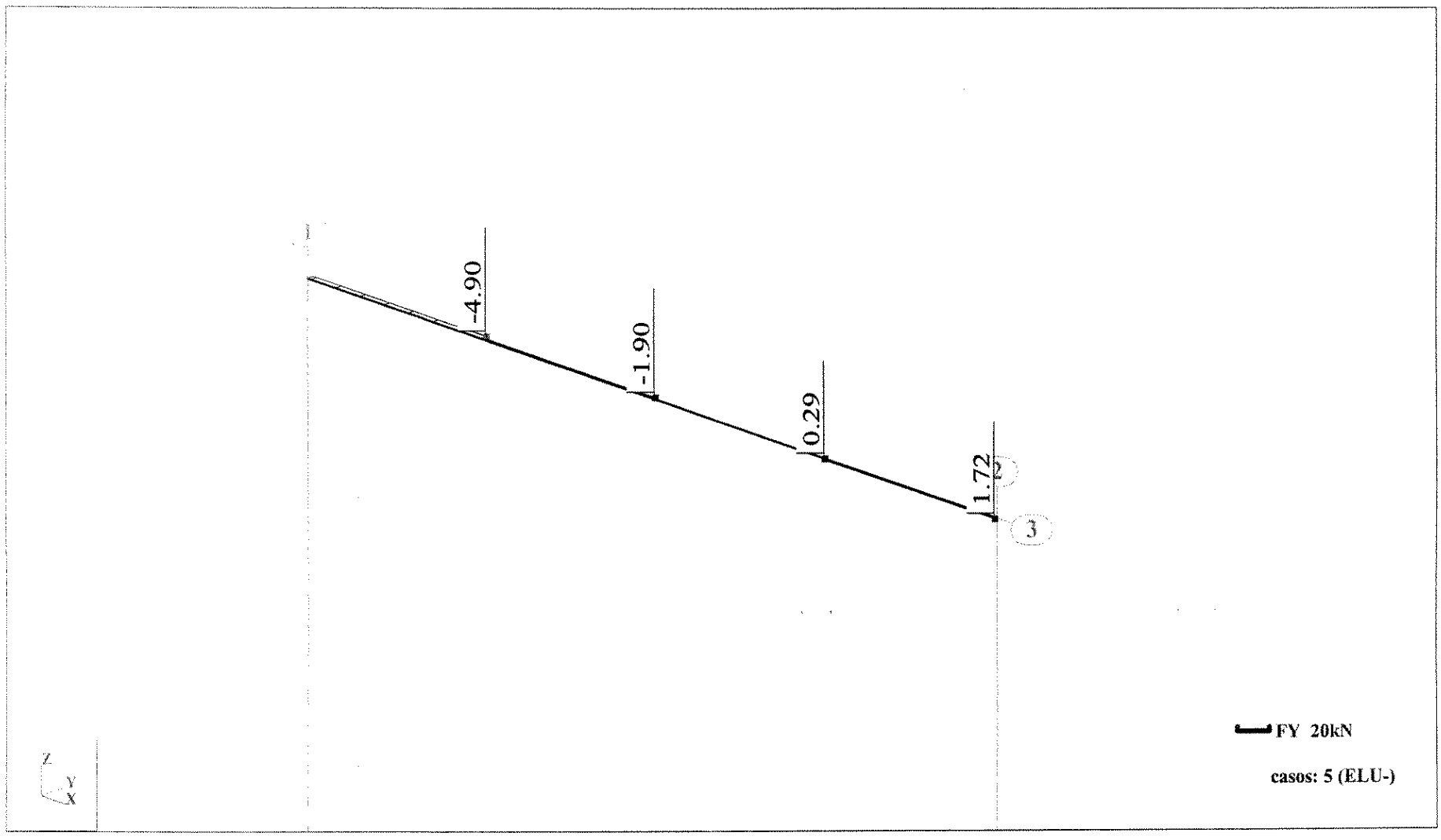
Vista:1 - MZ; casos: 4 (ELU+)



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Fecha : 24/11/03

Vista:1 - FY; casos: 4 (ELU+)



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PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Obras
Fecha: 24/11/2003
Hora: 21:14:15

Comprobación de secciones a flexión simple

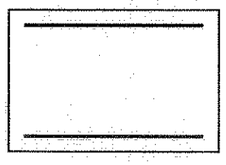
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

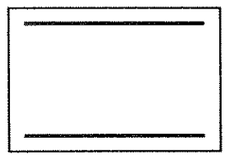
Sección : ATA_PANT
b [m] = 0.65
h [m] = 0.45
ri [m] = 0.050
rs [m] = 0.050

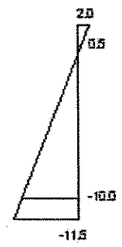


2 Comprobación

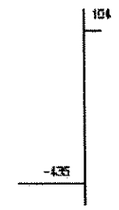
At [cm²] = 12.5
Ac [cm²] = 12.5

Mu [kN·m] = 200.5









Plano de deformación de agotamiento

x [m] = 0.067
1/r [1/m]·1.E-3 = 30.0
εs ·1.E-3 = 2.0
εi ·1.E-3 = -11.5

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	12.5	0.5	-103.7
0.400	12.5	-10.0	434.8

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: Obras
Fecha: 24/11/2003
Hora: 21:15:01

Cálculo de secciones a cortante

1 Datos

- Materiales

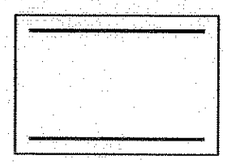
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : ATA_PANT
b0 [m] = 0.65
h [m] = 0.45



2 Comprobación

Tipo de armadura: cercos a 90.0°
separación s [m] = 0.20
ϕ [mm] = 12
nº ramas: 2
Area [cm²/m] = 11.3
ρ [·1.E-3] = 4.6

Inclinación de las bielas θ[°] = 45
Nd [kN] = 0.0
σyd [MPa] = 0.0

Vu1 [kN] = 1300.0
Vu2 [kN] = 263.0
Vcu [kN] = 100.2
Vsu [kN] = 162.9

- Resistencia a cortante:

Vu [kN] = 263.0

A6. Estribo 2

1. Cargas aplicadas y cálculo de estabilidad y resistencia

Estribos

- Esfuerzos en cabeza

$F_F = \frac{1}{20}(14.9.4 + 600)/2 = 27,6\ KN/estribo \rightarrow F_F = 3,07\ KN/m$

- Desplazamientos del tablero (temp + retrac. + fluencia)

$u = (\varepsilon_t + \varepsilon_{cs} + \varepsilon_{cr})\ 14/2 = 7,545\ mm$

$F_u = \frac{u}{\frac{29}{200.300.0,9}} = 14,05\ KN/ap \rightarrow F_u = 6,24\ KN/m$

$F_M = F_F + F_u = 9,31\ KN/m$

. Reacciones

Según emparrillado 14m

$N_{K\,pp} = 190,92\ KN/ap \rightarrow N_{Kpp} = 84,85\ KN/m$

$N_{K\,SC} = 359,45\ KN/ap \rightarrow N_{KSC} = 159,76\ KN/m$

Retaining wall : Cargadero

1. Calculation parameters:

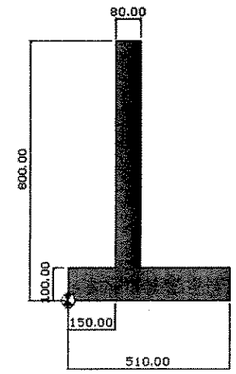
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 1.75
  - Overturning g = 2.00
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

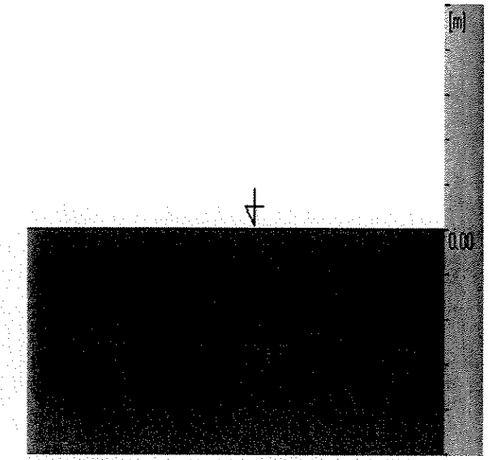


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 800.00 (cm)
- **Original layers:**

Parameters:

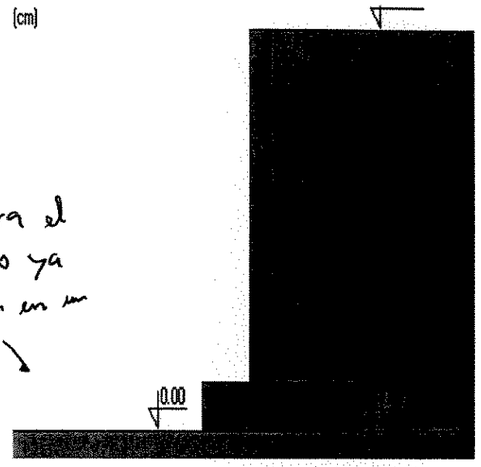
No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m2]*
1.	Argila	0.00	-	6.50	32.00	20.00	300.00



- **Soils (behind the wall):**

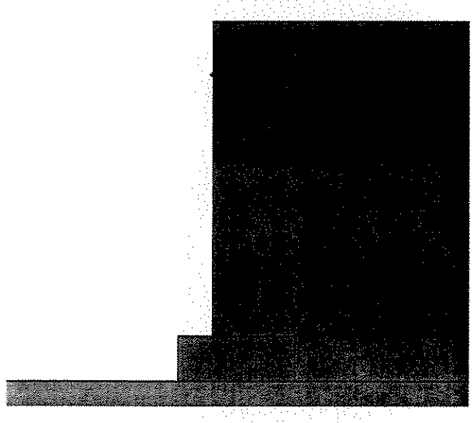
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	800.00	800.00	0.00	30.00	20.00



No se considera el terreno delantero ya que se encuentra en un talud.

4. Loads



- **Load report**

1 concentrated on wall
a1 dead z = 1.20 (m) V = -84.85 (kN) H = 0.00 (kN) M = 0.00 (kN*m)
2 uniform
a2 live x = 0.00 (m) P = 10.00 (kN/m2)
3 concentrated on wall
a3 live z = 1.20 (m) V = -159.76 (kN) H = -9.31 (kN) M = 0.00 (kN*m)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		800.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.11
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	2.21	0.69	0.00	-256.80	Self-weight of a retaining wall
2.	P'a	0.67	0.60	0.00	0.00	Soil pressure (before the wall)
3.	P'T	0.67	0.60	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.67	2.67	-213.33	0.00	Soil pressure (behind the wall)
5.	PT	3.70	0.60	0.00	-392.00	Soil weight (behind the wall)
6.	C	0.67	0.60	0.00	0.00	Soil cohesion
7.	a1	0.67	0.60	0.00	0.00	Dead load
8.	a2	3.70	4.00	-26.67	-26.75	Live load
9.	a3	0.67	0.60	0.00	0.00	Live load

CAPACITY

- Soil type under footing: not layered
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1 + 1.00*a2 + 1.00*a3
- Reduced design load:
  N=-920.16 (kN/m) My=-343.75 (kN*m) Fx=-249.31 (kN/m)
  Safety factor: 0.99 > 0.80

OVERTURNING

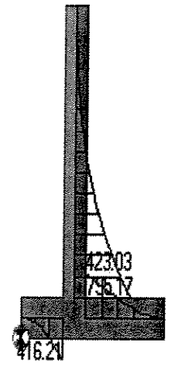
- Design combination: 1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.00*a1 + 1.50*a2
- Reduced design load:
  N=-600.64 (kN/m) Fx=-249.31 (kN/m)
- Overturning moment: Mo= 676.27 (kN*m)
- Moment preventing foundation overturning: M_{uf} = 1955.69 (kN*m)
- Safety factor: 2.89 > 2.00

SLIDING

- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1 + 1.00*a2
- Reduced design load:
  N=-760.40 (kN/m) My=-397.75 (kN*m) Fx=-240.00 (kN/m)
- Equivalent footing dimension: A = 510.00 (cm)
- Friction coefficient:
  - of soil (on the settlement level): f = 0.62
- Soil cohesion reduction factor = 100.00 %
- Cohesion: C = 6.50 (kN/m2)
- Sliding force value: Q_{tr} = 240.00 (kN/m)
- Value of force preventing wall sliding:
  $Q_{tf} = N * f + C * A$
  - on the foundation level: Q_{tf} = 504.60 (kN/m)
- Safety factor: 2.10 > 1.75

6. Results of RC design

- Moments



(kN*m)

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	795.17	100.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.35*a1 + 1.50*a2 + 1.50*a3
Wall	minimum	-0.00	800.00	1.00*PM + 1.00*P'a + 0.85*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.00*a1 + 1.50*a2 + 1.50*a3
Footing	maximum	421.78	150.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.35*a1 + 1.50*a2 + 1.50*a3
Footing	minimum	-496.84	230.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.00*a1 + 1.50*a2

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:09:02

Dimensionamiento de secciones a flexión simple

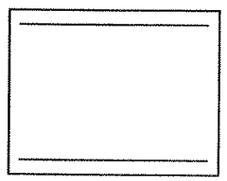
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

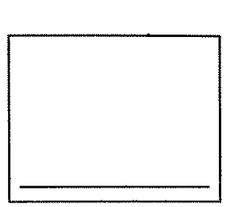
- Sección

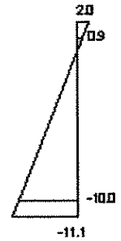
Sección : 100X80H25
b [m] = 1.00
h [m] = 0.80
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 795.17









Plano de deformación de agotamiento

x [m] = 0.123
1/r [1/m]·1.E-3 = 16.4
εs ·1.E-3 = 2.0
εi ·1.E-3 = -11.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	0.9	0.0
0.730	26.7	-10.0	434.8

At_est [cm²] = 26.7

ϕ [mm]	12	14	16	20	25
n°ϕ	24	18	14	9	6
n° capas	2	1	1	1	1
At [cm²]	27.1	27.7	28.1	28.3	29.5
wk [mm]	0.36	0.37	0.38	0.42	0.46

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0

Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:29:23

Comprobación de secciones a flexión simple

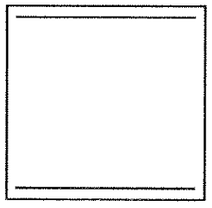
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

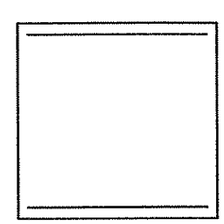
- Sección

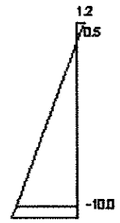
Sección : 100X100H25
b [m] = 1.00
h [m] = 1.00
ri [m] = 0.060
rs [m] = 0.060



2 Comprobación

At [cm²] = 15.7 > Amín = 9 cm²
Ac [cm²] = 1.0
Mu [kN·m] = 617.3 > Md = 496,8 kN·m









Plano de deformación de agotamiento

x [m] = 0.100
1/r [1/m]·1.E-3 = 11.9
εs ·1.E-3 = 1.2
εi ·1.E-3 = -10.7

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.060	1.0	0.5	-95.2
0.940	15.7	-10.0	434.8

3. Muros laterales de contención

Retaining wall : lateral1

1. Calculation parameters:

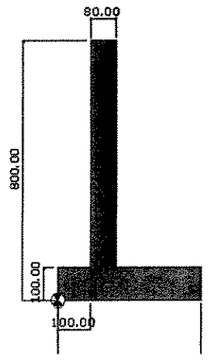
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 0.00
  - Overturning g = 0.00
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

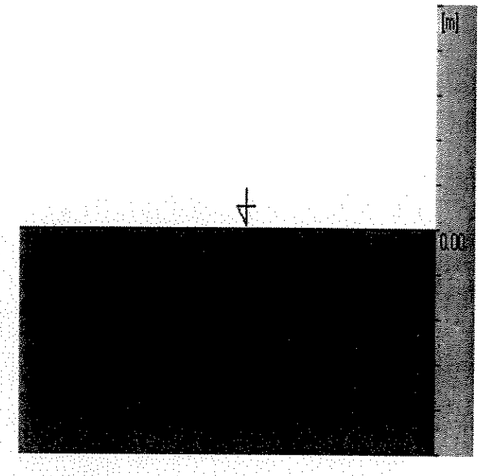


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 800.00 (cm)
- **Original layers:**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m2]*
1.	Argila	0.00	-	6.50	32.00	20.00	300.00



- **Soils (behind the wall):**

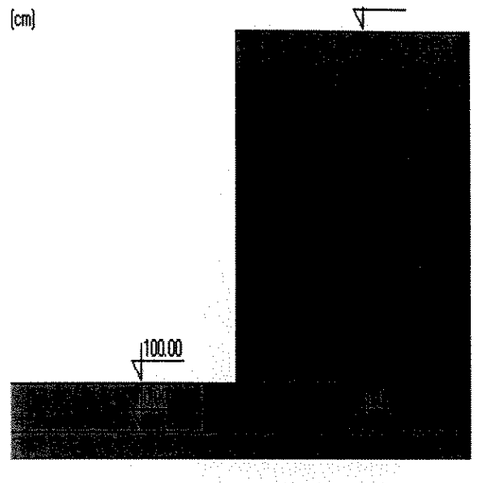
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	800.00	800.00	0.00	30.00	20.00

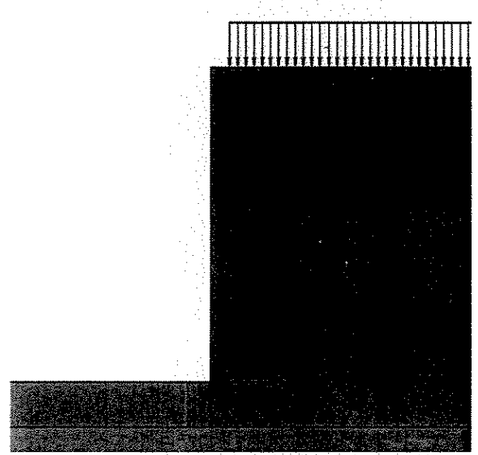
- **Soils (before the wall):**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	100.00	100.00	0.00	30.00	20.00



4. Loads



- **Load report**

1 uniform
a1 live x = 0.00 (m) P = 10.00 (kN/m2)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		800.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.11
  pressure 0.01

Soils (before the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.	Reblert	100.00	30.00	0.33	0.50	3.00

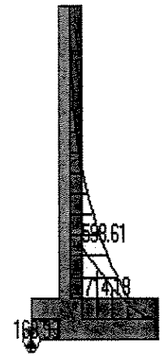
- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	1.78	0.70	0.00	-242.40	Self-weight of a retaining wall
2.	P'a	0.55	0.33	15.25	0.00	Soil pressure (before the wall)
3.	P'T	0.55	0.60	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.55	2.67	-213.33	0.00	Soil pressure (behind the wall)
5.	PT	3.15	0.60	0.00	-378.00	Soil weight (behind the wall)
6.	C	0.55	0.60	0.00	0.00	Soil cohesion
7.	a1	3.15	4.00	-26.67	-25.58	Live load

6. Results of RC design

- Moments



[kN*m]

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	714.18	100.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.50*a1
Wall	minimum	-0.00	800.00	1.00*PM + 1.00*P'a + 0.85*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	maximum	185.27	100.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	minimum	-611.96	180.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 1.49*PT + 1.00*C + 1.50*a1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:24:25

Dimensionamiento de secciones a flexión simple

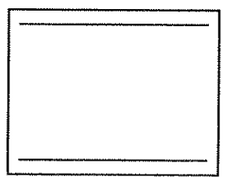
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

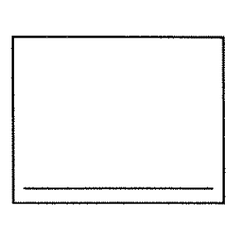
- Sección

Sección : 100X80H25
b [m] = 1.00
h [m] = 0.80
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 714.2



Plano de deformación de agotamiento

x [m] = 0.115
1/r [1/m]·1.E-3 = 16.2
εs ·1.E-3 = 1.9
εi ·1.E-3 = -11.1

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	0.7	0.0
0.730	23.9	-10.0	434.8

At_est [cm²] = 23.9

ϕ [mm]	12	14	16	20	25
nºϕ	22	16	12	8	5
nº capas	2	1	1	1	1
At [cm²]	24.9	24.6	24.1	25.1	24.5
wk [mm]	0.34	0.37	0.40	0.42	0.51

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:29:27

Comprobación de secciones a flexión simple

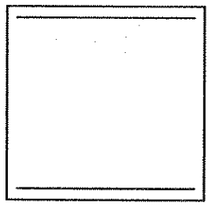
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

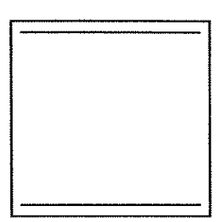
- Sección

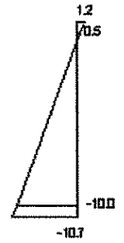
Sección : 100X100H25
b [m] = 1.00
h [m] = 1.00
ri [m] = 0.060
rs [m] = 0.060



2 Comprobación

At [cm²] = 15.7 > Amin = 9 cm²
Ac [cm²] = 1.0
Mu [kN·m] = 617.3 > 611,96 = Md









Plano de deformación de agotamiento

x [m] = 0.100
1/r [1/m]·1.E-3 = 11.9
εs ·1.E-3 = 1.2
εi ·1.E-3 = -10.7

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.060	1.0	0.5	-95.2
0.940	15.7	-10.0	434.8

Retaining wall : lateral2

1. Calculation parameters:

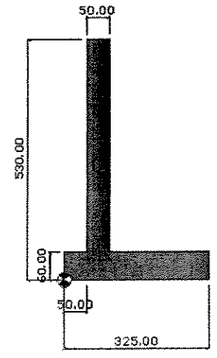
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 1.50
  - Overturning g = 1.80
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

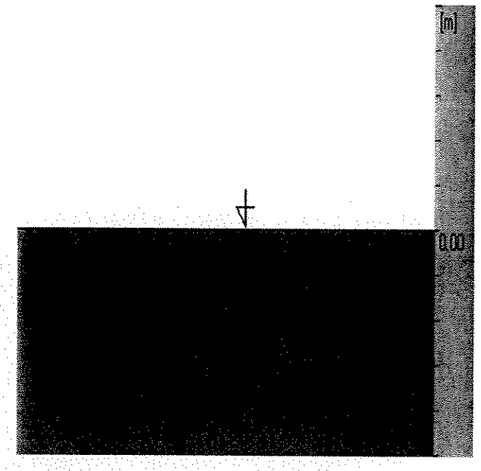


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 530.00 (cm)
- **Original layers:**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m2]*
1.	Reblert	0.00	-	0.00	30.00	20.00	200.00



- **Soils (behind the wall):**

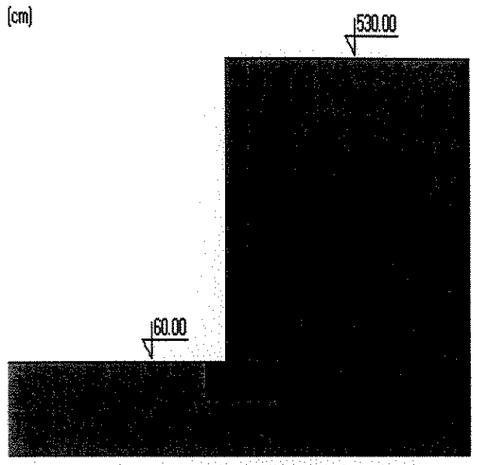
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	530.00	530.00	0.00	30.00	20.00

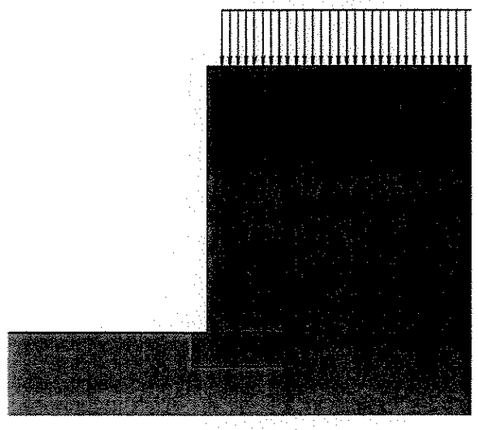
- **Soils (before the wall):**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	60.00	60.00	0.00	30.00	20.00



4. Loads



- **Load report**

1 uniform
a1 live x = 0.00 (m) P = 10.00 (kN/m2)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		530.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.12
  pressure 0.01

Soils (before the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.	Reblert	60.00	30.00	0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	1.15	0.45	0.00	-103.20	Self-weight of a retaining wall
2.	P'a	0.36	0.20	5.54	0.00	Soil pressure (before the wall)
3.	P'T	0.36	0.38	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.36	1.77	-93.63	0.00	Soil pressure (behind the wall)
5.	PT	2.13	0.38	0.00	-211.50	Soil weight (behind the wall)
6.	C	0.36	0.38	0.00	0.00	Soil cohesion
7.	a1	2.13	2.65	-17.67	-22.38	Live load

CAPACITY

- Soil type under footing: not layered
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-337.08 (kN/m) My=-214.86 (kN*m) Fx=-105.76 (kN/m)
  Safety factor: 1.02 > 0.80

OVERTURNING

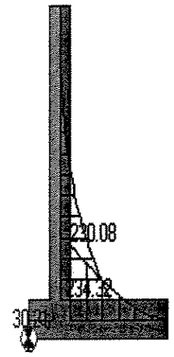
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-337.08 (kN/m Fx=-105.76 (kN/m)
- Overturning moment: Mo= 212.55 (kN*m)
- Moment preventing foundation overturning: M_{uf} = 617.95 (kN*m)
- Safety factor: 2.91 > 1.80

SLIDING

- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-337.08 (kN/m) My=-214.86 (kN*m) Fx=-105.76 (kN/m)
- Equivalent footing dimension: A = 325.00 (cm)
- Friction coefficient:
  - of soil (on the settlement level): f = 0.57
- Soil cohesion reduction factor = 100.00 %
- Cohesion: C = 0.00 (kN/m2)
- Sliding force value: Q_{tr} = 105.76 (kN/m)
- Value of force preventing wall sliding:
  $Q_{tf} = N * f + C * A$
  - on the foundation level: Q_{tf} = 192.14 (kN/m)
- Safety factor: 1.82 > 1.50

6. Results of RC design

- Moments



[kN*m]

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	234.32	60.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.50*a1
Wall	minimum	-0.00	530.00	1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
Footing	maximum	30.76	50.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	minimum	-232.39	100.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 1.49*PT + 1.00*C + 1.50*a1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:41:41

Dimensionamiento de secciones a flexión simple

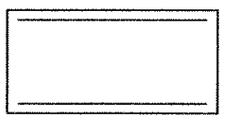
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

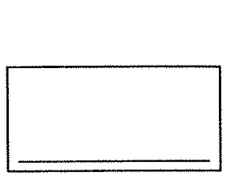
- Sección

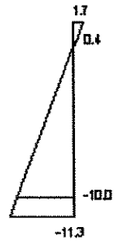
Sección : 100X50H25
b [m] = 1.00
h [m] = 0.50
ri [m] = 0.050
rs [m] = 0.050



2 Dimensionamiento

Md [kN·m] = 234.32









Plano de deformación de agotamiento

x [m] = 0.065
1/r [1/m]·1.E-3 = 25.9
εs ·1.E-3 = 1.7
εi ·1.E-3 = -11.3

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.050	0.0	0.4	0.0
0.450	12.6	-10.0	434.8

At_est [cm²] = 12.6

ϕ [mm]	12	14	16	20	25
nºϕ	12	9	7	5	3
nº capas	1	1	1	1	1
At [cm²]	13.6	13.9	14.1	15.7	14.7
wk [mm]	0.25	0.27	0.29	0.29	0.43

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:50:15

Comprobación de secciones a flexión simple

1 Datos

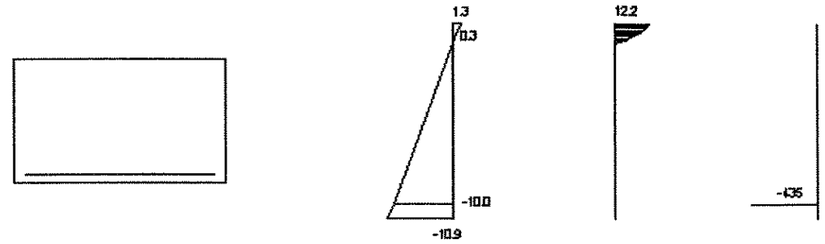
- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Sección

Sección : 100X60H25
b [m] = 1.00
h [m] = 0.60
ri [m] = 0.045
rs [m] = 0.045





Plano de deformación de agotamiento

x [m] = 0.062
1/r [1/m]·1.E-3 = 20.3
εs ·1.E-3 = 1.3
εi ·1.E-3 = -10.9

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.045	0.0	0.3	0.0
0.555	10.1	-10.0	434.8

2 Comprobación

At [cm²] = 10.1 > $A_{min} = 4{,}8\ cm^2$
Ac [cm²] = 0.0
Mu [kN·m] = 232.9 > 232,3 = Md

Retaining wall : lateral3

1. Calculation parameters:

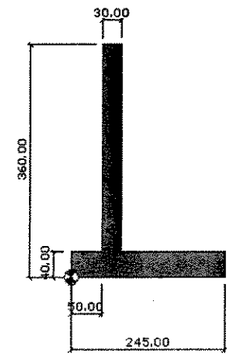
MATERIAL:

- **CONCRETE:** **class C25/30, fc28 = 25.00 (MN/m2), unit weight = 24.00 (kN/m3)**
- **STEEL:** **class HA 500, fe = 500.00 (MN/m2)**

OPTIONS:

- Calculations according to: concrete code: **EHE**
  soil code: **NTE A+C**
- Cover: c1 = 30.0 (mm), c2 = 50.0 (mm)
- Exposure:
- Retainig wall design according to:
  - Capacity g = 0.80
  - Sliding g = 1.50
  - Overturning g = 1.80
- Retainig wall verification according to:
- Wall/soil friction angle:
  - Passive pressure for cohesive soils 0×ϕ
  - Cohesive soil pressure 0×ϕ
  - Passive pressure for non-cohesive soils 0×ϕ
  - Pressure for non-cohesive soils 0×ϕ

2. Geometry:

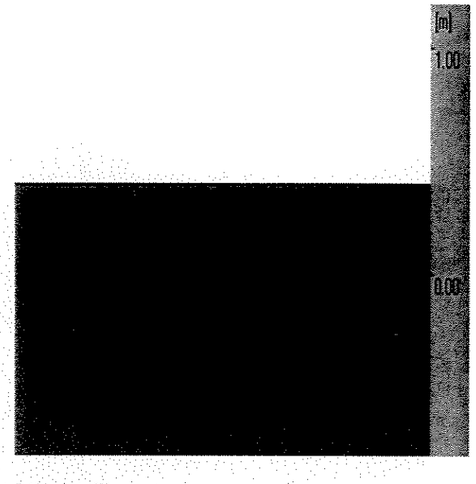


3. Soil:

- **Soil parameter selection - method: A**
- **Backfill** Soil depth (behind the wall) Ho = 360.00 (cm)
- **Original layers:**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*	qmax *[kN/m2]*
1.	Reblert	40.00	-	0.00	30.00	20.00	200.00



- **Soils (behind the wall):**

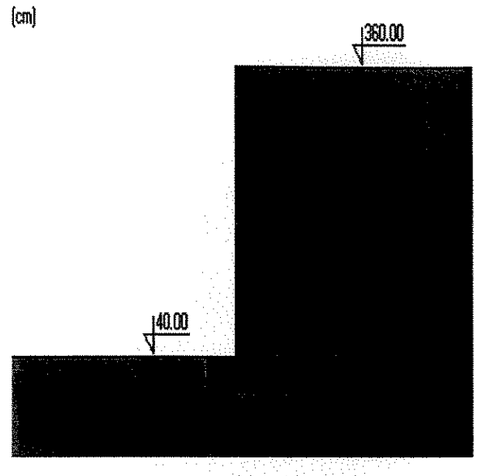
Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	360.00	360.00	0.00	30.00	20.00

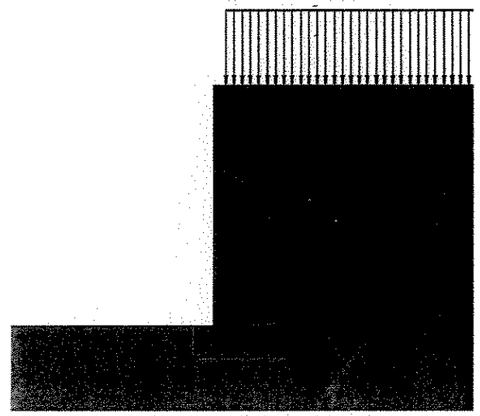
- **Soils (before the wall):**

Parameters:

No.	Soil name	Level *[cm]*	Thickness *[cm]*	Cohesion *[kN/m2]*	Friction angle *[Deg]*	Unit weight *[kN/m3]*
1	Reblert	40.00	40.00	0.00	30.00	20.00



4. Loads



- **Load report**

1 uniform
a1 live x = 0.00 (m) P = 10.00 (kN/m2)

5. Results (soils)

PRESSURES

Soil pressure and passive pressure : limit
Factors for pressures and passive pressures for soils:

$$K_a = \frac{\cos^2 \cdot (\beta - \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 + \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi - \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_p = \frac{\cos^2 \cdot (\beta + \phi)}{\cos^2 \beta \cdot \cos(\beta + \delta) \cdot \left(1 - \sqrt{\frac{\sin(\phi + \delta) \cdot \sin(\phi + \varepsilon)}{\cos(\beta + \delta) \cdot \cos(\beta - \varepsilon)}}\right)^2}$$

$$K_o = \frac{\sigma_x}{\sigma_z} = \frac{\nu}{1 - \nu}$$

$$K_a \le K_o \le K_p$$

Soils (behind the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.		360.00		0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.12
  pressure 0.01

Soils (before the wall):

No.	Soil name	Level *[cm]*	Friction angle *[Deg]*	Ka	Ko	Kp
1.	Reblert	40.00	30.00	0.33	0.50	3.00

- Generalized limit displacements
  passive pressure 0.13
  pressure 0.01

Simple cases

No.	Case	x (m)	y (m)	Px (kN/m)	Py (kN/m)	Description
1.	PM	0.94	0.30	0.00	-46.56	Self-weight of a retaining wall
2.	P'a	0.28	0.13	2.48	0.00	Soil pressure (before the wall)
3.	P'T	0.28	0.26	0.00	0.00	Soil weight (before the wall)
4.	Pa	0.28	1.20	-43.20	0.00	Soil pressure (behind the wall)
5.	PT	1.63	0.26	0.00	-105.60	Soil weight (behind the wall)
6.	C	0.28	0.26	0.00	0.00	Soil cohesion
7.	a1	1.63	1.80	-12.00	-16.38	Live load

CAPACITY

- Soil type under footing: not layered
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-168.54 (kN/m) My=-80.43 (kN*m) Fx=-52.72 (kN/m)
  Safety factor: 1.69 > 0.80

OVERTURNING

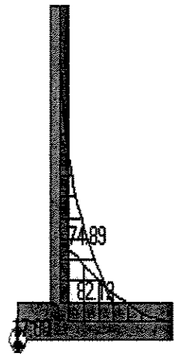
- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-168.54 (kN/m) Fx=-52.72 (kN/m)
- Overturning moment: Mo= 73.44 (kN*m)
- Moment preventing foundation overturning: M_{uf} = 242.92 (kN*m)
- Safety factor: 3.31 > 1.80

SLIDING

- Design combination: 1.00*PM + 1.00*P'a + 1.00*Pa + 1.00*P'T + 1.00*PT + 1.00*C + 1.00*a1
- Reduced design load:
  N=-168.54 (kN/m) My=-80.43 (kN*m) Fx=-52.72 (kN/m)
- Equivalent footing dimension: A = 245.00 (cm)
- Friction coefficient:
  - of soil (on the settlement level): f = 0.57
- Soil cohesion reduction factor = 100.00 %
- Cohesion: C = 0.00 (kN/m2)
- Sliding force value: Q_{tr} = 52.72 (kN/m)
- Value of force preventing wall sliding:
  $Q_{tf} = N * f + C * A$
  - on the foundation level: Q_{tf} = 96.07 (kN/m)
- Safety factor: 1.82 > 1.50

6. Results of RC design

- Moments



[kN*m]

Element	Moments	Value *[kN*m]*	Position *[cm]*	Combination
Wall	maximum	82.12	40.00	1.35*PM + 1.35*P'a + 1.55*Pa + 1.35*P'T + 1.49*PT + 1.35*C + 1.50*a1
Wall	minimum	-0.00	360.00	1.00*PM + 1.00*P'a + 0.85*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1
Footing	maximum	17.09	50.00	1.35*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 1.49*PT + 1.00*C + 1.50*a1
Footing	minimum	-77.69	80.00	1.00*PM + 1.00*P'a + 1.55*Pa + 1.00*P'T + 0.90*PT + 1.00*C + 1.50*a1

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:58:33

Dimensionamiento de secciones a flexión simple

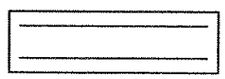
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

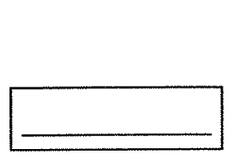
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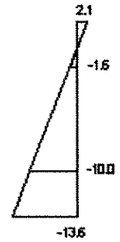
Sección : 100X30H25
b [m] = 1.00
h [m] = 0.30
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 82.12









Plano de deformación de agotamiento

x [m] = 0.040
1/r [1/m]·1.E-3 = 52.4
εs ·1.E-3 = 2.1
εi ·1.E-3 = -13.6

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-1.6	0.0
0.230	8.8	-10.0	434.8

At_est [cm²] = 8.8

ϕ [mm]	12	14	16	20	25
nºϕ	8	6	5	3	3
nº capas	1	1	1	1	1
At [cm²]	9.0	9.2	10.1	9.4	14.7
wk [mm]	0.32	0.34	0.34	0.43	0.28

PRONTUARIO INFORMÁTICO DEL HORMIGÓN ESTRUCTURAL 3.0
Cátedra de Hormigón Estructural ETSICCPM - IECA

Obra: ARMAT
Fecha: 20/11/2003
Hora: 18:59:16

Dimensionamiento de secciones a flexión simple

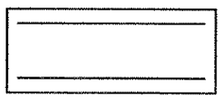
1 Datos

- Materiales

Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

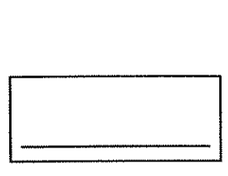
- Sección

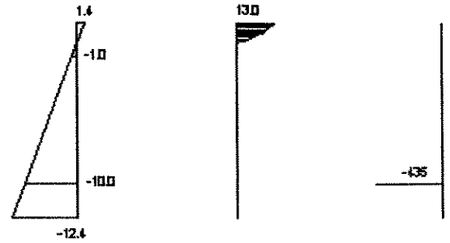
Sección : 100X40H25
b [m] = 1.00
h [m] = 0.40
ri [m] = 0.070
rs [m] = 0.070



2 Dimensionamiento

Md [kN·m] = 77.69





Plano de deformación de agotamiento

x [m] = 0.041
1/r [1/m]·1.E-3 = 34.6
εs ·1.E-3 = 1.4
εi ·1.E-3 = -12.4

Deformación y tensión de armaduras

Profundidad [m]	Armadura [cm²]	Deformación ·1.E-3	Tensión [MPa]
0.070	0.0	-1.0	0.0
0.330	7.2	-10.0	434.8

At_est [cm²] = 7.2

ϕ [mm]	12	14	16	20	25
nºϕ	7	5	4	3	3
nº capas	1	1	1	1	1
At [cm²]	7.9	7.7	8.0	9.4	14.7
wk [mm]	0.17	0.20	0.21	0.19	0.12

4. Elementos de coronación

CARGAS CONCENTRADAS SOBRE MACIZOS
Apoyo: O.F. 5.9 AVE VILAFRANCA

DATOS:

GEOMETRIA

a1 (m)=	0.2	Dim. del apoyo en sentido del eje de la viga (dim. menor)
b1 (m)=	0.3	Dim. del apoyo en sentido perpendicular al eje de la viga (dim. mayor)
a (m)=	0.4	Dim. homotética de a1
b (m)=	0.5	Dim. homotética de b1
h(m)=	0.8	Espesor del elemento de apoyo + banqueta

MATERIALES

fck(MPa)=	25
fyk(MPa)=	500
fcd(MPa)=	16.67
fyd(MPa)=	434.78

CARGAS

Nd(kN)=	892.65	Carga sobre el apoyo (mayorada)

CALCULOS

ESPESOR MINIMO DEL ELEMENTO DE APOYO:

0.8 >=? 0.18

TENSION DE CONTACTO LOCALIZADA

Nu		Nd
1825.7	>?	892.65
3300.0	>?	892.65

ARMADURAS TRANSVERSALES

Asa(cm2)=	3.08	En sentido paralelo a a
Asb(cm2)=	2.46	En sentido paralelo a b

0.04	hasta	0.4	Rango de Profundidad para el reparto de Asa (m)
0.05	hasta	0.5	Rango de Profundidad para el reparto de Asb (m)

P.S 5+9

MEMORIA DE CALCULO
DE ELEMENTOS PREFABRICADOS

OBRA:AVE OLERDOLA U.T.E.
ESTRUCTURA: P.S. 5+9

DESTINATARIO: AVE OLERDOLA U.T.E.
Rev. 01
FECHA: 2 DE MARZO DE 2004

CE-21

ACS VIAS DOCUMENTO CONTROLADO
REV.: 1 FECHA: 5/4/04 FIRMA:
COPIA Nº: FIRMA:

1. DIMENSIONES

1.1. Sección longitudinal

- Nº de vanos: 3
- Luces de cálculo: 13.725 m, 16.55 m y 13.725 m

1.2. Sección transversal

- Ancho de tablero: 9 m
- Ancho de aceras: 0.90 m
- Ancho de plataforma: 7.20 m
- Número de vigas: 2
- Canto de vigas: 0.90 m
- Espesor de losa: 0.25 m (el espesor de losa incluye las placas de encofrado perdido de canto 6 cm)
- Espesor de aceras 0.20 m
- Espesor de aglomerado 8 cm

1.3. Clase de exposición

La clase de exposición ambiental considerada es la II a que se corresponde, según la tabla 8.22 de la EHE, con exteriores en ausencia de cloruros sometidas a la acción del agua de lluvia en zonas con precipitación media anual superior a 600 mm.

2. ACCIONES CONSIDERADAS

2.1. Pesos propios

Peso propio losa:	6.25	kN/m^2
Peso propio viga:	19.74	kN/ml

2.2. Cargas permanentes

Aceras	5.00	kN/m^2
Pavimento	2.88	kN/m^2
Barandilla e imposta....	10.00	kN/ml

2.3. Sobrecargas

Se han considerado las acciones previstas en la "Instrucción sobre las acciones a considerar en el Proyecto de Puentes de Carretera", I.A.P-98.

Según dicha Instrucción el tren de cargas se valorará por la acción simultánea de las sobrecargas siguientes:

SOBRECARGA DE USO

a) Una sobrecarga uniforme de 4 kN/m^2 extendida a toda la superficie a nivel de la calzada o a parte de ella, según sea más desfavorable para el elemento en estudio.

b) Uno o dos vehículos de 600 kN, cuyo eje longitudinal se considerará paralelo al eje de la calzada y formado cada uno por seis cargas, de 100 kN, pudiendo desplazarse en sentido transversal.

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Prefabricados, S.A.

DEPARTAMENTO TECNICO

Fecha:

La separación entre cargas en sentido longitudinal será de 1.50 m y en sentido transversal de 2 m.

La superficie de apoyo sobre la que actuará cada carga será de 0.2 m paralelamente al eje del vehículo, por 0.6 m de ancho.

En puentes de anchura de plataforma menor o igual de 12 m se considerará un solo vehículo pesado.

En puentes de anchura de plataforma superior a 12 m e inferior a 25 m, se considerará la acción de uno o dos vehículos pesados, según sea más desfavorable.

La disposición transversal de los vehículos pesados dentro de la plataforma cumplirá las siguientes prescripciones:

- Distancia mínima de una de las líneas de carga a bordes de plataforma: 0.50 m
- Distancia transversal mínima entre líneas de carga de vehículos pesados diferentes situados en la misma zona de la plataforma: 2.00 m

ACCIONES ACCIDENTALES

Sistemas de contención deformables: fuerza puntual de 45 kN aplicada a 60 cm sobre la superficie del pavimento, perpendicularmente al elemento considerado.

Sistemas de contención rígidos: fuerza puntual de 300 kN, aplicada perpendicularmente al elemento considerado y a una altura igual a la altura útil del mismo.

FRENADO

Para el frenado se toma 1/20 de la sobrecarga total en calzada con un mínimo de 20b ($\geq$40 kN) y un máximo de 60b ($\leq$720 kN), siendo b el ancho de plataforma en m.

Como es difícil prever con exactitud en el proyecto los tiempos que transcurrirán entre la fabricación de la viga y colocación de la misma en obra, hormigonado de la losa, introducción de pesos muertos y disposición de juntas de dilatación, así como las características ambientales, se ha optado por considerar unos períodos y unas variables termohigrométricas fijas para todos los puentes con vistas a obtener unos valores de retracción y fluencia que nos dejen del lado de la seguridad.

Los períodos considerados han sido:

Introducción del pretensado:	a los 4 días del hormigonado de la viga.
Hormigonado de losa sobre vigas:	a los 30 días del hormigonado de la viga.
Colocación de pesos muertos:	a los 60 días del hormigonado de la viga.

3. CONTROL Y SEGURIDAD

Para la verificación de los Estados Límite de Servicio y los Estados Límite Últimos, adoptamos las expresiones del Artículo 13 de la Instrucción EHE correspondientes a nivel de control de ejecución intenso para elementos prefabricados y para hormigón "in situ".

3.1.Estados Límite de Servicio

Combinación poco probable

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{0,1}Q_{k,i}$$

Combinación frecuente

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}\psi_{1,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

Combinación cuasipermanente

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\sum_{i\geq 1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

Coeficientes parciales de seguridad

a. Acciones:

TIPO DE ACCION	Efecto favorable	Efecto desfavorable
Permanente	$\gamma_G = 1.00$	$\gamma_G = 1.00$
Pretensado	$\gamma_P = 0.95$	$\gamma_P = 1.05$
Variable	$\gamma_Q = 0.00$	$\gamma_Q = 1.00$

b. Materiales:

Hormigón γ_c	Acero activo y pasivo γ_s
1.0	1

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Fecha:

3.1.Estados Límite Últimos

Situaciones permanentes o transitorias

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{0,i}Q_{k,i}$$

Situaciones Accidentales

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\sum_{j\geq 1}\gamma_{G^*,j}G^*_{k,j}+\gamma_P P_k+\gamma_A A_k+\gamma_{Q,1}\psi_{1,1}Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

Coeficientes parciales de seguridad:

a. Acciones:

TIPO DE ACCION	NIVEL DE CONTROL DE EJECUCION			
	NORMAL		INTENSO	
	E. FAVORABLE	E.DESFAV.	E. FAVORABLE	E.DESFAV
Permanente	$\gamma_G = 1.00$	$\gamma_G = 1.50$	$\gamma_G = 1.00$	$\gamma_G = 1.35$
Pretensado	$\gamma_P = 1.00$	$\gamma_P = 1.00$	$\gamma_P = 1.00$	$\gamma_P = 1.00$
Variable	$\gamma_Q = 0.00$	$\gamma_Q = 1.60$	$\gamma_Q = 0.00$	$\gamma_Q = 1.50$

b. Materiales:

SITUACION DE PROYECTO	Hormigón γ_c	Acero activo y pasivo γ_s
Persistente o transitoria	1.5	1.15

Para la obtención de los valores representativos de las acciones, usamos los coeficientes dados en la tabla 14 de I.A.P.-96:

Valor de combinación $\psi_0 = 0.6$

Valor frecuente $\psi_1 = 0.5$

Valor casi-permanente $\psi_2 = 0.2$

4. CARACTERISTICAS DE LOS MATERIALES

4.1.- Elementos de hormigón armado

Hormigón	HA-35
Acero pasivo	Barras corrugadas UNE 36068-1994 B 500 S

4.2.- Elementos de hormigón pretensado

Hormigón	HP-45
Armadura activa	Cordones UNE 36094-1997 Y1860 S7 13,0 Cordones UNE 36094-1997 Y1860 S7 15,2
Armadura pasiva	Malla electrosoldada UNE 36092-1996 B 500 T Barras corrugadas UNE 36068-1994 B 500 S

4.3. Hormigón armado en losa "in situ"

Hormigón	HA-25
Acero pasivo	Barras corrugadas UNE 36068-1994 B 500 S

5. PROCESO DE CALCULO

5.1. Cálculo de Esfuerzos

El cálculo de esfuerzos en vigas se realiza mediante un modelo de emparrillado plano, situándose las sobrecargas en distintas posiciones del tablero y seleccionándose los esfuerzos más desfavorables.

5.2. Cálculo del Pretensado

Según Artículo 49 de EHE, se dimensiona el pretensado para que cumpla las limitaciones establecidas para el Estado Límite de Fisuración por solicitaciones normales que incluye la aparición de fisuras por compresión para la combinación poco probable o rara y la verificación de los valores máximos de apertura de fisura que aparecen en la Tabla 49.2.4 para la combinación de acciones frecuentes, dependiendo de la clase de exposición ambiental.

Asimismo se realiza la correspondiente comprobación de tensiones en la viga en la situación de vacío.

5.3 Cálculo de la armadura a cortante

El cálculo de la armadura a cortante se realiza ateniéndonos a lo dispuesto en EHE, tomando como ángulo de inclinación de las fisuras el ángulo elástico de referencia. Uno de los datos necesarios para hallar dicho ángulo de inclinación de las fisuras es el de la tensión normal en la fibra baricéntrica de la sección, pero como el centro de gravedad de la sección homogeneizada varía al añadirle la losa y varía también según sea el tipo de carga - instantánea o permanente - a considerar, se ha optado por hacer un barrido de fibra neutra quedándonos con la máxima armadura transversal obtenida.

En cuanto a la armadura de cosido entre viga y losa se comprueba según el artículo 47.2 de EHE que se refiere al E.L.U. de agotamiento por esfuerzo rasante en juntas entre hormigones.

5.4 Seguridad frente a rotura

Se realiza considerando como ley de tensión-deformación en el hormigón la parábola rectángulo y suponiendo un acortamiento unitario de rotura por compresión en el hormigón de 3.5 por mil siendo 10 por mil el alargamiento unitario máximo en la fibra más traccionada. Siguiendo la ley de "pivoteo" del plano de deformaciones que se indica en EHE se fija la profundidad de la fibra neutra para la cual la resultante de las tensiones coincide con la compresión exterior - nula en nuestro caso - hallando el correspondiente momento generado por las tensiones internas que tendrá que ser mayor que el momento exterior mayorado para que la sección sea válida. En caso de que así no fuera se va incrementando la armadura pasiva inferior hasta igualar al momento exterior mayorado.

El origen de la ley tensión-deformación del acero de pretensado se traslada al punto de alargamiento unitario igual al obtenido en el acero después de pretensar.

5.5 Armadura transversal en losa sobre vigas

Los momentos más desfavorables se obtienen mediante suma de los correspondientes al efecto de flexión general de las barras transversales del emparrillado y al de localizadas entre vigas.

Una vez obtenidos los momentos más desfavorables en el centro del tablero se procede al dimensionamiento de la armadura que se realiza según la Instrucción EHE

5.6 Cálculo de los apoyos

A efectos de dimensionamiento de apoyos de neopreno se ha considerado una variación longitudinal lenta del 0.6 por mil que incluye fluencia, retracción y variación térmica.

Para el frenado se ha adoptado el valor total preconizado por la Instrucción repartiendo a partes iguales esta fuerza entre el número de apoyos. En cuanto al giro del apoyo no se ha contado con las acciones anteriores a la del peso propio de la losa, ya que admitimos que al colocar la viga el apoyo no tiene ningún giro, cosa que, si los neoprenos son horizontales, nos dejará del lado de la seguridad, debido a la contraflecha de las vigas.

La verificación de los neoprenos elegidos se realiza siguiendo las comprobaciones exigidas por las Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (1982) y la publicación Aparatos de Apoyo de Puentes de la Asociación Técnica de Carreteras (1996).

6. CONCLUSION

Los cálculos han sido efectuados conforme a las Instrucciones y Normativas españolas referentes a la materia, actualmente vigentes.

Fundamentalmente se han considerado las siguientes:

- "Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera". (IAP-96).

- "Instrucción de hormigón estructural" (EHE).

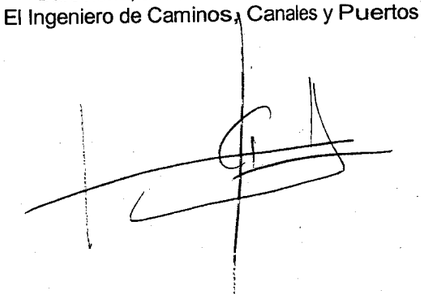
- "Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera" (1982)

- "Aparatos de apoyo de Puentes. Asociación Técnica de Carreteras" (1996)

Con todo lo expuesto y los Anexos de Cálculo que se adjuntan se da por concluida la presente Memoria de Cálculo.

NOTA A LA REV. 01: En esta revisión se ha incluido la Prueba de Carga de los Tableros y el cálculo del recorrido de las Juntas de Dilatación.

Barcelona, a 2 de marzo de 2004
El Ingeniero de Caminos, Canales y Puertos



Fdo.: Jaume Gironella i Cobos

ALVISA
Prefabricados, S.A.

DEPARTAMENTO TECNICO

Fecha:

ANEXOS A LA MEMORIA

INDICE DE ANEXOS

A. VANOS 1 Y 3

A.1. OBTENCION DE ESFUERZOS
A.2. DIMENSIONAMIENTO DE VIGAS
A.3. DIMENSIONAMIENTO DE ARMADO DE LOSA
A.4. PRUEBA DE CARGA

B. VANO 2

B.1. OBTENCION DE ESFUERZOS
B.2. DIMENSIONAMIENTO DE VIGAS
B.3. DIMENSIONAMIENTO DE ARMADO DE LOSA
B.4. PRUEBA DE CARGA

C. APARATOS DE APOYO

D. RECORRIDO DE JUNTAS DE DILATACIÓN

A. VANOS 1 Y 3

ANEXO A.1. OBTENCIÓN DE ESFUERZOS

PROGRAMA EMPAREHE

El programa EMPAREHE es un programa desarrollado por los servicios técnicos de Prainsa en lenguaje HPBASIC para Windows. Su objeto es el dimensionamiento de tableros isostáticos de puentes de vigas rectas de sección constante, pretensadas con armaduras pretesas y apoyadas en un solo neopreno por extremo.

Para el cálculo de esfuerzos sobre las vigas este programa utiliza 2 esquemas estáticos:

Para los esfuerzos debidos a peso propio de viga y peso propio de losa (encofrados perdidos + hormigón "in situ") el esquema es de viga simplemente apoyada: cada viga recibe el peso del área tributaria de losa más el del encofrado perdido.

Para los esfuerzos debidos a cargas muertas y sobrecargas el esquema estático es el de emparrillado plano.

Las barras del emparrillado se generan del siguiente modo:

- barras longitudinales coincidentes con ejes de viga.
- barras transversales: hay 2 grupos de barras transversales. Un primer grupo coincidente con la línea de apoyos y un segundo grupo de barras paralelas entre sí y equiespaciadas excepto las barras extremas que se sitúan a 0.75H siendo H el canto total del tablero.

Las características mecánicas de las barras se obtienen del modo siguiente:

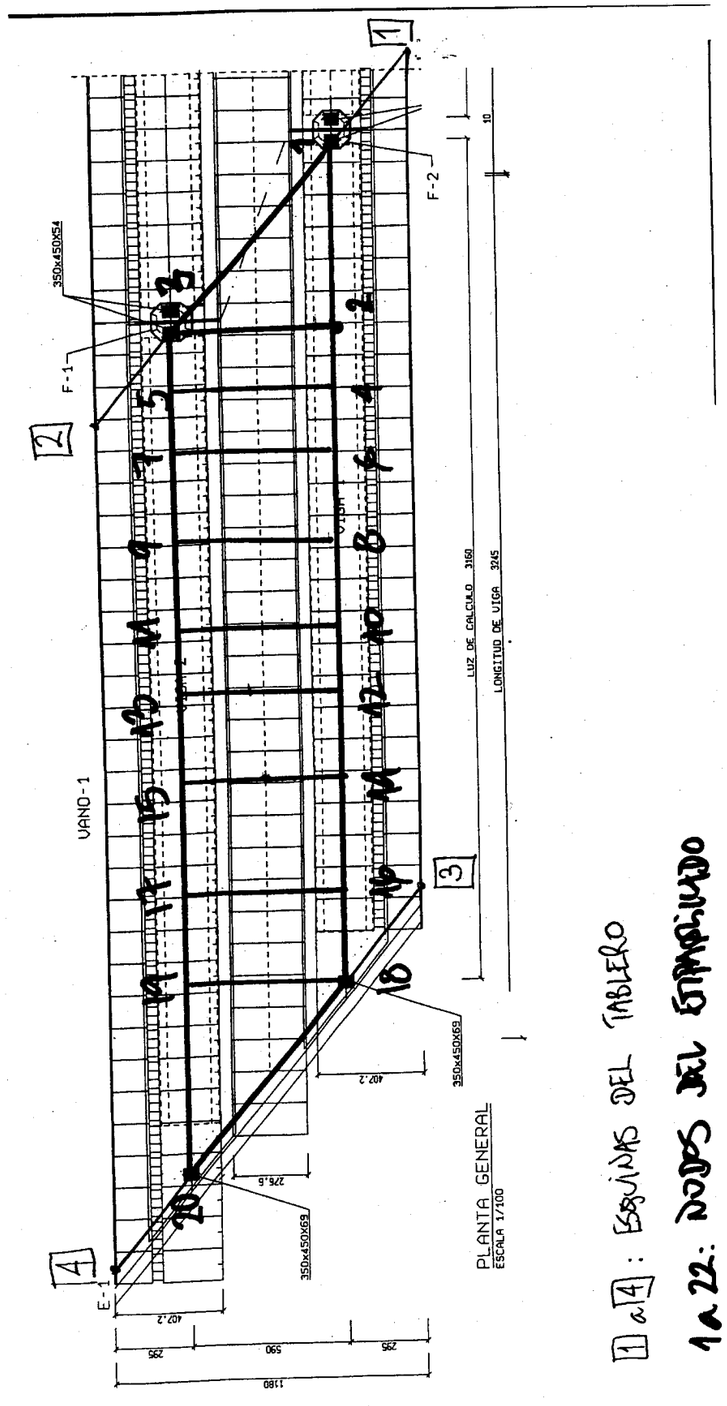
- barras longitudinales: inercias y área correspondientes a la sección compuesta por la sección prefabricada (hormigón HP-45) más el ancho tributario de losa "in situ" (hormigón HA-25)
- barras transversales:
  - para las barras de la línea de apoyo las inercias y área correspondientes al diafragma de la viga cajón más losa "in situ" correspondiente
  - para las barras intermedias las inercias y área correspondientes al canto de la losa de compresión y ancho calculado a partir de las distancias entre barras transversales. Para la obtención de las características mecánicas de estas barras se considera además la losa de fondo de la viga cajón (si es el caso) según la formulación del libro de Julio Martínez Calzón titulado " Secciónes Mixtas Hormigón y Acero" Para información más detallada se recomienda acudir a bibliografía especializada.

Ver en hoja Anexa un esquema de discretización sobre un tablero:

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1 a 4 : Esquinas del tablero

1 a 22: Nodos del emparrillado

El módulo de generación de cargas genera las hipótesis de carga siguientes:
1ª hipótesis : es siempre la de cargas muertas debidas al peso de la superestructura del tablero (aglomerado, cuyo espesor se multiplica por 1.50, aceras, barreras, barandillas e impostas).

Luego se generan tantas hipótesis de carga como vigas tenga el tablero. Estas hipótesis se corresponden con bandas de sobrecarga uniforme de 4.00 kN/m^2 coincidentes con los ejes de vigas que a su vez se convierten en el emparrillado en carga lineal sobre las barras de las vigas.

Para obtener los esfuerzos debidos al vehículo tipo de 600 kN el programa efectúa 3 paseos, uno por cada una de estas líneas: línea dorsal, línea central y línea frontal.
El c.d.g. del vehículo se sitúa a 1.50 m de las líneas de apoyo y en su bisectriz (paseo por línea central) de estas dos. Una vez determinada la línea de paseo el programa establece el ancho de plataforma asociado a esta línea y, por tanto si la hipótesis ha de contemplar 1 ó 2 carros. El paseo se establece separando los c.d.g.del vehículo como máximo 1 m y orienta el carro según la línea que une su c.d.g. con el vértice del ángulo formado por los dos bordes laterales del tablero (centro de abaniqueo)

A partir de las posiciones del c.d.g. el programa reparte las cargas de las ruedas a los nodos adyacentes inversamente proporcional a la distancia de ésta a aquellos.

El resultado del cálculo de esfuerzos es, para cada una de las hipótesis descritas antes, y para cada una de las barras, el valor del Cortante, Flector y Torsor en sus dos nodos.
Habitualmente en la salida de resultados de esfuerzos sólo se muestra la envolvente del cálculo del emparrillado.

En esta envolvente se muestran los esfuerzos siguientes:

- MOMENTOS LONGITUDINALES EN VIGAS:
  - MPPV: Momento Peso Propio Viga
  - MPPL Momento Peso Propio Losa
  - MPM Momento Pesos Muertos
  - MSCU Momento SobreCarga Uniforme
  - MCARRO Momento Vehículo 600 kN
  - MAXSUMCP Momento Máximo Suma de Cargas Permanentes
  - MAXSUMT Momento Máximo Suma de Cargas Total
- MOMENTOS TRANSVERSALES POR METRO DE ANCHO DE LOSA DEBIDO AL EMPARRILLADO: que son los momentos generalizados de cada una de las barras transversales del modelo del emparrillado.
  - MTPM+ Momento Transversal positivo por Cargas Muertas
  - MTPM- Momento Transversal negativo por Cargas Muertas
  - MTSCU+ Momento Transversal positivo por SobreCarga Uniforme
  - MTSCU- Momento Transversal negativo por SobreCarga Uniforme
  - MTCARRO+ Momento Transversal positivo por Vehículo(s) Tipo(s)
  - MTCARRO- Momento Transversal negativo por Vehículo(s) Tipo(s)
  - MTTOT+ Momento Transversal positivo total (suma de positivos)
  - MTTOT- Momento Transversal negativo total (suma de negativos)
- MOMENTOS LOCALIZADOS EN LOSA POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM: que son los momentos localizados de cada una de las barras transversales del modelo del emparrillado.
  - MTLOCSCU+ Mto Transversal positivo por SobreCarga Uniforme
  - MTLOCSCU- Mto Transversal negativo por SobreCarga Uniforme
  - MTLOCCARRO+ Mto Transversal positivo por Vehículo(s) Tipo(s)
  - MTLOCCARRO- Mto Transversal negativo por Vehículo(s) Tipo(s)
  - MTLOCPM+ Mto Transversal positivo por Cargas Muertas

  - MTLOCPM- Mto Transversal positivo por Cargas Muertas
  - MVOLCARRO Momento Transversal positivo total (suma de positivos)
- REACCIONES: que son las reacciones máximas en valor absoluto que se producen en los dos extremos de la viga (Las vigas se numeran de abajo a arriba según el emparrillado)
  - PP Reacción debida a peso propio de viga
  - PL Reacción debida a peso propio de losa
  - CM Reacción debida a cargas muertas
  - SCUP Reacción positiva debida a SobreCarga Uniforme
  - SCUN Reacción negativa debida a SobreCarga Uniforme
  - CARRO+ Reacción positiva debida a Vehículo(s) Tipo(s)
  - CARRO- Reacción negativa debida a Vehículo(s) Tipo(s)

Ver en la página siguiente una salida tipo de la envolvente de esfuerzos.

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Febrero 2001

ARCHIVO DE DATOS GEOMÉTRICOS.... 10540 · T DERECHO
ARCHIVO DE CALCULO..... DEMPAR_jaume

MOMENTOS LONGITUDINALES EN VIGAS (mKN)

VIGA	MPPV	MPPL	MPM	MSCU	MCARRO	MAXSUMCP	MAXSUMT
1	1330.9	1455.0	1915.9	942.62	2356.38	4701.75	8000.75
2	1296.6	2045.8	1114.5	1318.22	2646.89	4456.92	8422.03
3	1296.0	2026.2	821.9	1361.26	2772.80	4144.14	8278.20
4	1250.9	1944.9	1031.3	1283.75	2615.19	4218.42	8096.76
5	1260.8	1351.1	1826.1	885.60	2294.60	4438.03	7618.24

MOMENTOS TRANSVERSALES POR METRO DE ANCHO EN LOSA DEBIDOS AL EMPARRILLADO (mKN /m)

BANDA	MTPM+	MTPM-	MTSCU+	MTSCU-	MTCARRO+	MTCARRO-	MT.TOT+	MT.TOT-
1	2.56	-10.02	6.10	-1.64	10.37	-2.65	6.53	-11.61
2	1.78	-10.59	5.36	-.89	5.26	-.46	2.96	-10.65
3	1.21	-5.88	5.44	-3.93	7.64	-1.25	7.65	-9.07
4	1.88	-6.12	6.32	-4.60	9.07	-4.84	9.38	-11.19
5	3.17	-7.00	7.82	-5.23	10.29	-6.53	12.18	-13.86
6	1.66	-7.35	8.83	-5.91	11.21	-6.68	14.25	-15.98
7	-1.99	-7.46	10.65	-8.41	12.53	-8.47	19.65	-20.62
8	-2.08	-5.92	10.56	-9.27	14.34	-8.53	22.47	-21.63
9	-1.92	-6.95	10.37	-8.39	13.24	-8.43	20.68	-20.68
10	2.12	-6.89	8.69	-5.78	11.74	-6.93	14.96	-15.77
11	4.13	-8.22	7.68	-5.19	10.88	-7.10	13.05	-13.39
12	1.79	-5.62	6.38	-4.37	9.92	-5.29	10.83	-10.52
13	.95	-6.68	4.78	-3.61	8.20	-1.29	9.03	-7.87
14	1.71	-11.17	4.90	-.75	6.01	-.40	2.68	-11.24
15	2.90	-11.76	6.69	-1.94	11.03	-2.75	5.96	-14.90

MOMENTOS LOCALIZADOS EN LOSA/POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM. (mKN /m)

BANDA	MTLOCSCU+	MTLOCSCU-	MTLOCCARRO+	MTLOCCARRO-	MTLOCPM+	MTLOCPM-	MVOLCARRO
1	7.05	-7.69	42.68	-16.26	2.57	-9.78	0.00
2	5.73	-.85	31.32	-13.12	.61	-9.78	0.00
3	4.76	-6.14	31.74	-13.24	3.28	-9.78	0.00
4	5.08	-5.83	32.17	-13.37	2.30	-9.78	0.00
5	5.08	-6.09	32.60	-13.50	2.09	-9.78	0.00
6	5.04	-6.04	32.35	-13.42	2.08	-9.78	0.00
7	4.91	-5.88	31.59	-13.20	2.05	-9.78	0.00
8	4.79	-5.73	30.81	-12.97	2.03	-9.78	0.00
9	4.66	-5.58	30.04	-12.74	2.00	-9.78	0.00
10	4.54	-5.43	29.26	-12.50	1.98	-9.78	0.00
11	4.50	-5.38	29.01	-12.42	1.97	-9.78	0.00
12	4.49	-5.21	28.60	-12.30	2.15	-9.78	0.00
13	4.30	-5.43	28.19	-12.17	3.11	-9.78	0.00
14	5.02	-.85	27.78	-12.04	.26	-9.78	0.00
15	5.88	-6.44	36.88	-14.71	2.30	-9.78	0.00

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REACCIONES (KN)

VIGA	APOYO	PP	PL	CM	SCUP	SCUN	CARRO +	CARRO -
1	1	-184.6	-129.3	-285.8	5.5	-120.8	0.0	-348.5
1	2	-184.6	-129.3	-300.0	17.8	-136.7	0.0	-299.0
2	3	-184.6	-186.2	-145.1	1.3	-195.8	0.0	-488.3
2	4	-184.6	-186.2	-120.0	6.2	-195.4	0.0	-461.8
3	5	-184.6	-186.2	-113.5	5.4	-196.1	0.0	-494.8
3	6	-184.6	-186.2	-111.3	5.0	-191.7	0.0	-454.8
4	7	-184.6	-186.2	-119.9	6.4	-196.4	0.0	-510.2
4	8	-184.6	-186.2	-133.2	1.6	-184.7	0.0	-461.6
5	9	-184.6	-129.3	-290.4	16.8	-131.1	0.0	-317.4
5	10	-184.6	-129.3	-278.4	6.2	-115.3	0.0	-340.5

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

PROYECTO: AVE OLERDOLA U.T.E. · P.S. 5+9 · VANOS 1 Y 3

ARCHIVO: 12000·SO3·VANO1

VIGA: u90

GEOMETRIA DEL TABLERO

ANCHO TOTAL..... 9.00 m ACERA IZQUIERDA. .90 m ACERA DERECHA... .90 m
CANTO LOSA ..... .25 m CANTO ENCOFRADO. .06 m ENTREGA ENCOF... .08 m

No DE VIGAS..... 2
DISTANCIAS DE EJES DE VIGAS EXTREMAS A BORDE DE TABLERO:
IZQUIERDO... 2.03 m DERECHO... 2.03 m

VIGA: 1
LUZ DE CALCULO.. 13.73 m SITUACION VIGA.. 0.00 m CANTO VIGA..... .90 m
LONGITUD VIGA... 14.33 m

VIGA: 2
LUZ DE CALCULO.. 13.73 m SITUACION VIGA.. 4.95 m CANTO VIGA..... .90 m
LONGITUD VIGA... 14.33 m

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

SECCION VIGA SIMPLE

Trapecio	Base inferior	Base superior	Altura
INF.No. 1	1.760	1.808	.020
No. 2	1.808	1.896	.220
No. 3	.400	.300	.050
No. 4	.300	.300	.290
No. 5	.300	.538	.120
No. 6	.538	1.168	.130
SUP.No. 7	1.168	1.140	.070

CARACTERISTICAS MECANICAS SECCION SIMPLE

Area = .7896 m2
Ysup = .5401 m
Yinf = .3599 m
Canto= .9000 m

Inercia= .07251731 m4
Wsup = .13427342 m3
Winf = .20147726 m3

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NORMA EHE

TIPO DE AMBIENTE

Clase de exposición: IIa,IIb / H
Descripción: Interiores con condensación y exteriores sin cloruros / Hielo

CARACTERISTICAS MATERIALES

Propiedades Tecnológicas		Datos para Proyecto		Coef. E.L.U.
Hormigón en losa:	HA-25/F/20/(IIa,IIb,H)	Fckl =	25 N/mm2	1.50
Hormigón en viga:	HP-45/F/20/(IIIa,IIIb,IV,F)	Fck =	45 N/mm2	1.50
Acero pasivo:	BS 500	Fyk =	500 N/mm2	1.15
Acero activo:	UNE 36094-1997 Y 1860 S7 15.2	Fyk =	1640 N/mm2	1.15
	Area: 140 mm2	Fmaxx =	1860 N/mm2	
	Diametro: 0.6''			

ACCIONES

Coeficientes Parciales de Seguridad:	E.L.U.	E.L.S.
Permanentes:	1.35	1.00
Variables:	1.50	1.00
Pretensado:	1.00	1.00

Coeficientes de Combinación

Combinación Cuasipermanente:	Psi2= .2
Combinación Frecuente:	Psi1= .5
Combinación Característica o Rara:	Psi0= .6

E.L.S. DE FISURACIÓN

Tensiones admisibles:

Combinación de acciones	Comp. losa (N/mm2)	Trac. viga (N/mm2)	Comp. viga (N/mm2)
Pretensar:		1.50	23.33
Sobrecarga Cuasipermanente:	15.00	0.00	27.00
Sobrecarga Frecuente:	15.00	2.66	27.00
Sobrecarga Rara:	15.00	3.80	27.00

Abertura máxima de fisuras (mm): 0.2

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ESTADO DE CARGAS

NORMA IAP (INSTRUCCCIÓN DE ACCIONES EN PUENTES DE CARRETERA)

Pesos propios:	Peso Propio Viga	=	19.74 KN/m
	Peso Propio Losa	=	6.25 KN/m2
Cargas muertas:	Peso de Aceras	=	5.00 KN/m2
	Peso Barandillas	=	10.00 KN/m
	Peso Aglomerado (Inferior)	=	1.92 KN/m2
	Peso Aglomerado (Superior)	=	2.88 KN/m2
Sobrecargas:	Sobrec. uniforme	=	4.00 KN/m2
	Peso total carro	=	600.00 KN
	Número de carros	=	1

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GENERACION DE DATOS DE UN EMPARRILLADO

COORDENADAS DE LAS ESQUINAS

Esquina	X	Y
1	13.725	0.000
2	13.725	9.000
3	0.000	0.000
4	0.000	9.000

NUMERO DE VIGAS= 2

VUELOS IZQUIERDO Y DERECHO 2.025 2.025

NUMERO DE BARRAS TRANSVERSALES COMPLETAS= 9

BARRAS TRASVERSALES PARALELAS A 0 0 0 1

COORDENADAS DE LOS NUDOS

NUDO	X	Y
1	13.725	2.025
2	13.725	6.975
3	12.863	2.025
4	12.863	6.975
5	10.863	2.025
6	10.863	6.975
7	8.863	2.025
8	8.863	6.975
9	6.863	2.025
10	6.863	6.975
11	4.863	2.025
12	4.863	6.975
13	2.863	2.025
14	2.863	6.975
15	.863	2.025
16	.863	6.975
17	0.000	2.025
18	0.000	6.975

NUDOS APOYADOS
1 17 2 18

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DATOS DE LAS BARRAS

BARRA	N.ORI	N.FIN	ANCHO LOSA (m.)	ANCHO DCHO (m.)	ANCHO IZDO (m.)	INER FLEXION (m4)	INER TORSION (m4)
1	1	3	4.50000	2.47500	2.02500	.25922	.36940
2	3	5	4.50000	2.47500	2.02500	.26074	.36940
3	5	7	4.50000	2.47500	2.02500	.26074	.36940
4	7	9	4.50000	2.47500	2.02500	.26074	.36940
5	9	11	4.50000	2.47500	2.02500	.26074	.36940
6	11	13	4.50000	2.47500	2.02500	.26074	.36940
7	13	15	4.50000	2.47500	2.02500	.26074	.36940
8	15	17	4.50000	2.47500	2.02500	.26074	.36940
9	2	4	4.50000	2.02500	2.47500	.26074	.36940
10	4	6	4.50000	2.02500	2.47500	.26074	.36940
11	6	8	4.50000	2.02500	2.47500	.26074	.36940
12	8	10	4.50000	2.02500	2.47500	.26074	.36940
13	10	12	4.50000	2.02500	2.47500	.26074	.36940
14	12	14	4.50000	2.02500	2.47500	.26074	.36940
15	14	16	4.50000	2.02500	2.47500	.26074	.36940
16	16	18	4.50000	2.02500	2.47500	.26074	.36940
17	1	2	.43125	0.00000	.43125	.00131	.00041
18	3	4	1.43125	.43125	1.00000	.00433	.00135
19	5	6	2.00000	1.00000	1.00000	.00606	.00188
20	7	8	2.00000	1.00000	1.00000	.00606	.00188
21	9	10	2.00000	1.00000	1.00000	.00606	.00188
22	11	12	2.00000	1.00000	1.00000	.00606	.00188
23	13	14	2.00000	1.00000	1.00000	.00606	.00188
24	15	16	1.43125	1.00000	.43125	.00433	.00135
25	17	18	.43125	.43125	0.00000	.00131	.00041

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G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE LA LÍNEA MEDIA DEL TABLERO

HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
4	6.863	2.400
5	6.863	3.240
6	6.863	4.080
7	6.863	4.920
8	6.863	5.760
9	6.863	6.600

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G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE EL EXTREMO DORSAL DEL TABLERO

HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
10	12.225	2.400
11	12.225	3.240
12	12.225	4.080
13	12.225	4.920
14	12.225	5.760
15	12.225	6.600

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE EL EXTREMO FRONTAL DEL TABLERO

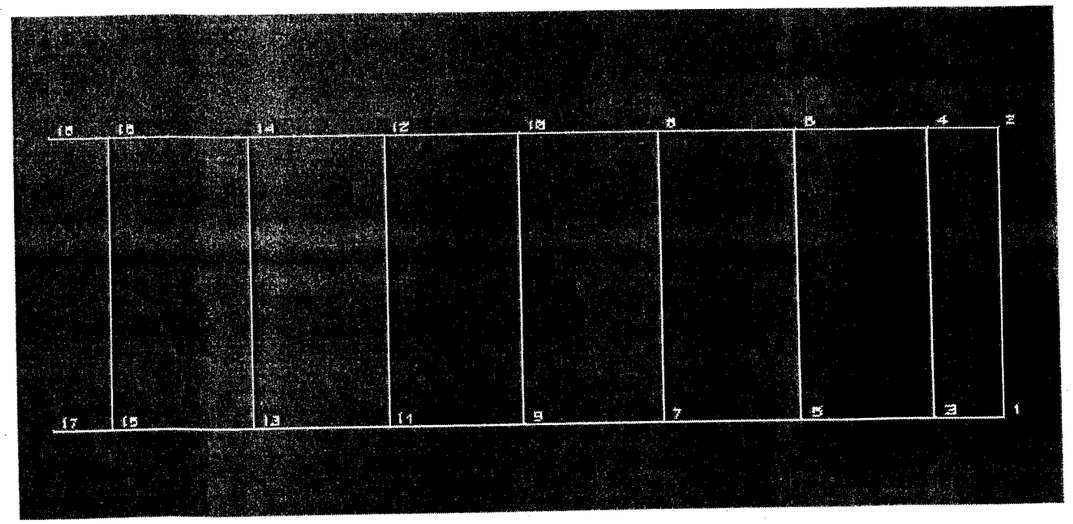
HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
16	1.500	2.400
17	1.500	3.240
18	1.500	4.080
19	1.500	4.920
20	1.500	5.760
21	1.500	6.600

EMPARRILLADO PLANO



* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

ARCHIVO DE DATOS GEOMÉTRICOS.... 12000·SO3·VANO1
ARCHIVO DE CALCULO..... DEMPAR_JGIRONELLA

MOMENTOS LONGITUDINALES EN VIGAS (mKN)

VIGA	MPPV	MPPL	MPM	MSCU	MCARRO	MAXSUMCP	MAXSUMT
1	464.8	662.3	585.6	423.85	1443.05	1712.62	3579.52
2	464.8	662.3	585.6	423.85	1443.06	1712.62	3579.52

MOMENTOS TRANSVERSALES POR METRO DE ANCHO EN LOSA DEBIDOS AL EMPARRILLADO (mKN /m)

BANDA	MTPM+	MTPM-	MTSCU+	MTSCU-	MTCARRO+	MTCARRO-	MT.TOT+	MT.TOT-
1	-20.34	-20.34	10.66	-6.61	29.58	-29.58	19.90	-56.53
2	-20.34	-20.34	7.04	-2.99	19.89	-19.89	6.59	-43.22
3	-20.34	-20.34	4.05	0.00	1.58	-1.58	0.00	-21.91
4	-20.34	-20.34	8.47	-4.42	12.57	-12.57	.70	-37.33
5	-20.34	-20.34	10.00	-5.95	17.45	-17.45	7.11	-43.74
6	-20.34	-20.34	8.47	-4.42	12.57	-12.57	.70	-37.33
7	-20.34	-20.34	4.05	0.00	1.57	-1.57	0.00	-21.91
8	-20.34	-20.34	7.04	-2.99	19.89	-19.89	6.59	-43.22
9	-20.34	-20.34	10.66	-6.61	29.58	-29.58	19.90	-56.53

MOMENTOS LOCALIZADOS EN LOSA/POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM. (mKN /m)

BANDA	MTLOCSCU+	MTLOCSCU-	MTLOCCARRO+	MTLOCCARRO-	MTLOCPM+	MTLOCPM-	MVOLCARRO
1	0.00	-1.43	16.93	-9.97	.51	-1.03	0.00
2	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
3	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
4	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
5	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
6	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
7	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
8	1.75	-2.14	17.01	-9.98	2.76	-12.27	0.00
9	0.00	-1.43	16.93	-9.97	.51	-1.03	0.00

TORSORES

VIGA 1	(mKN)		(KN)		(MKN)	
NUDO	TMIN	TMAX	VTMIN	VTMAX	MTMIN	MTMAX
1.0	24.4	-8.6	536.7	228.10	.73	.7
3.0	41.3	-30.8	485.4	221.06	445.06	189.4
5.0	56.6	-56.6	400.7	170.28	1327.48	584.4
7.0	40.4	-40.4	223.3	88.98	2040.93	877.3
9.0	5.6	-5.6	16.4	65.90	705.32	1409.9
11.0	40.4	-40.4	120.5	314.92	877.33	2040.9
13.0	56.6	-56.6	171.3	399.62	584.36	1327.5
15.0	30.8	-41.3	206.7	499.76	189.42	445.1
17.0	8.6	-24.4	228.1	536.73	.73	-.7

VIGA 2	(mKN)		(KN)		(MKN)	
NUDO	TMIN	TMAX	VTMIN	VTMAX	MTMIN	MTMAX
2.0	8.6	-24.4	228.1	536.73	.73	.7
4.0	30.8	-41.3	221.1	485.36	189.42	445.1
6.0	56.6	-56.6	170.3	400.66	584.36	1327.5
8.0	40.4	-40.4	89.0	223.32	877.33	2040.9
10.0	5.6	-5.6	59.5	22.80	986.02	1129.2
12.0	40.4	-40.4	314.9	120.55	2040.93	877.3
14.0	56.6	-56.6	399.6	171.32	1327.48	584.4
16.0	41.3	-30.8	499.8	206.66	445.06	189.4
18.0	24.4	-8.6	536.7	228.10	-.73	.7

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		REACCIONES (KN)						
VIGA	APOYO	PP	PL	CM	SCUP	SCUN	CARRO +	CARRO -
1	1	-135.5	-193.0	-170.7	0.0	-123.5	0.0	-445.6
1	2	-135.5	-193.0	-170.7	0.0	-123.5	0.0	-445.6
2	3	-135.5	-193.0	-170.7	0.0	-123.5	0.0	-445.6
2	4	-135.5	-193.0	-170.7	0.0	-123.5	0.0	-445.6

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ANEXO A.2. DIMENSIONAMIENTO DE VIGAS

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CALCULO Y REPARTO DE MOMENTOS FLECTORES LONGITUDINALES

VIGA 1 (viga extrema izquierda)

Momento peso propio viga =	464.799mKN		
Momento peso propio losa =	662.258mKN		
Momento pesos muertos =	585.565mKN	Momento total permanentes=	1712.62mKN
Momento sobrecarga unif. =	423.845mKN	Momento total sobrecargas=	1866.90mKN
Momento sob. punt. (carro)=	1443.055mKN	Momento maximo total=	3579.52mKN

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ESTADOS LIMITE DE SERVICIO

ESTADO LIMITE DE FISURACIÓN. VIGA EXTREMA IZQUIERDA

CÁLCULO DE TENSIONES

Fuerza en Bancada:	4588.500 KN	
Altura del Pretensado:	.190 m	
Pérdidas Instantáneas:	241.450 KN	(5.26%)
Pérdidas Totales:	824.724 KN	(17.97%)

Tensiones (N/mm2) al Pretensar en Secciones:
De Apoyo (Cables entubados) A 0 m. (Todos los cables)

Fibra superior:	-.013	Fibra superior	-.013
Fibra inferior:	9.004	Fibra inferior	9.004

Tensiones (N/mm2) en Sección Central al colocar Losa

Fibra superior:	8.029
Fibra inferior:	3.446

Tensiones (N/mm2) en Sección Central con Cargas Muertas

Fibra superior losa:	1.000
Fibra superior viga:	8.463
Fibra inferior viga:	1.842

Tensiones (N/mm2) en Sección Central con Cargas Muertas para Tiempo Infinito

Fibra superior losa:	1.085
Fibra superior viga:	8.381
Fibra inferior viga:	1.158

Tensiones (N/mm2) en Sección Central con Sobrec. Cuasipermanentes para Tiempo Infinito

Fibra superior losa:	1.716
Fibra superior viga:	8.663
Fibra inferior viga:	.185

Tensiones (N/mm2) en Sección Central con Sobrecargas Frecuentes para Tiempo Infinito

Fibra superior losa:	2.663
Fibra superior viga:	9.087
Fibra inferior viga:	-1.274

Tensiones (N/mm2) en Sección Central con Sobrecargas Raras para Tiempo Infinito

Fibra superior losa:	4.240
Fibra superior viga:	9.793
Fibra inferior viga:	-3.707

ESTADO LIMITE DE FISURACION

MÁXIMA ABERTURA DE FISURA (Wmax = .20 mm)

Sección X (m)	% Pretensado	M3 (mKN)	Mtotal (mKN)	Area pas inf (cm2)
6	100	5515.026	3456.448	0.00
5	100	5503.835	3274.860	0.00

4	100	5488.493	2944.828	0.00
3	100	5466.499	2452.326	0.00
2	100	5437.662	1797.354	0.00
1	100	5401.829	979.912	0.00

ESTADO LIMITE DE DEFORMACION

CALCULO DE FLECHAS

Inicial (Al Cortar Cables)= -.39 cm Al Hormigonar Losa= .01 cm
Incremento por Sobrecargas= .34 cm

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ESTADOS LIMITE ULTIMOS

CALCULO DE ARM DE REFUERZO POR ROTURA A FLEXION: VIGA EXTREMA 1

SECCION VIGA COMPUESTA:

TRAPECIO N.	BASES INF. m	BASES SUP. m	ORDENADAS INF. m	ORDENADAS SUP. m	RESISTENCIA DE CALCULO N/mm2
1	1.760	1.808	0.000	.020	30
2	1.808	1.896	.020	.240	30
3	.400	.300	.240	.290	30
4	.300	.300	.290	.580	30
5	.300	.538	.580	.700	30
6	.538	1.168	.700	.830	30
7	1.168	1.140	.830	.900	30
8	.900	.900	.900	.960	17
9	4.500	4.500	.960	1.150	17

ARMADURA ACTIVA:

SUPERFICIE cm2	ORDENADA m	LIM.ELAS. DE CALC. N/mm2	MODULO ELASTICO N/mm2	DEFORM. EN DESCOMP. o/oo	COEFICIENTE EN COMPR.
26.60	.050	1455	193800	.2044	1.00
0.00	.100	1455	193800	.2044	1.00
0.00	.150	1455	193800	.2044	1.00
5.60	.855	1455	193800	.2044	1.00

ARMADURA PASIVA:

SUPERFICIE cm2	ORDENADA m	LIM.ELAS. DE CALC. N/mm2	MODULO ELASTICO N/mm2	COEFICIENTE EN COMPR.
0.00	.050	443	204000	1.00
4.53	.050	443	204000	1.00
6.04	.210	443	204000	1.00
2.01	.380	443	204000	1.00
2.01	.580	443	204000	1.00
1.01	.740	443	204000	1.00
1.01	.810	443	204000	1.00
12.06	.870	443	204000	1.00
0.00	.850	443	204000	1.00
ADICIONAL	.030	443	204000	1.00

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DEFORMACIONES LIMITE:

ORDENADA:

Sup.= 3.50000 o/oo Y= 1.150 m
Inf.= 10.00000 o/oo Y= .035 m
Med.= 2.00000 o/oo

ESTADO LÍMITE ÚLTIMO DE ROTURA A FLEXIÓN (CON ARM DE REFUERZO ADICIONAL)

DEFORMACIONES:

Sup.= 1.42146 o/oo
Inf.= 10.00000 o/oo

ESFUERZOS:

Nu= .03 KN
Mu= 5132.71 mKN
Md= 1.35* 1712.62+ 1.50* 1866.90= 5112.39 mKN

Condición de Rotura (E.L.U.): Mu > Md
5132.71 mKN > 5112.39 mKN

ARMADURA ADICIONAL DE REFUERZO DISPUESTA:

AREA : 7.000 cm2 - 2 m A CADA LADO DEL EJE DE LA VIGA (sin anclaje)

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CALCULO DE ARMADURA TRANSVERSAL PARA ESFUERZO CORTANTE

EN VIGA Y RASANTE EN UNION VIGA-LOSA. (EHE)

CARACTERISTICAS GENERALES :

VIGA: 1
Fyd : 400 N/mm2
Fct,d (mín.) : 1.2 N/mm2
Espesor alma de viga: .30 m
Ancho ala sup. viga : 1.14 m

Xi (Coef.geométrico): 1.423
A90 mínimo cortante : 4.412 cm2/m
A90 mínimo rasante : 10.070 cm2/m
Coeficiente ß : 0.4 (rugosidad alta)
Coeficiente μ : 0.9 (rugosidad alta)

***ZONA 1 (SECCION A 0.000 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	135.461	193.008	170.657	123.525	445.561
M(mKN)	0.000	0.000	0.000	0.000	0.000

CORTANTE VIGA :

Vd : 1527.448 KN
Sigma'c,d : .473 N/mm2
Y crítica : .675 m
Cotg. Theta : 1.061
Ro 1 : .020
Vu1 : 3018.791 KN
Vcu : 238.114 KN
A90 necesaria máxima: 29.562 cm2/m

RASANTE VIGA-LOSA :

Vd : 1084.015 KN
Tau md : 1091.605 KN/m2
Tau admisible : 1544.782 KN/m2

Cap. mec. rasante : 721.756 KN
Cap. mec. cortante : 1255.498 KN
Cap. mec. suplement.: 0.000 KN
A90 rasante nec. : 0.000 cm2/m

ARMADURA EN CADA ALMA:
Diámetro (mm) : 10 + 10
Separación : 0.20 m
A90 cortante real : 15.700 cm2/m

Diámetro (mm) : 0
Separacion : 0.00 m
A90 rasante real : 0.000 cm2/m

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***ZONA 2 (SECCION A .800 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	119.669	170.508	150.762	109.545	416.403
M(mKN)	102.052	145.406	128.568	87.636	333.123

CORTANTE VIGA :

Vd	:	1384.190 KN
Sigma'c,d	:	3.215 N/mm2
Y crítica	:	.675 m
Cotg. Theta	:	1.359
Ro 1	:	.020
Vu1	:	2887.029 KN
Vcu	:	376.328 KN
A90 necesaria máxima	:	18.031 cm2/m

RASANTE VIGA-LOSA :

Vd	:	992.451 KN
Tau md	:	999.443 KN/m2
Tau admisible	:	1161.841 KN/m2
Cap. mec. rasante	:	613.210 KN
Cap. mec. cortante	:	804.478 KN
Cap. mec. suplement.	:	0.000 KN
A90 rasante nec.	:	0.000 cm2/m

ARMADURA EN CADA ALMA:

Diámetro (mm)	:	8 + 8
Separación	:	0.20 m
A90 cortante real	:	10.060 cm2/m
Diámetro (mm)	:	0
Separacion	:	0.00 m
A90 rasante real	:	0.000 cm2/m

***ZONA 3 (SECCION A 2.100 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	94.008	133.945	118.434	88.617	369.023
M(mKN)	240.942	343.301	303.545	186.095	774.947

CORTANTE VIGA :

Vd	:	1154.082 KN
Sigma'c,d	:	5.154 N/mm2
Y crítica	:	.360 m
Cotg. Theta	:	1.276
Ro 1	:	.020
Vu1	:	2936.470 KN
Vcu	:	474.008 KN
A90 necesaria máxima	:	15.624 cm2/m

RASANTE VIGA-LOSA :

Vd	:	846.345 KN
Tau md	:	852.389 KN/m2
Tau admisible	:	1011.788 KN/m2
Cap. mec. rasante	:	440.013 KN
Cap. mec. cortante	:	627.749 KN
Cap. mec. suplement.	:	0.000 KN
A90 rasante nec.	:	0.000 cm2/m

ARMADURA EN CADA ALMA:

Diámetro (mm)	:	10
Separación	:	0.20 m
A90 cortante real	:	7.850 cm2/m
Diámetro (mm)	:	0
Separacion	:	0.00 m
A90 rasante real	:	0.000 cm2/m

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***ZONA 4 (SECCION A 4.600 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	44.660	63.633	56.264	54.600	277.906
M(mKN)	414.278	590.273	521.918	251.162	1278.367

CORTANTE VIGA :

Vd	:	720.911 KN
Sigma'c,d	:	7.572 N/mm2
Y crítica	:	.360 m
Cotg. Theta	:	1.133
Ro 1	:	.020
Vu1	:	3000.531 KN
Vcu	:	595.912 KN
A90 necesaria máxima	:	9.706 cm2/m

RASANTE VIGA-LOSA :

Vd	:	574.716 KN
Tau md	:	579.013 KN/m2
Tau admisible	:	820.656 KN/m2
Cap. mec. rasante	:	402.639 KN
Cap. mec. cortante	:	402.239 KN
Cap. mec. suplement.	:	.400 KN
A90 rasante nec.	:	.010 cm2/m

ARMADURA EN CADA ALMA:

Diámetro (mm)	:	8
Separación	:	0.20 m
A90 cortante real	:	5.030 cm2/m
Diámetro (mm)	:	8
Separacion	:	0.20 m
A90 rasante real	:	5.030 cm2/m

PROGRAMA : DIAFRAGME.EHE *** PRAINSA ***

FECHA : 22.01.2004

NOMBRE DEL PROYECTO : 12000·SO3·VANOS 1 Y 3

NORMA DE MATERIALES : EHE

CANTO DE LA VIGA : .90 m.

REACCION MAXIMA : 1095.000 KN

ANGULO DE ESVIAJE : 0.000 g

ANCHO DIAFRAGMA : .500 m.

DIMENSION MAYOR DEL NEOPRENO UTILIZADO : 400 mm.

	Md (mKN)	As (cm2)	As2 (cm2)
* ARMADURA LONGITUDINAL SUPERIOR	813.0	23.6	0.0

	Vd (KN)	Aq (cm2/m)
* CERCOS TRANVERSALES	821.3	19.2

	As (cm2)
* ARM. LONG. INF. CARGA SOBRE MACIZO	7.6

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RESUMEN DE ARMADO. VIGA: u90

HORMIGON:

RESISTENCIA CARACTERISTICA A 28 DIAS: 45 N/mm2
RESISTENCIA INICIAL AL CORTAR CABLES: 35 N/mm2

PRETENSADO:VIGA - 1

TENSION DE PRETENSADO DE LOS CABLES: 1425 N/mm2
FUERZA TOTAL DE PRETENSADO EN BANCADA: 4588.500 KN

FILA	No. DE CORDONES	DIAMETRO (Pulgadas)	ALTURA FILA (m)
1	19	.600	.050
2	0	0.000	0.000
3	0	0.000	0.000
4	4	.600	.855

ARMADURA PASIVA:

LIMITE ELASTICO ACERO: 500 N/mm2

PLANTILLA 1 EN ALMA:
(Los asteriscos indican la zona que necesita refuerzo en ala)
(2 d 10 a 20 cms. en 1.70m./ 20 Ud.) (2 d 8 a 20 cms en 1.30m./ 13 Ud.)
(1 d 10 a 20 cms. en 2.50m./ 25 Ud.) (1 d 8 a 20 cms. en 1.66m./ 16 Ud.)(*)

REFUERZO COSIDO ALA :

(1 d 8 a 20 cms. en 1.66m./ 16 Ud.)(*)

PLANTILLAS 2, 3 y 4: 1 d 5 a 20 cms. MISMA SECUENCIA QUE PLANTILLA 1
No. DE PIEZAS DE CADA UNA: 74

REFUERZO POR ROTURA A FLEXION: 2 barras de 25mm. de diametro en 5.3 m

DATOS PARA TRANSPORTE:

PESO DE LA VIGA: 28.28 Tn LONGITUD TOTAL: 14.33m.

ANEXO A.3. DIMENSIONAMIENTO DE ARMADO DE LOSA

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Fecha:

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    MOMENTOS TRANSVERSALES EN LOSA

BANDA TRANSVERSAL.............:  1

    MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 29.58  mKN
MOMENTO NEGATIVO=-29.58  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 10.66  mKN
MOMENTO NEGATIVO=-6.61   mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

    MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)
MOMENTO POSITIVO= 16.93  mKN
MOMENTO NEGATIVO=-9.97   mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 0  mKN
MOMENTO NEGATIVO=-1.43   mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= .51  mKN
MOMENTO NEGATIVO=-1.03   mKN

      MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 37.34  mKN
MOMENTO TORSOR ASOCIADO= 1.7  mKN
MOMENTO NEGATIVO TOTAL =-68.95  mKN
MOMENTO TORSOR ASOCIADO=-1.7  mKN

      CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 348.78  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 555.88  KN
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BANDA TRANSVERSAL.............:  2

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 19.89  mKN
MOMENTO NEGATIVO=-19.89  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 7.04  mKN
MOMENTO NEGATIVO=-2.99  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76  mKN
MOMENTO NEGATIVO=-12.27  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 28.12  mKN
MOMENTO TORSOR ASOCIADO= 1.67  mKN
MOMENTO NEGATIVO TOTAL =-67.62  mKN
MOMENTO TORSOR ASOCIADO=-1.67  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 259.08  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 534.05  KN
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BANDA TRANSVERSAL.............:  3

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 1.58  mKN
MOMENTO NEGATIVO=-1.58  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 4.05  mKN
MOMENTO NEGATIVO= 0  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76  mKN
MOMENTO NEGATIVO=-12.27  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 21.53  mKN
MOMENTO TORSOR ASOCIADO= 0  mKN
MOMENTO NEGATIVO TOTAL =-46.31  mKN
MOMENTO TORSOR ASOCIADO=-1.36  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 183.71  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 352.64  KN
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-------------------------------------------------------------------------------

BANDA TRANSVERSAL.............:  4

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 12.57  mKN
MOMENTO NEGATIVO=-12.57  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 8.47  mKN
MOMENTO NEGATIVO=-4.42  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76  mKN
MOMENTO NEGATIVO=-12.27  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 22.23  mKN
MOMENTO TORSOR ASOCIADO= .78  mKN
MOMENTO NEGATIVO TOTAL =-61.72  mKN
MOMENTO TORSOR ASOCIADO=-.78  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 197.03  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 475.72  KN
```



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-------------------------------------------------------------------------------

BANDA TRANSVERSAL.............:  5

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.45  mKN
MOMENTO NEGATIVO=-17.45  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 10  mKN
MOMENTO NEGATIVO=-5.95  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76  mKN
MOMENTO NEGATIVO=-12.27  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 28.64  mKN
MOMENTO TORSOR ASOCIADO= .09  mKN
MOMENTO NEGATIVO TOTAL =-68.13  mKN
MOMENTO TORSOR ASOCIADO=-.09  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 249.24  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 524.81  KN
```

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  * * * P R A I N S A * * *  Programa EMPAR21  * * *  Version:        Julio 2003
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BANDA TRANSVERSAL.....: 6

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 12.57 mKN
MOMENTO NEGATIVO=-12.57 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 8.47 mKN
MOMENTO NEGATIVO=-4.42 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34 mKN
MOMENTO NEGATIVO=-20.34 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01 mKN
MOMENTO NEGATIVO=-9.98 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75 mKN
MOMENTO NEGATIVO=-2.14 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76 mKN
MOMENTO NEGATIVO=-12.27 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 22.23 mKN
MOMENTO TORSOR ASOCIADO= .78 mKN
MOMENTO NEGATIVO TOTAL =-61.72 mKN
MOMENTO TORSOR ASOCIADO=-.78 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 197.03 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 475.72 KN


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BANDA TRANSVERSAL.....: 7

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 1.57 mKN
MOMENTO NEGATIVO=-1.57 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 4.05 mKN
MOMENTO NEGATIVO= 0 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34 mKN
MOMENTO NEGATIVO=-20.34 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01 mKN
MOMENTO NEGATIVO=-9.98 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75 mKN
MOMENTO NEGATIVO=-2.14 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76 mKN
MOMENTO NEGATIVO=-12.27 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 21.53 mKN
MOMENTO TORSOR ASOCIADO= 0 mKN
MOMENTO NEGATIVO TOTAL =-46.31 mKN
MOMENTO TORSOR ASOCIADO=-1.36 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 183.71 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 352.64 KN

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BANDA TRANSVERSAL.............:  8

    MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 19.89  mKN
MOMENTO NEGATIVO=-19.89  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 7.04  mKN
MOMENTO NEGATIVO=-2.99  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

    MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.76  mKN
MOMENTO NEGATIVO=-12.27  mKN

       MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 28.12  mKN
MOMENTO TORSOR ASOCIADO= 1.67  mKN
MOMENTO NEGATIVO TOTAL =-67.62  mKN
MOMENTO TORSOR ASOCIADO=-1.67  mKN

       CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 259.08  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 534.05  KN
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---------------------------------------------------------------------------

BANDA TRANSVERSAL.............:  9

    MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 29.58  mKN
MOMENTO NEGATIVO=-29.58  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 10.66  mKN
MOMENTO NEGATIVO=-6.61  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-20.34  mKN
MOMENTO NEGATIVO=-20.34  mKN

    MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 16.93  mKN
MOMENTO NEGATIVO=-9.97  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 0  mKN
MOMENTO NEGATIVO=-1.43  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= .51  mKN
MOMENTO NEGATIVO=-1.03  mKN

       MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 37.34  mKN
MOMENTO TORSOR ASOCIADO= 1.7  mKN
MOMENTO NEGATIVO TOTAL =-68.95  mKN
MOMENTO TORSOR ASOCIADO=-1.7  mKN

       CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 348.77  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 555.88  KN
```

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ARMADURAS EN LOSA	CAP.MEC.NEC.	ARM. TRANSV.	ARM. LONGIT.	PESO
BANDA: 1				
INFERIOR	348.78 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
SUPERIOR	555.88 KN	7 Ø 16 pml	5 Ø 10 pml	14.1600 Kg/m2
BANDA: 2				
INFERIOR	259.08 KN	8 Ø 10 pml	4 Ø 8 pml	6.5600 Kg/m2
SUPERIOR	534.05 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
BANDA: 3				
INFERIOR	183.71 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	352.64 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
BANDA: 4				
INFERIOR	197.03 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	475.72 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
BANDA: 5				
INFERIOR	249.24 KN	8 Ø 10 pml	4 Ø 8 pml	6.5600 Kg/m2
SUPERIOR	524.81 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
BANDA: 6				
INFERIOR	197.03 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	475.72 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
BANDA: 7				
INFERIOR	183.71 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	352.64 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
BANDA: 8				
INFERIOR	259.08 KN	8 Ø 10 pml	4 Ø 8 pml	6.5600 Kg/m2
SUPERIOR	534.05 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
BANDA: 9				
INFERIOR	348.77 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
SUPERIOR	555.88 KN	7 Ø 16 pml	5 Ø 10 pml	14.1600 Kg/m2

ANEXO A.4. CÁLCULO DE LA PRUEBA DE CARGA

El vehículo tipo a utilizar es el que se especifica en el Anexo 6.1.

El tablero se modeliza mediante el método del emparrillado plano para estudiar su comportamiento resistente.

En el Anexo 4.2 se indica la geometría del tablero y el sistema de coordenadas utilizado, y su discretización en barras.

La hipótesis de carga considerada se corresponde con los vehículos dispuestos tal como se indica en el Anexo 4.3.

Los máximos esfuerzos previstos para cada barra del emparrillado en esta hipótesis se expresan en el Anexo 4.4.

El momento máximo resultante es de 1003 mxkN, lo que representa un porcentaje del 54% del momento por sobrecargas (1867 mxkN) que se considera aceptable.

2.- DEFORMACIONES PREVISTAS

La máxima deformación prevista es de 3 mm. (Ver Anexo nº 4.4).

3.- TOMA DE DATOS

La toma de datos se efectuará al menos en tres vigas, en el centro de su luz libre y en los apoyos. Se elegirán preferentemente la del centro y las de borde.

Se dispondrán al efecto flexímetros accionados directamente por la viga o por un peso suspendido de ésta, mediante un hilo indeformable y de baja dilatación térmica. Se recomienda complementar la observación con una estación fija de nivelación óptica.

La flecha final residual, para un solo ciclo de carga, deberá ser inferior al quinto de la máxima alcanzada, en cada viga.

4.- CONCLUSION

Finalizada la prueba de carga se redactará un acta conteniendo los siguientes puntos:

- Datos generales (personas, organismos o empresas asistentes, fecha y clave del proyecto)
- Descripción de la obra (características del puente objeto de la prueba)
- Estado previo (estado de la estructura y medios para la prueba)
- Tren de cargas (ver Anexo 3)
- Aparatos de medida (características de los empleados en la prueba de carga)
- Condiciones climatológicas.
- Puntos de referencia (puntos fijos de observación de la prueba de carga)

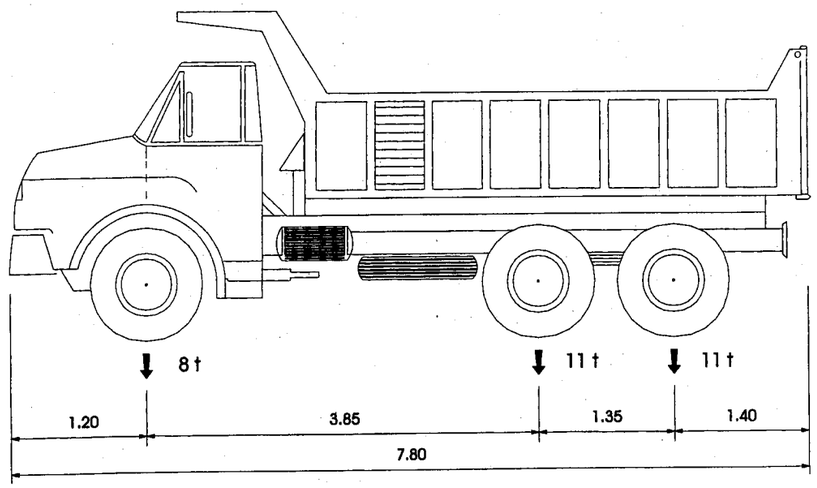
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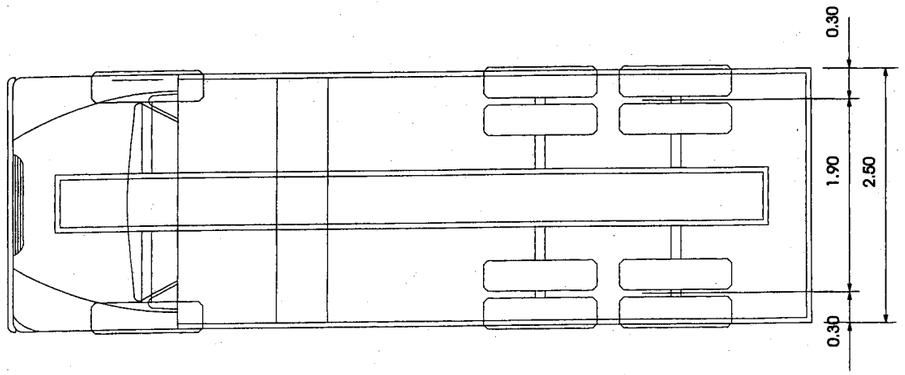
Fecha:

ANEXO A.4.1 : VEHICULO TIPO

VEHICULO DE 3 EJES (DUMPER)



CARGAS POR EJES



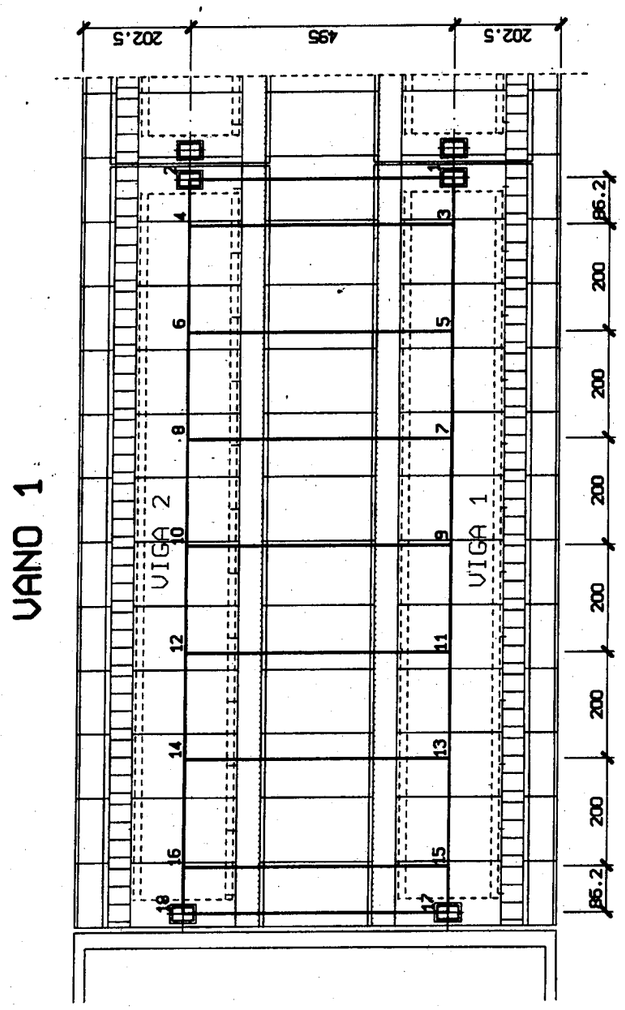
CARGA TOTAL: 30 t

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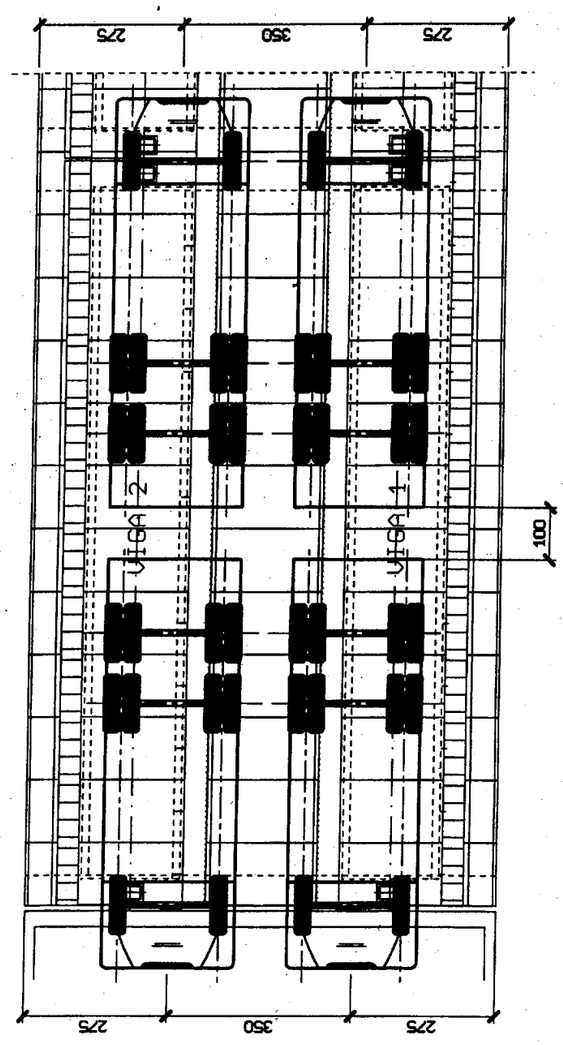
Fecha:

ANEXO A.4.2: DISCRETIZACION DEL TABLERO



ANEXO A.4.3 : DISPOSICION DE LOS VEHICULOS PARA LA PRUEBA DE CARGA

VANO 1



CARGA TOTAL 1.200 KN

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ANEXO A.4.4 : CALCULO DE LA PRUEBA DE CARGA

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DESCRIPCION DEL VEHICULO TIPO

RUEDA	CARGA (KN)	COORDENADAS RELATIVAS Xq	Yq
1	40.00	0.00	0.00
2	55.00	3.85	0.00
3	55.00	5.20	0.00
4	55.00	9.00	0.00
5	55.00	10.35	0.00
6	40.00	14.20	0.00
7	40.00	0.00	1.90
8	55.00	3.85	1.90
9	55.00	5.20	1.90
10	55.00	9.00	1.90
11	55.00	10.35	1.90
12	40.00	14.20	1.90

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS VEHICULOS TIPO

ABSCISA X (m)	ORDENADA Y (m)
6.863	2.750
6.863	6.250

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REPARTO DE CARGAS DEL VEHICULO 1

RUEDA 1 X= 13.963 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
0	0.000
0	0.000
1	40.000
SUMA POR RUEDA	40.000

RUEDA 2 X= 10.113 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
5	34.024
0	0.000
7	20.976
SUMA POR RUEDA	55.000

RUEDA 3 X= 8.763 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
7	48.729
0	0.000
9	6.271
SUMA POR RUEDA	55.000

RUEDA 4 X= 4.963 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
9	6.271
0	0.000
11	48.729
SUMA POR RUEDA	55.000

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RUEDA 5 X= 3.613 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
11	20.976
0	0.000
13	34.024
SUMA POR RUEDA	55.000

RUEDA 6 X= -.238 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
17	40.000
0	0.000
0	0.000
SUMA POR RUEDA	40.000

RUEDA 7 X= 13.963 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
0	0.000
1	26.399
2	13.601
SUMA POR RUEDA	40.000

RUEDA 8 X= 10.113 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
5	18.657
6	10.191
7	16.383
8	9.768
SUMA POR RUEDA	55.000

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RUEDA 9 X= 8.763 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
7	21.010
8	10.760
9	13.919
10	9.311
SUMA POR RUEDA	55.000

RUEDA 10 X= 4.963 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
9	13.919
10	9.311
11	21.010
12	10.760
SUMA POR RUEDA	55.000

RUEDA 11 X= 3.613 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
11	16.383
12	9.768
13	18.657
14	10.191
SUMA POR RUEDA	55.000

RUEDA 12 X= -.238 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
17	26.399
18	13.601
0	0.000
0	0.000
SUMA POR RUEDA	40.000

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REPARTO DE CARGAS DEL VEHICULO 2

RUEDA 1 X= 13.963 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
0	0.000
1	13.601
2	26.399
SUMA POR RUEDA	40.000

RUEDA 2 X= 10.113 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
5	10.191
6	18.657
7	9.768
8	16.383
SUMA POR RUEDA	55.000

RUEDA 3 X= 8.763 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
7	10.760
8	21.010
9	9.311
10	13.919
SUMA POR RUEDA	55.000

RUEDA 4 X= 4.963 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
9	9.311
10	13.919
11	10.760
12	21.010
SUMA POR RUEDA	55.000

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RUEDA 5 X= 3.613 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
11	9.768
12	16.383
13	10.191
14	18.657
SUMA POR RUEDA	55.000

RUEDA 6 X= -.238 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
17	13.601
18	26.399
0	0.000
0	0.000
SUMA POR RUEDA	40.000

RUEDA 7 X= 13.963 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
0	0.000
2	40.000
0	0.000
SUMA POR RUEDA	40.000

RUEDA 8 X= 10.113 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
6	34.024
0	0.000
8	20.976
0	0.000
SUMA POR RUEDA	55.000

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RUEDA 9 X= 8.763 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
8	48.729
0	0.000
10	6.271
0	0.000
SUMA POR RUEDA	55.000

RUEDA 10 X= 4.963 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
10	6.271
0	0.000
12	48.729
0	0.000
SUMA POR RUEDA	55.000

RUEDA 11 X= 3.613 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
12	20.976
0	0.000
14	34.024
0	0.000
SUMA POR RUEDA	55.000

RUEDA 12 X= -.238 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
18	40.000
0	0.000
0	0.000
0	0.000
SUMA POR RUEDA	40.000

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RESUMEN DE CARGAS

NUDO	CARGA TOTAL (KN)
1	80.00
2	80.00
3	0.00
4	0.00
5	62.87
6	62.87
7	127.63
8	127.63
9	59.00
10	59.00
11	127.63
12	127.63
13	62.87
14	62.87
15	0.00
16	0.00
17	80.00
18	80.00
SUMA DE CARGAS	1200.00

HIPOTESIS DE CARGA NUM.: 1 CODIGO: 1 CARACTER: Permanentes

NUDO	TIPO	M-X (mKN)	M-Y (mKN)	F-Z (KN)
1	1	0.000	0.000	80.000
2	2	0.000	0.000	80.000
5	5	0.000	0.000	62.873
6	6	0.000	0.000	62.873
7	7	0.000	0.000	127.626
8	8	0.000	0.000	127.626
9	9	0.000	0.000	59.002
10	10	0.000	0.000	59.002
11	11	0.000	0.000	127.626
12	12	0.000	0.000	127.626
13	13	0.000	0.000	62.873
14	14	0.000	0.000	62.873
17	17	0.000	0.000	80.000
18	18	0.000	0.000	80.000
			TOTAL F-Z:	1200.000

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Fecha:

AVE OLERDOLA U.T.E. · P.S. 5+9 · VANOS 1 Y 3

DESPLAZAMIENTOS DE LOS NUDOS

NUDO	HIPOTESIS	GIRO X	GIRO Y	DESCENSO
1	F1	-0.00000	.00058	0.00000
2	F1	-0.00000	.00058	0.00000
3	F1	-0.00000	.00057	.00050
4	F1	-0.00000	.00057	.00050
5	F1	-0.00000	.00047	.00156
6	F1	-0.00000	.00047	.00156
7	F1	-0.00000	.00026	.00230
8	F1	-0.00000	.00026	.00230
9	F1	-0.00000	-0.00000	.00256
10	F1	-0.00000	-0.00000	.00256
11	F1	-0.00000	-.00026	.00230
12	F1	-0.00000	-.00026	.00230
13	F1	-0.00000	-.00047	.00156
14	F1	-0.00000	-.00047	.00156
15	F1	-0.00000	-.00057	.00050
16	F1	-0.00000	-.00057	.00050
17	F1	-0.00000	-.00058	0.00000
18	F1	-0.00000	-.00058	0.00000

ESFUERZOS

BARRA	HIPOTESIS	TOR. I (mKN)	TOR. J (mKN)	FLEC. I (mKN)	FLEC. J (mKN)	CORT. I (KN)	CORT. J (KN)
1- 3	F1	0.000	0.000	-0.000	189.750	-220.000	220.000
3- 5	F1	-0.000	-0.000	189.750	629.749	-220.000	220.000
5- 7	F1	-.001	-.001	629.750	944.004	-157.127	157.127
7- 9	F1	-.001	-.001	944.004	1003.006	-29.501	29.501
9- 11	F1	-.001	-.001	1003.006	944.004	29.501	-29.501
11- 13	F1	-.001	-.001	944.005	629.750	157.127	-157.127
13- 15	F1	-0.000	-0.000	629.750	189.750	220.000	-220.000
15- 17	F1	-0.000	-0.000	189.750	-0.000	220.000	-220.000
2- 4	F1	0.000	0.000	0.000	189.750	-220.000	220.000
4- 6	F1	-0.000	-0.000	189.750	629.751	-220.000	220.000
6- 8	F1	-.001	-.001	629.751	944.005	-157.127	157.127
8- 10	F1	-.001	-.001	944.005	1003.007	-29.501	29.501
10- 12	F1	-.001	-.001	1003.007	944.004	29.501	-29.501
12- 14	F1	-.001	-.001	944.004	629.750	157.127	-157.127
14- 16	F1	-0.000	-0.000	629.750	189.750	220.000	-220.000
16- 18	F1	-0.000	-0.000	189.750	0.000	220.000	-220.000
1- 2	F1	-0.000	-0.000	-0.000	0.000	-0.000	0.000
3- 4	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
5- 6	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
7- 8	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
9- 10	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
11- 12	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
13- 14	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
15- 16	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
17- 18	F1	0.000	0.000	-0.000	0.000	-0.000	0.000

REACCIONES DE LOS APOYOS RIGIDOS

NUDO	HIPOTESIS	MX (mKN)	MY (mKN)	FZ (KN)
1	F1	0.00000	0.00000	-299.99979
17	F1	0.00000	0.00000	-300.00021
2	F1	0.00000	0.00000	-300.00021
18	F1	0.00000	0.00000	-299.99979

AVE OLERDOLA U.T.E. · P.S. 5+9 · VANOS 1 Y 3
DESPLAZAMIENTOS DE LOS NUDOS

VIGA	HIPOTESIS	FLECHAS
1	F1	.003
2	F1	.003

ESFUERZOS

VIGA	HIPOTESIS	MOMENTO (mKN)
1	F1	1003.0
2	F1	1003.0

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B. VANO 2

ANEXO B.1. OBTENCIÓN DE ESFUERZOS

PROGRAMA EMPAREHE

El programa EMPAREHE es un programa desarrollado por los servicios técnicos de Prainsa en lenguaje HPBASIC para Windows. Su objeto es el dimensionamiento de tableros isostáticos de puentes de vigas rectas de sección constante, pretensadas con armaduras pretesas y apoyadas en un solo neopreno por extremo.

Para el cálculo de esfuerzos sobre las vigas este programa utiliza 2 esquemas estáticos:

Para los esfuerzos debidos a peso propio de viga y peso propio de losa (encofrados perdidos + hormigón "in situ") el esquema es de viga simplemente apoyada: cada viga recibe el peso del área tributaria de losa más el del encofrado perdido.

Para los esfuerzos debidos a cargas muertas y sobrecargas el esquema estático es el de emparrillado plano.

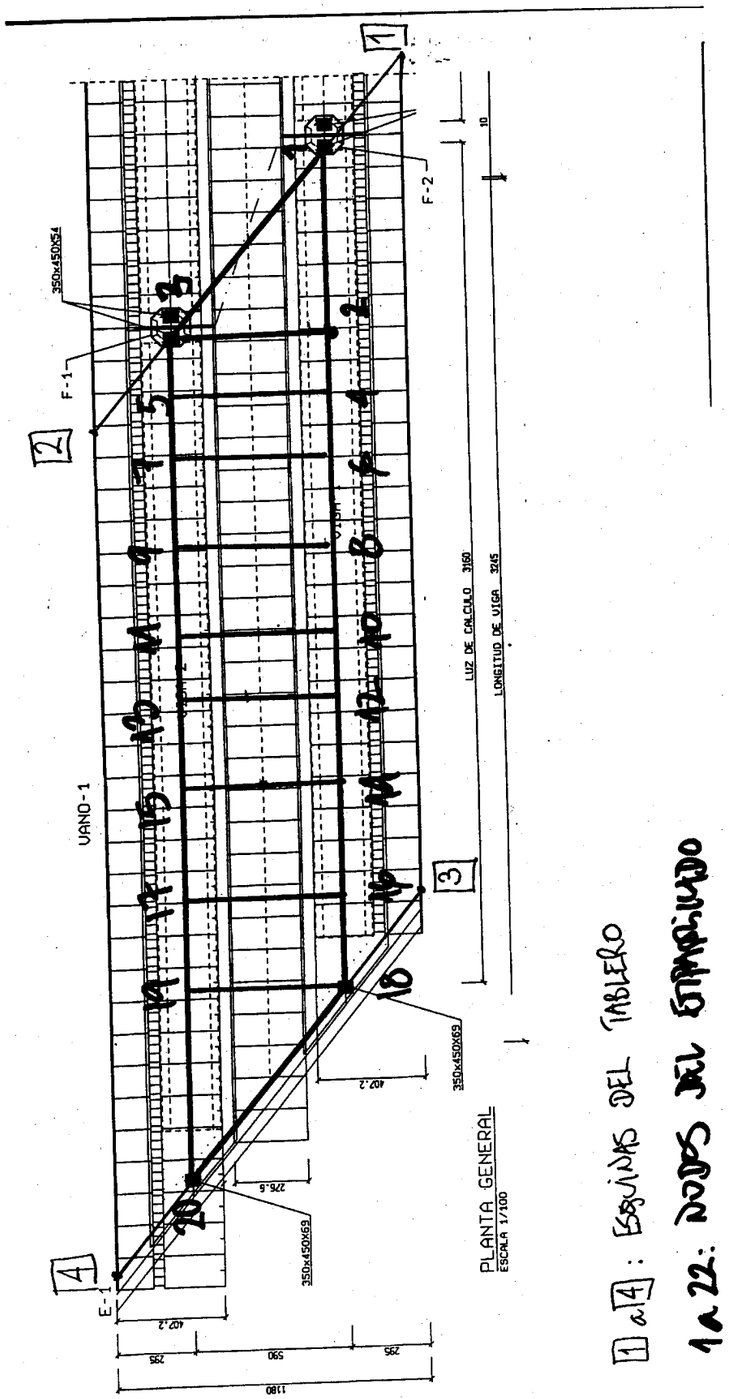
Las barras del emparrillado se generan del siguiente modo:

- barras longitudinales coincidentes con ejes de viga.
- barras transversales: hay 2 grupos de barras transversales. Un primer grupo coincidente con la línea de apoyos y un segundo grupo de barras paralelas entre sí y equiespaciadas excepto las barras extremas que se sitúan a 0.75H siendo H el canto total del tablero.

Las características mecánicas de las barras se obtienen del modo siguiente:

- barras longitudinales: inercias y área correspondientes a la sección compuesta por la sección prefabricada (hormigón HP-45) más el ancho tributario de losa "in situ" (hormigón HA-25)
- barras transversales:
  - para las barras de la línea de apoyo las inercias y área correspondientes al diafragma de la viga cajón más losa "in situ" correspondiente
  - para las barras intermedias las inercias y área correspondientes al canto de la losa de compresión y ancho calculado a partir de las distancias entre barras transversales. Para la obtención de las características mecánicas de estas barras se considera además la losa de fondo de la viga cajón (si es el caso) según la formulación del libro de Julio Martínez Calzón titulado " Secciónes Mixtas Hormigón y Acero" Para información más detallada se recomienda acudir a bibliografía especializada.

Ver en hoja Anexa un esquema de discretización sobre un tablero:



1 a 4 : Esquinas del tablero

1 a 22: Nudos del emparrillado

El módulo de generación de cargas genera las hipótesis de carga siguientes:
1ª hipótesis : es siempre la de cargas muertas debidas al peso de la superestructura del tablero (aglomerado, cuyo espesor se multiplica por 1.50, aceras, barreras, barandillas e impostas).

Luego se generan tantas hipótesis de carga como vigas tenga el tablero. Estas hipótesis se corresponden con bandas de sobrecarga uniforme de 4.00 kN/m^2 coincidentes con los ejes de vigas que a su vez se convierten en el emparrillado en carga lineal sobre las barras de las vigas.

Para obtener los esfuerzos debidos al vehículo tipo de 600 kN el programa efectúa 3 paseos, uno por cada una de estas líneas: línea dorsal, línea central y línea frontal.
El c.d.g. del vehículo se sitúa a 1.50 m de las líneas de apoyo y en su bisectriz (paseo por línea central) de estas dos. Una vez determinada la línea de paseo el programa establece el ancho de plataforma asociado a esta línea y, por tanto si la hipótesis ha de contemplar 1 ó 2 carros. El paseo se establece separando los c.d.g.del vehículo como máximo 1 m y orienta el carro según la línea que une su c.d.g. con el vértice del ángulo formado por los dos bordes laterales del tablero (centro de abaniqueo)

A partir de las posiciones del c.d.g. el programa reparte las cargas de las ruedas a los nodos adyacentes inversamente proporcional a la distancia de ésta a aquellos.

El resultado del cálculo de esfuerzos es, para cada una de las hipótesis descritas antes, y para cada una de las barras, el valor del Cortante, Flector y Torsor en sus dos nodos.
Habitualmente en la salida de resultados de esfuerzos sólo se muestra la envolvente del cálculo del emparrillado.

En esta envolvente se muestran los esfuerzos siguientes:

- MOMENTOS LONGITUDINALES EN VIGAS:
  - MPPV: Momento Peso Propio Viga
  - MPPL Momento Peso Propio Losa
  - MPM Momento Pesos Muertos
  - MSCU Momento SobreCarga Uniforme
  - MCARRO Momento Vehículo 600 kN
  - MAXSUMCP Momento Máximo Suma de Cargas Permanentes
  - MAXSUMT Momento Máximo Suma de Cargas Total
- MOMENTOS TRANSVERSALES POR METRO DE ANCHO DE LOSA DEBIDO AL EMPARRILLADO: que son los momentos generalizados de cada una de las barras transversales del modelo del emparrillado.
  - MTPM+ Momento Transversal positivo por Cargas Muertas
  - MTPM- Momento Transversal negativo por Cargas Muertas
  - MTSCU+ Momento Transversal positivo por SobreCarga Uniforme
  - MTSCU- Momento Transversal negativo por SobreCarga Uniforme
  - MTCARRO+ Momento Transversal positivo por Vehículo(s) Tipo(s)
  - MTCARRO- Momento Transversal negativo por Vehículo(s) Tipo(s)
  - MTTOT+ Momento Transversal positivo total (suma de positivos)
  - MTTOT- Momento Transversal negativo total (suma de negativos)
- MOMENTOS LOCALIZADOS EN LOSA POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM: que son los momentos localizados de cada una de las barras transversales del modelo del emparrillado.
  - MTLOCSCU+ Mto Transversal positivo por SobreCarga Uniforme
  - MTLOCSCU- Mto Transversal negativo por SobreCarga Uniforme
  - MTLOCCARRO+ Mto Transversal positivo por Vehículo(s) Tipo(s)
  - MTLOCCARRO- Mto Transversal negativo por Vehículo(s) Tipo(s)
  - MTLOCPM+ Mto Transversal positivo por Cargas Muertas

- MTLOCPM- Mto Transversal positivo por Cargas Muertas
- MVOLCARRO Momento Transversal positivo total (suma de positivos)

- REACCIONES: que son las reacciones máximas en valor absoluto que se producen en los dos extremos de la viga (Las vigas se numeran de abajo a arriba según el emparrillado)
  - PP Reacción debida a peso propio de viga
  - PL Reacción debida a peso propio de losa
  - CM Reacción debida a cargas muertas
  - SCUP Reacción positiva debida a SobreCarga Uniforme
  - SCUN Reacción negativa debida a SobreCarga Uniforme
  - CARRO+ Reacción positiva debida a Vehículo(s) Tipo(s)
  - CARRO- Reacción negativa debida a Vehículo(s) Tipo(s)

Ver en la página siguiente una salida tipo de la envolvente de esfuerzos.

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```
 * * * P R A I N S A * * *  Programa EMPAR21  * * *  Version:        Febrero 2001

ARCHIVO DE DATOS GEOMÉTRICOS....        10540 · T DERECHO
ARCHIVO DE CALCULO..............        DEMPAR_jaume

                    MOMENTOS LONGITUDINALES EN VIGAS   ( mKN )

VIGA     MPPV     MPPL      MPM      MSCU      MCARRO    MAXSUMCP   MAXSUMT

  1     1330.9   1455.0   1915.9    942.62    2356.38   4701.75   8000.75
  2     1296.6   2045.8   1114.5   1318.22    2646.89   4456.92   8422.03
  3     1296.0   2026.2    821.9   1361.26    2772.80   4144.14   8278.20
  4     1250.9   1944.9   1031.3   1283.75    2615.19   4218.42   8096.76
  5     1260.8   1351.1   1826.1    885.60    2294.60   4438.03   7618.24

MOMENTOS TRANSVERSALES POR METRO DE ANCHO EN LOSA DEBIDOS AL EMPARRILLADO ( mKN /m )

BANDA    MTPM+    MTPM-    MTSCU+   MTSCU-  MTCARRO+ MTCARRO-  MT.TOT+  MT.TOT-

  1       2.56   -10.02     6.10    -1.64     10.37    -2.65     6.53   -11.61
  2       1.78   -10.59     5.36     -.89      5.26     -.46     2.96   -10.65
  3       1.21    -5.88     5.44    -3.93      7.64    -1.25     7.65    -9.07
  4       1.88    -6.12     6.32    -4.60      9.07    -4.84     9.38   -11.19
  5       3.17    -7.00     7.82    -5.23     10.29    -6.53    12.18   -13.86
  6       1.66    -7.35     8.83    -5.91     11.21    -6.68    14.25   -15.98
  7      -1.99    -7.46    10.65    -8.41     12.53    -8.47    19.65   -20.62
  8      -2.08    -5.92    10.56    -9.27     14.34    -8.53    22.47   -21.63
  9      -1.92    -6.95    10.37    -8.39     13.24    -8.43    20.68   -20.68
 10       2.12    -6.89     8.69    -5.78     11.74    -6.93    14.96   -15.77
 11       4.13    -8.22     7.68    -5.19     10.88    -7.10    13.05   -13.39
 12       1.79    -5.62     6.38    -4.37      9.92    -5.29    10.83   -10.52
 13        .95    -6.68     4.78    -3.61      8.20    -1.29     9.03    -7.87
 14       1.71   -11.17     4.90     -.75      6.01     -.40     2.68   -11.24
 15       2.90   -11.76     6.69    -1.94     11.03    -2.75     5.96   -14.90

MOMENTOS LOCALIZADOS EN LOSA/POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM. ( mKN /m)

BANDA    MTLOCSCU+ MTLOCSCU-  MTLOCCARRO+ MTLOCCARRO-  MTLOCPM+  MTLOCPM-  MVOLCARRO

  1        7.05     -7.69       42.68      -16.26       2.57     -9.78      0.00
  2        5.73      -.85       31.32      -13.12        .61     -9.78      0.00
  3        4.76     -6.14       31.74      -13.24       3.28     -9.78      0.00
  4        5.08     -5.83       32.17      -13.37       2.30     -9.78      0.00
  5        5.08     -6.09       32.60      -13.50       2.09     -9.78      0.00
  6        5.04     -6.04       32.35      -13.42       2.08     -9.78      0.00
  7        4.91     -5.88       31.59      -13.20       2.05     -9.78      0.00
  8        4.79     -5.73       30.81      -12.97       2.03     -9.78      0.00
  9        4.66     -5.58       30.04      -12.74       2.00     -9.78      0.00
 10        4.54     -5.43       29.26      -12.50       1.98     -9.78      0.00
 11        4.50     -5.38       29.01      -12.42       1.97     -9.78      0.00
 12        4.49     -5.21       28.60      -12.30       2.15     -9.78      0.00
 13        4.30     -5.43       28.19      -12.17       3.11     -9.78      0.00
 14        5.02      -.85       27.78      -12.04        .26     -9.78      0.00
 15        5.88     -6.44       36.88      -14.71       2.30     -9.78      0.00

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                              REACCIONES   (KN)

  VIGA   APOYO     PP       PL        CM       SCUP      SCUN      CARRO +  CARRO -

    1      1    -184.6   -129.3    -285.8      5.5     -120.8       0.0    -348.5
    1      2    -184.6   -129.3    -300.0     17.8     -136.7       0.0    -299.0

    2      3    -184.6   -186.2    -145.1      1.3     -195.8       0.0    -488.3
    2      4    -184.6   -186.2    -120.0      6.2     -195.4       0.0    -461.8

    3      5    -184.6   -186.2    -113.5      5.4     -196.1       0.0    -494.8
    3      6    -184.6   -186.2    -111.3      5.0     -191.7       0.0    -454.8

    4      7    -184.6   -186.2    -119.9      6.4     -196.4       0.0    -510.2
    4      8    -184.6   -186.2    -133.2      1.6     -184.7       0.0    -461.6

    5      9    -184.6   -129.3    -290.4     16.8     -131.1       0.0    -317.4
    5     10    -184.6   -129.3    -278.4      6.2     -115.3       0.0    -340.5
```

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

PROYECTO: AVE OLERDOLA U.T.E. · P.S. 5+9 · VANO 2

ARCHIVO: 12000·SO3·VANO2

VIGA: U90

GEOMETRIA DEL TABLERO

ANCHO TOTAL..... 9.00 m ACERA IZQUIERDA. .40 m ACERA DERECHA... .40 m
CANTO LOSA ..... .25 m CANTO ENCOFRADO. .06 m ENTREGA ENCOF... .08 m

No DE VIGAS..... 2
DISTANCIAS DE EJES DE VIGAS EXTREMAS A BORDE DE TABLERO:
IZQUIERDO... 2.03 m DERECHO... 2.03 m

VIGA: 1
LUZ DE CALCULO.. 16.55 m SITUACION VIGA.. 0.00 m CANTO VIGA..... .90 m
LONGITUD VIGA... 17.15 m

VIGA: 2
LUZ DE CALCULO.. 16.55 m SITUACION VIGA.. 4.95 m CANTO VIGA..... .90 m
LONGITUD VIGA... 17.15 m

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

SECCION VIGA SIMPLE

Trapecio	Base inferior	Base superior	Altura
INF.No. 1	1.760	1.808	.020
No. 2	1.808	1.896	.220
No. 3	.400	.300	.050
No. 4	.300	.300	.290
No. 5	.300	.538	.120
No. 6	.538	1.168	.130
SUP.No. 7	1.168	1.140	.070

CARACTERISTICAS MECANICAS SECCION SIMPLE

Area = .7896 m2 Inercia= .07251731 m4
Ysup = .5401 m Wsup = .13427342 m3
Yinf = .3599 m Winf = .20147726 m3
Canto= .9000 m

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

NORMA EHE

TIPO DE AMBIENTE

Clase de exposición: IIa,IIb / H
Descripción: Interiores con condensación y exteriores sin cloruros / Hielo

CARACTERISTICAS MATERIALES

Propiedades Tecnológicas		Datos para Proyecto			Coef. E.L.U.
Hormigón en losa:	HA-25/F/20/(IIa,IIb,H)	Fckl	=	25 N/mm2	1.50
Hormigón en viga:	HP-45/F/20/(IIIa,IIIb,IV,F)	Fck	=	45 N/mm2	1.50
Acero pasivo:	BS 500	Fyk	=	500 N/mm2	1.15
Acero activo:	UNE 36094-1997 Y 1860 S7 15.2	Fyk	=	1640 N/mm2	1.15
	Area: 140 mm2	Fmaxx	=	1860 N/mm2	
	Diametro: 0.6´´				

ACCIONES

Coeficientes Parciales de Seguridad:	E.L.U.	E.L.S.
Permanentes:	1.35	1.00
Variables:	1.50	1.00
Pretensado:	1.00	1.00

Coeficientes de Combinación

Combinación Cuasipermanente:	Psi2= .2
Combinación Frecuente:	Psi1= .5
Combinación Característica o Rara:	Psi0= .6

E.L.S. DE FISURACIÓN

Tensiones admisibles:

Combinación de acciones	Comp. losa (N/mm2)	Trac. viga (N/mm2)	Comp. viga (N/mm2)
Pretensar:		1.50	23.33
Sobrecarga Cuasipermanente:	15.00	0.00	27.00
Sobrecarga Frecuente:	15.00	2.66	27.00
Sobrecarga Rara:	15.00	3.80	27.00

Abertura máxima de fisuras (mm): 0.2

ALVISA Prefabricados, S.A.

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Fecha:

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

ESTADO DE CARGAS

NORMA IAP (INSTRUCCCIÓN DE ACCIONES EN PUENTES DE CARRETERA)

Pesos propios:	Peso Propio Viga	=	19.74 KN/m
	Peso Propio Losa	=	6.25 KN/m2
Cargas muertas:	Peso de Aceras	=	5.00 KN/m2
	Peso Barandillas	=	10.00 KN/m
	Peso Aglomerado (Inferior)	=	1.92 KN/m2
	Peso Aglomerado (Superior)	=	2.88 KN/m2
Sobrecargas:	Sobrec. uniforme	=	4.00 KN/m2
	Peso total carro	=	600.00 KN
	Número de carros	=	1

```
 * * * P R A I N S A * * *  Programa EMPAR21  * * *  Version:        Julio 2003

GENERACION DE DATOS DE UN EMPARRILLADO
======================================

COORDENADAS DE LAS ESQUINAS
---------------------------

 Esquina            X             Y
-------------------------------------
   1              16.550        0.000
   2              16.550        9.000
   3               0.000        0.000
   4               0.000        9.000

NUMERO DE VIGAS= 2

VUELOS IZQUIERDO Y DERECHO 2.025          2.025

NUMERO DE BARRAS TRANSVERSALES COMPLETAS= 9

BARRAS TRASVERSALES PARALELAS A 0  0     0  1

COORDENADAS DE LOS NUDOS
------------------------

 NUDO               X             Y
-------------------------------------
   1              16.550        2.025
   2              16.550        6.975
   3              15.688        2.025
   4              15.688        6.975
   5              13.217        2.025
   6              13.217        6.975
   7              10.746        2.025
   8              10.746        6.975
   9               8.275        2.025
  10               8.275        6.975
  11               5.804        2.025
  12               5.804        6.975
  13               3.333        2.025
  14               3.333        6.975
  15                .863        2.025
  16                .863        6.975
  17               0.000        2.025
  18               0.000        6.975

NUDOS APOYADOS
   1  17   2  18
```



```
 * * * P R A I N S A * * *  Programa EMPAR21  * * *  Version:        Julio 2003

DATOS DE LAS BARRAS
-------------------

                                ANCHO LOSA     ANCHO DCHO     ANCHO IZDO     INER FLEXION     INER  TORSION
BARRA N.ORI N.FIN                 (m.)           (m.)           (m.)            (m4)             (m4)
-------------------------------------------------------------------------------------------------------
   1    1    3     4.50000        2.47500        2.02500          .25922          .36940
   2    3    5     4.50000        2.47500        2.02500          .26074          .36940
   3    5    7     4.50000        2.47500        2.02500          .26074          .36940
   4    7    9     4.50000        2.47500        2.02500          .26074          .36940
   5    9   11     4.50000        2.47500        2.02500          .26074          .36940
   6   11   13     4.50000        2.47500        2.02500          .26074          .36940
   7   13   15     4.50000        2.47500        2.02500          .26074          .36940
   8   15   17     4.50000        2.47500        2.02500          .26074          .36940
   9    2    4     4.50000        2.02500        2.47500          .26074          .36940
  10    4    6     4.50000        2.02500        2.47500          .26074          .36940
  11    6    8     4.50000        2.02500        2.47500          .26074          .36940
  12    8   10     4.50000        2.02500        2.47500          .26074          .36940
  13   10   12     4.50000        2.02500        2.47500          .26074          .36940
  14   12   14     4.50000        2.02500        2.47500          .26074          .36940
  15   14   16     4.50000        2.02500        2.47500          .26074          .36940
  16   16   18     4.50000        2.02500        2.47500          .26074          .36940
  17    1    2      .43125        0.00000         .43125          .00131          .00041
  18    3    4     1.66667         .43125        1.23542          .00505          .00157
  19    5    6     2.47083        1.23542        1.23542          .00748          .00232
  20    7    8     2.47083        1.23542        1.23542          .00748          .00232
  21    9   10     2.47083        1.23542        1.23542          .00748          .00232
  22   11   12     2.47083        1.23542        1.23542          .00748          .00232
  23   13   14     2.47083        1.23542        1.23542          .00748          .00232
  24   15   16     1.66667        1.23542         .43125          .00505          .00157
  25   17   18      .43125         .43125        0.00000          .00131          .00041
```

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G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE LA LÍNEA MEDIA DEL TABLERO

HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
4	8.275	1.900
5	8.275	2.767
6	8.275	3.633
7	8.275	4.500
8	8.275	5.367
9	8.275	6.233
10	8.275	7.100

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G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE EL EXTREMO DORSAL DEL TABLERO

HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
11	15.050	1.900
12	15.050	2.767
13	15.050	3.633
14	15.050	4.500
15	15.050	5.367
16	15.050	6.233
17	15.050	7.100

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G E N E R A C I Ó N A U T O M Á T I C A D E H I P Ó T E S I S

PASEO DE CARRO SOBRE EL EXTREMO FRONTAL DEL TABLERO

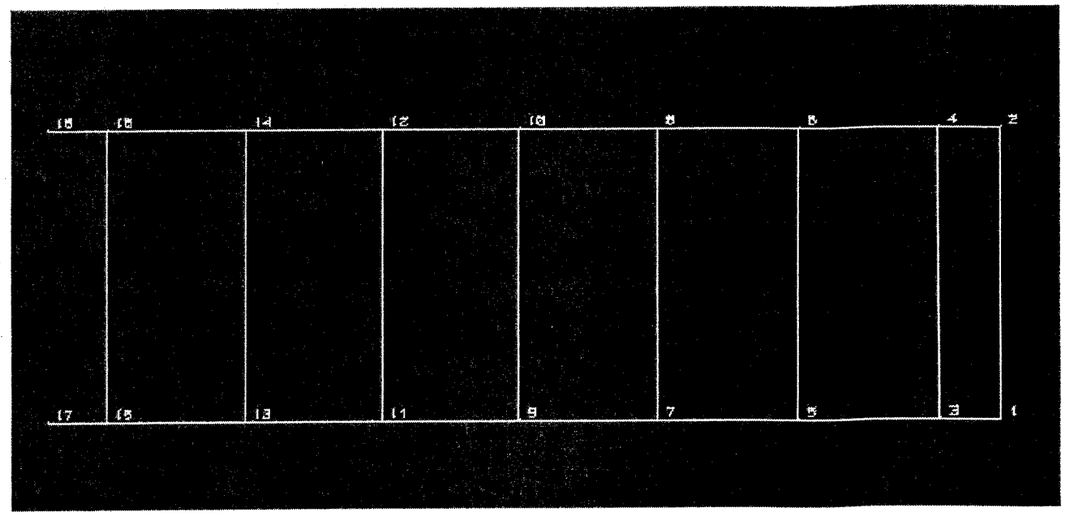
HIPÓTESIS DE CARRO GENERADAS CON IAP

Numero de carros..... 1
Carga total por carro ..... 600 KN

COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS CARROS

HIPOTESIS N°	ABSCISA X (m)	ORDENADA Y (m)
18	1.500	1.900
19	1.500	2.767
20	1.500	3.633
21	1.500	4.500
22	1.500	5.367
23	1.500	6.233
24	1.500	7.100

EMPARRILLADO PLANO



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ARCHIVO DE DATOS GEOMÉTRICOS.... 12000·SO3·VANO2
ARCHIVO DE CALCULO..... DEMPAR_JGIRONELLA

MOMENTOS LONGITUDINALES EN VIGAS (mKN)

VIGA	MPPV	MPPL	MPM	MSCU	MCARRO	MAXSUMCP	MAXSUMT
1	675.8	962.9	815.1	616.28	1739.67	2453.90	4809.85
2	675.8	962.9	815.1	616.28	1739.67	2453.90	4809.85

MOMENTOS TRANSVERSALES POR METRO DE ANCHO EN LOSA DEBIDOS AL EMPARRILLADO (mKN /m)

BANDA	MTPM+	MTPM-	MTSCU+	MTSCU-	MTCARRO+	MTCARRO-	MT.TOT+	MT.TOT-
1	-18.88	-18.88	19.04	-14.99	48.21	-48.21	48.37	-82.08
2	-18.88	-18.88	13.44	-9.39	34.60	-34.60	29.16	-62.87
3	-18.88	-18.88	4.05	0.00	2.26	-2.26	0.00	-21.14
4	-18.88	-18.88	11.69	-7.64	19.87	-19.87	12.68	-46.39
5	-18.88	-18.88	14.40	-10.35	28.03	-28.03	23.54	-57.26
6	-18.88	-18.88	11.69	-7.64	19.87	-19.87	12.68	-46.39
7	-18.88	-18.88	4.05	0.00	2.26	-2.26	0.00	-21.14
8	-18.88	-18.88	13.44	-9.39	34.60	-34.60	29.16	-62.87
9	-18.88	-18.88	19.04	-14.99	48.21	-48.21	48.37	-82.08

MOMENTOS LOCALIZADOS EN LOSA/POR METRO DEBIDOS A SOBRECARGA CARRO Y C.PERM. (mKN /m)

BANDA	MTLOCSCU+	MTLOCSCU-	MTLOCCARRO+	MTLOCCARRO-	MTLOCPM+	MTLOCPM-	MVOLCARRO
1	0.00	-1.43	16.93	-9.97	.51	-1.03	0.00
2	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
3	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
4	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
5	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
6	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
7	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
8	1.75	-2.14	17.01	-9.98	2.69	-11.92	0.00
9	0.00	-1.43	16.93	-9.97	.51	-1.03	0.00

TORSORES

VIGA 1	(mKN)		(KN)		(MKN)	
NUDO	TMIN	TMAX	VTMIN	VTMAX	MTMIN	MTMAX
1.0	35.4	-20.9	593.1	249.90	1.06	1.1
3.0	75.0	-61.4	526.0	260.35	492.89	209.8
5.0	112.2	-112.2	422.2	202.06	1660.54	784.8
7.0	81.4	-81.4	250.3	100.55	2572.24	1215.3
9.0	9.6	-9.6	47.2	52.99	1141.78	1758.1
11.0	81.4	-81.4	143.2	318.90	1215.27	2572.2
13.0	112.2	-112.2	201.5	422.73	784.84	1660.5
15.0	61.4	-75.0	229.4	557.02	209.76	492.9
17.0	20.9	-35.4	249.9	593.08	1.06	-1.1

VIGA 2	(mKN)		(KN)		(MKN)	
NUDO	TMIN	TMAX	VTMIN	VTMAX	MTMIN	MTMAX
2.0	20.9	-35.4	249.9	593.08	1.06	1.1
4.0	61.4	-75.0	260.3	526.03	209.76	492.9
6.0	112.2	-112.2	202.1	422.20	784.84	1660.5
8.0	81.4	-81.4	100.6	250.32	1215.27	2572.2
10.0	9.6	-9.6	5.0	23.87	920.13	1536.4
12.0	81.4	-81.4	318.9	143.23	2572.24	1215.3
14.0	112.2	-112.2	422.7	201.52	1660.54	784.8
16.0	75.0	-61.4	557.0	229.36	492.89	209.8
18.0	35.4	-20.9	593.1	249.90	-1.06	1.1

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REACCIONES (KN)

VIGA	APOYO	PP	PL	CM	SCUP	SCUN	CARRO +	CARRO -
1	1	-163.3	-232.7	-197.0	0.0	-149.0	0.0	-486.2
1	2	-163.3	-232.7	-197.0	0.0	-149.0	0.0	-486.2
2	3	-163.3	-232.7	-197.0	0.0	-149.0	0.0	-486.2
2	4	-163.3	-232.7	-197.0	0.0	-149.0	0.0	-486.2

ANEXO B.2. DIMENSIONAMIENTO DE VIGAS

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CALCULO Y REPARTO DE MOMENTOS FLECTORES LONGITUDINALES


VIGA  1 (viga extrema izquierda)


Momento peso propio viga  =     675.829mKN
Momento peso propio losa  =     962.938mKN
Momento pesos muertos     =     815.134mKN   Momento total permanentes=     2453.90mKN
Momento sobrecarga unif.  =     616.281mKN
Momento sob. punt. (carro)=    1739.667mKN   Momento total sobrecargas=     2355.95mKN

                                             Momento maximo total=          4809.85mKN
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ESTADOS LIMITE DE SERVICIO

ESTADO LIMITE DE FISURACIÓN. VIGA EXTREMA IZQUIERDA

CÁLCULO DE TENSIONES

Fuerza en Bancada: 6583.500 KN
Altura del Pretensado: .148 m
Pérdidas Instantáneas: 441.188 KN (6.70%)
Pérdidas Totales: 1418.234 KN (21.54%)

Tensiones (N/mm2) al Pretensar en Secciones:
De Apoyo (Cables entubados) A .4 m. (Todos los cables)

Fibra superior: -1.499 Fibra superior -1.409
Fibra inferior: 12.959 Fibra inferior 13.630

Tensiones (N/mm2) en Sección Central al colocar Losa

Fibra superior: 9.849
Fibra inferior: 5.859

Tensiones (N/mm2) en Sección Central con Cargas Muertas

Fibra superior losa: 1.393
Fibra superior viga: 10.454
Fibra inferior viga: 3.627

Tensiones (N/mm2) en Sección Central con Cargas Muertas para Tiempo Infinito

Fibra superior losa: 1.560
Fibra superior viga: 10.348
Fibra inferior viga: 2.543

Tensiones (N/mm2) en Sección Central con Sobrec. Cuasipermanentes para Tiempo Infinito

Fibra superior losa: 2.353
Fibra superior viga: 10.706
Fibra inferior viga: 1.334

Tensiones (N/mm2) en Sección Central con Sobrecargas Frecuentes para Tiempo Infinito

Fibra superior losa: 3.541
Fibra superior viga: 11.242
Fibra inferior viga: -.478

Tensiones (N/mm2) en Sección Central con Sobrecargas Raras para Tiempo Infinito

Fibra superior losa: 5.523
Fibra superior viga: 12.137
Fibra inferior viga: -3.498

Cables Envainados: 2 en .7 m. Desde el Extremo

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ESTADO LIMITE DE FISURACION

MÁXIMA ABERTURA DE FISURA (Wmax = .20 mm)

Sección X (m)	% Pretensado	M3 (mKN)	Mtotal (mKN)	Area pas inf (cm2)
8	100	6939.823	4690.284	0.00
7	100	6934.502	4625.687	0.00
6	100	6922.853	4407.278	0.00
5	100	6904.552	4041.402	0.00
4	100	6879.509	3528.057	0.00
3	100	6847.588	2867.245	0.00
2	100	6808.661	2058.964	0.00
1	100	6762.605	1103.216	0.00

ESTADO LIMITE DE DEFORMACION

CALCULO DE FLECHAS

Inicial (Al Cortar Cables)= -1.08 cm Al Hormigonar Losa= -.33 cm
Incremento por Sobrecargas= .63 cm

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ESTADOS LIMITE ULTIMOS

CALCULO DE ARM DE REFUERZO POR ROTURA A FLEXION: VIGA EXTREMA 1

SECCION VIGA COMPUESTA:

TRAPECIO N.	BASES INF. m	BASES SUP. m	ORDENADAS INF. m	ORDENADAS SUP. m	RESISTENCIA DE CALCULO N/mm2
1	1.760	1.808	0.000	.020	30
2	1.808	1.896	.020	.240	30
3	.400	.300	.240	.290	30
4	.300	.300	.290	.580	30
5	.300	.538	.580	.700	30
6	.538	1.168	.700	.830	30
7	1.168	1.140	.830	.900	30
8	.900	.900	.900	.960	17
9	4.500	4.500	.960	1.150	17

ARMADURA ACTIVA:

SUPERFICIE cm2	ORDENADA m	LIM.ELAS. DE CALC. N/mm2	MODULO ELASTICO N/mm2	DEFORM. EN DESCOMP. o/oo	COEFICIENTE EN COMPR.
40.60	.050	1455	193800	.3263	1.00
0.00	.100	1455	193800	.3263	1.00
0.00	.150	1455	193800	.3263	1.00
5.60	.855	1455	193800	.3263	1.00

ARMADURA PASIVA:

SUPERFICIE cm2	ORDENADA m	LIM.ELAS. DE CALC. N/mm2	MODULO ELASTICO N/mm2	COEFICIENTE EN COMPR.
0.00	.050	443	204000	1.00
4.53	.050	443	204000	1.00
6.04	.210	443	204000	1.00
2.01	.380	443	204000	1.00
2.01	.580	443	204000	1.00
1.01	.740	443	204000	1.00
1.01	.810	443	204000	1.00
12.06	.870	443	204000	1.00
0.00	.850	443	204000	1.00
ADICIONAL	.030	443	204000	1.00

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DEFORMACIONES LIMITE: ORDENADA:

Sup.= 3.50000 o/oo Y= 1.150 m
Inf.= 10.00000 o/oo Y= .035 m
Med.= 2.00000 o/oo

ESTADO LÍMITE ÚLTIMO DE ROTURA A FLEXIÓN (CON ARM DE REFUERZO ADICIONAL)

DEFORMACIONES:

Sup.= 1.67081 o/oo
Inf.= 10.00000 o/oo

ESFUERZOS:

Nu= .03 KN
Mu= 6871.10 mKN
Md= 1.35* 2453.90+ 1.50* 2355.95= 6846.69 mKN

Condición de Rotura (E.L.U.): Mu > Md
6871.10 mKN > 6846.69 mKN

ARMADURA ADICIONAL DE REFUERZO DISPUESTA:

AREA : 0.000 cm2 - 0 m A CADA LADO DEL EJE DE LA VIGA (sin anclaje)

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CALCULO DE ARMADURA TRANSVERSAL PARA ESFUERZO CORTANTE

EN VIGA Y RASANTE EN UNION VIGA-LOSA. (EHE)

CARACTERISTICAS GENERALES :

VIGA: 1			Xi (Coef.geométrico)	:	1.423
Fyd	: 400	N/mm2	A90 mínimo cortante	:	4.412 cm2/m
Fct,d (mín.)	: 1.2	N/mm2	A90 mínimo rasante	:	10.070 cm2/m
Espesor alma de viga	: .30	m	Coeficiente ß	:	0.4 (rugosidad alta)
Ancho ala sup. viga	: 1.14	m	Coeficiente μ	:	0.9 (rugosidad alta)

***ZONA 1 (SECCION A 0.000 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	163.342	232.734	197.011	148.950	486.231
M(mKN)	0.000	0.000	0.000	0.000	0.000

CORTANTE VIGA			RASANTE VIGA-LOSA		
Vd	: 1753.441	KN	Vd	: 1218.738	KN
Sigma'c,d	: .380	N/mm2	Tau md	: 1224.596	KN/m2
Y crítica	: .672	m	Tau admisible	: 1844.888	KN/m2
Cotg. Theta	: 1.049				
Ro 1	: .020		Cap. mec. rasante	: 878.390	KN
Vu1	: 3020.564	KN	Cap. mec. cortante	: 1608.956	KN
Vcu	: 233.414	KN	Cap. mec. suplement.	: 0.000	KN
A90 necesaria máxima	: 35.239	cm2/m	A90 rasante nec.	: 0.000	cm2/m

ARMADURA EN CADA ALMA:					
Diámetro (mm)	: 2 d 8 + 2 d 8		Diámetro (mm)	: 0	
Separación	: 0.20	m	Separacion	: 0.00	m
A90 cortante real	: 20.120	cm2/m	A90 rasante real	: 0.000	cm2/m

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***ZONA 2 (SECCION A .800 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	147.551	210.234	177.965	134.898	460.385
M(mKN)	124.357	177.188	149.991	107.919	368.308

CORTANTE VIGA			RASANTE VIGA-LOSA		
Vd	: 1616.188	KN	Vd	: 1133.178	KN
Sigma'c,d	: 3.267	N/mm2	Tau md	: 1138.687	KN/m2
Y crítica	: .672	m	Tau admisible	: 1246.712	KN/m2
Cotg. Theta	: 1.364				
Ro 1	: .020		Cap. mec. rasante	: 777.208	KN
Vu1	: 2883.865	KN	Cap. mec. cortante	: 904.438	KN
Vcu	: 378.927	KN	Cap. mec. suplement.	: 0.000	KN
A90 necesaria máxima	: 22.054	cm2/m	A90 rasante nec.	: 0.000	cm2/m

ARMADURA EN CADA ALMA:					
Diámetro (mm)	: 12		Diámetro (mm)	: 0	
Separación	: 0.20	m	Separacion	: 0.00	m
A90 cortante real	: 11.310	cm2/m	A90 rasante real	: 0.000	cm2/m

***ZONA 3 (SECCION A 1.300 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	137.681	196.172	166.061	126.469	444.231
M(mKN)	195.665	278.789	235.997	164.410	577.501

CORTANTE VIGA			RASANTE VIGA-LOSA		
Vd	: 1530.935	KN	Vd	: 1080.233	KN
Sigma'c,d	: 4.260	N/mm2	Tau md	: 1085.527	KN/m2
Y crítica	: .672	m	Tau admisible	: 1161.841	KN/m2
Cotg. Theta	: 1.457				
Ro 1	: .020		Cap. mec. rasante	: 714.598	KN
Vu1	: 2821.867	KN	Cap. mec. cortante	: 804.478	KN
Vcu	: 428.974	KN	Cap. mec. suplement.	: 0.000	KN
A90 necesaria máxima	: 18.392	cm2/m	A90 rasante nec.	: 0.000	cm2/m

ARMADURA EN CADA ALMA:					
Diámetro (mm)	: 8 + 8		Diámetro (mm)	: 0	
Separación	: 0.20	m	Separacion	: 0.00	m
A90 cortante real	: 10.060	cm2/m	A90 rasante real	: 0.000	cm2/m

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***ZONA 4 (SECCION A 3.400 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	96.229	137.109	116.064	94.037	376.385
M(mKN)	441.271	628.734	532.228	319.724	1279.709

CORTANTE VIGA :

Vd	:	1177.326 KN		
Sigma'c,d	:	7.694 N/mm2		
Y crítica	:	.357 m		
Cotg. Theta	:	1.305		
Ro 1	:	.020		
Vu1	:	2919.754 KN		
Vcu	:	602.055 KN		
A90 necesaria máxima	:	15.432 cm2/m		

RASANTE VIGA-LOSA :

Vd	:	862.319 KN
Tau md	:	866.741 KN/m2
Tau admisible	:	1011.788 KN/m2
Cap. mec. rasante	:	456.917 KN
Cap. mec. cortante	:	627.749 KN
Cap. mec. suplement.	:	0.000 KN
A90 rasante nec.	:	0.000 cm2/m

ARMADURA EN CADA ALMA:

Diámetro (mm)	:	10	Diámetro (mm)	:	0
Separación	:	0.20 m	Separacion	:	0.00 m
A90 cortante real	:	7.850 cm2/m	A90 rasante real	:	0.000 cm2/m

***ZONA 5 (SECCION A 5.900 m DEL APOYO) (VIGA: 1)

	PPV	PPL	CM	SCU	SCP
V(KN)	46.881	66.797	56.544	61.680	295.616
M(mKN)	620.158	883.617	747.989	363.912	1744.133

CORTANTE VIGA :

Vd	:	765.743 KN		
Sigma'c,d	:	10.197 N/mm2		
Y crítica	:	.357 m		
Cotg. Theta	:	1.188		
Ro 1	:	.020		
Vu1	:	2979.573 KN		
Vcu	:	728.201 KN		
A90 necesaria máxima	:	9.673 cm2/m		

RASANTE VIGA-LOSA :

Vd	:	612.278 KN
Tau md	:	615.726 KN/m2
Tau admisible	:	820.656 KN/m2
Cap. mec. rasante	:	402.639 KN
Cap. mec. cortante	:	402.239 KN
Cap. mec. suplement.	:	.400 KN
A90 rasante nec.	:	.010 cm2/m

ARMADURA EN CADA ALMA:

Diámetro (mm)	:	8	Diámetro (mm)	:	8
Separación	:	0.20 m	Separacion	:	0.20 m
A90 cortante real	:	5.030 cm2/m	A90 rasante real	:	5.030 cm2/m

---

PROGRAMA : DIAFRAGME.EHE * * * P R A I N S A * * *

FECHA : 22.01.2004

NOMBRE DEL PROYECTO : 12000·SO3·VANO 2

NORMA DE MATERIALES : EHE

CANTO DE LA VIGA : .90 m.

REACCION MAXIMA : 1255.000 KN

ANGULO DE ESVIAJE : 0.000 g

ANCHO DIAFRAGMA : .500 m.

DIMENSION MAYOR DEL NEOPRENO UTILIZADO : 400 mm.

	Md (mKN)	As (cm2)	As2 (cm2)
* ARMADURA LONGITUDINAL SUPERIOR	931.8	27.5	0.0

	Vd (KN)	Aq (cm2/m)
* CERCOS TRANVERSALES	941.3	22.5

	As (cm2)
* ARM. LONG. INF. CARGA SOBRE MACIZO	8.7

```
-------------------------------------------------------------------------------------------
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-------------------------------------------------------------------------------------------

     RESUMEN DE ARMADO.   VIGA: U90


     HORMIGON:

     RESISTENCIA CARACTERISTICA A 28 DIAS:   45 N/mm2
     RESISTENCIA INICIAL AL CORTAR CABLES:   35 N/mm2

     PRETENSADO:VIGA - 1

     TENSION DE PRETENSADO DE LOS CABLES:    1425 N/mm2
     FUERZA TOTAL DE PRETENSADO EN BANCADA:  6583.500 KN

     FILA       No. DE CORDONES    DIAMETRO    ALTURA FILA
                                   (Pulgadas)      (m)
       1              29             .600          .050
       2               0            0.000         0.000
       3               0            0.000         0.000
       4               4             .600          .855

     CABLES ENVAINADOS: 2  EN  .7  m, DESDE EL EXTREMO

     ARMADURA PASIVA:

     LIMITE ELASTICO ACERO:  500 N/mm2

        PLANTILLA 1 EN ALMA:
   ( Los asteriscos indican la zona que necesita refuerzo en ala )

   (4 d  8 a 20 cms. en  1.70m./ 20 Ud.) (1 d 12 a 20 cms. en   .50m./  5 Ud.)
   (2 d  8 a 20 cms  en  2.10m./ 21 Ud.) (1 d 10 a 20 cms. en  2.50m./ 25 Ud.)
   (1 d  8 a 20 cms. en  1.78m./ 17 Ud.)(*)

        REFUERZO COSIDO ALA :

   (1 d  8 a 20 cms. en  1.78m./ 17 Ud.)(*)

        PLANTILLAS  2, 3 y 4: 1 d 5 a 20 cms. MISMA SECUENCIA QUE PLANTILLA 1
        No. DE PIEZAS DE CADA UNA: 88


        DATOS PARA TRANSPORTE:

        PESO DE LA VIGA: 33.85 Tn        LONGITUD TOTAL: 17.15m.
```


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ANEXO B.3. DIMENSIONAMIENTO DE ARMADO DE LOSA

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MOMENTOS TRANSVERSALES EN LOSA

BANDA TRANSVERSAL.....: 1

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 48.21 mKN
MOMENTO NEGATIVO=-48.21 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 19.04 mKN
MOMENTO NEGATIVO=-14.99 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88 mKN
MOMENTO NEGATIVO=-18.88 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 16.93 mKN
MOMENTO NEGATIVO=-9.97 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 0 mKN
MOMENTO NEGATIVO=-1.43 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= .51 mKN
MOMENTO NEGATIVO=-1.03 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 65.81 mKN
MOMENTO TORSOR ASOCIADO= 2.46 mKN
MOMENTO NEGATIVO TOTAL =-94.5 mKN
MOMENTO TORSOR ASOCIADO=-2.46 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 651.76 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 799.24 KN


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BANDA TRANSVERSAL.....: 2

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 34.6 mKN
MOMENTO NEGATIVO=-34.6 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 13.44 mKN
MOMENTO NEGATIVO=-9.39 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88 mKN
MOMENTO NEGATIVO=-18.88 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01 mKN
MOMENTO NEGATIVO=-9.98 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75 mKN
MOMENTO NEGATIVO=-2.14 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69 mKN
MOMENTO NEGATIVO=-11.92 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 50.61 mKN
MOMENTO TORSOR ASOCIADO= 2.42 mKN
MOMENTO NEGATIVO TOTAL =-86.91 mKN
MOMENTO TORSOR ASOCIADO=-2.42 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 486.08 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 715.69 KN

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BANDA TRANSVERSAL.....: 3

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 2.26 mKN
MOMENTO NEGATIVO=-2.26 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 4.05 mKN
MOMENTO NEGATIVO= 0 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88 mKN
MOMENTO NEGATIVO=-18.88 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01 mKN
MOMENTO NEGATIVO=-9.98 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75 mKN
MOMENTO NEGATIVO=-2.14 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69 mKN
MOMENTO NEGATIVO=-11.92 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 21.46 mKN
MOMENTO TORSOR ASOCIADO= 0 mKN
MOMENTO NEGATIVO TOTAL =-45.18 mKN
MOMENTO TORSOR ASOCIADO=-1.98 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 183.13 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 348.85 KN

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BANDA TRANSVERSAL.....: 4

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 19.87 mKN
MOMENTO NEGATIVO=-19.87 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 11.69 mKN
MOMENTO NEGATIVO=-7.64 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88 mKN
MOMENTO NEGATIVO=-18.88 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01 mKN
MOMENTO NEGATIVO=-9.98 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75 mKN
MOMENTO NEGATIVO=-2.14 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69 mKN
MOMENTO NEGATIVO=-11.92 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 34.14 mKN
MOMENTO TORSOR ASOCIADO= 1.14 mKN
MOMENTO NEGATIVO TOTAL =-70.43 mKN
MOMENTO TORSOR ASOCIADO=-1.14 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 310.66 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 554.39 KN

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BANDA TRANSVERSAL.............: 5

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 28.03  mKN
MOMENTO NEGATIVO=-28.03  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 14.4  mKN
MOMENTO NEGATIVO=-10.35  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88  mKN
MOMENTO NEGATIVO=-18.88  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69  mKN
MOMENTO NEGATIVO=-11.92  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 45  mKN
MOMENTO TORSOR ASOCIADO= .11  mKN
MOMENTO NEGATIVO TOTAL =-81.3  mKN
MOMENTO TORSOR ASOCIADO=-.11  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 406  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 642.31  KN
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BANDA TRANSVERSAL.............: 6

     MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 19.87  mKN
MOMENTO NEGATIVO=-19.87  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 11.69  mKN
MOMENTO NEGATIVO=-7.64  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88  mKN
MOMENTO NEGATIVO=-18.88  mKN

     MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69  mKN
MOMENTO NEGATIVO=-11.92  mKN

        MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 34.14  mKN
MOMENTO TORSOR ASOCIADO= 1.14  mKN
MOMENTO NEGATIVO TOTAL =-70.43  mKN
MOMENTO TORSOR ASOCIADO=-1.14  mKN

        CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 310.66  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 554.39  KN
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BANDA TRANSVERSAL.............:  7

    MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 2.26  mKN
MOMENTO NEGATIVO=-2.26  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 4.05  mKN
MOMENTO NEGATIVO= 0  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88  mKN
MOMENTO NEGATIVO=-18.88  mKN

    MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69  mKN
MOMENTO NEGATIVO=-11.92  mKN

       MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 21.46  mKN
MOMENTO TORSOR ASOCIADO= 0  mKN
MOMENTO NEGATIVO TOTAL =-45.18  mKN
MOMENTO TORSOR ASOCIADO=-1.98  mKN

       CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 183.13  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 348.85  KN
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BANDA TRANSVERSAL.............:  8

    MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 34.6  mKN
MOMENTO NEGATIVO=-34.6  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 13.44  mKN
MOMENTO NEGATIVO=-9.39  mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88  mKN
MOMENTO NEGATIVO=-18.88  mKN

    MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 17.01  mKN
MOMENTO NEGATIVO=-9.98  mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 1.75  mKN
MOMENTO NEGATIVO=-2.14  mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= 2.69  mKN
MOMENTO NEGATIVO=-11.92  mKN

       MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 50.61  mKN
MOMENTO TORSOR ASOCIADO= 2.42  mKN
MOMENTO NEGATIVO TOTAL =-86.91  mKN
MOMENTO TORSOR ASOCIADO=-2.42  mKN

       CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 486.08  KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 715.69  KN
```

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BANDA TRANSVERSAL.....: 9

MOMENTOS TRANSVERSALES GENERALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 48.21 mKN
MOMENTO NEGATIVO=-48.21 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 19.04 mKN
MOMENTO NEGATIVO=-14.99 mKN

POR CARGA PERMANENTE

MOMENTO POSITIVO=-18.88 mKN
MOMENTO NEGATIVO=-18.88 mKN

MOMENTOS TRANSVERSALES LOCALIZADOS

POR CARGAS PUNTUALES (CARRO)

MOMENTO POSITIVO= 16.93 mKN
MOMENTO NEGATIVO=-9.97 mKN

POR SOBRECARGA UNIFORME

MOMENTO POSITIVO= 0 mKN
MOMENTO NEGATIVO=-1.43 mKN

MOMENTOS POR CARGAS PERMANENTES

MOMENTO POSITIVO= .51 mKN
MOMENTO NEGATIVO=-1.03 mKN

MOMENTOS TOTALES EN LOSA

MOMENTO POSITIVO TOTAL = 65.81 mKN
MOMENTO TORSOR ASOCIADO= 2.46 mKN
MOMENTO NEGATIVO TOTAL =-94.5 mKN
MOMENTO TORSOR ASOCIADO=-2.46 mKN

CAPACIDADES MECANICAS NECESARIAS

CAPACIDAD MECANICA MOMENTO POSITIVO 651.76 KN
CAPACIDAD MECANICA MOMENTO NEGATIVO 799.23 KN

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ARMADURAS EN LOSA	CAP.MEC.NEC.	ARM. TRANSV.	ARM. LONGIT.	PESO
BANDA: 1				
INFERIOR	651.76 KN	8 Ø 16 pml	5 Ø 12 pml	17.0900 Kg/m2
SUPERIOR	799.24 KN	6 Ø 20 pml	5 Ø 12 pml	19.2700 Kg/m2
BANDA: 2				
INFERIOR	486.08 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
SUPERIOR	715.69 KN	6 Ø 20 pml	5 Ø 12 pml	19.2700 Kg/m2
BANDA: 3				
INFERIOR	183.13 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	348.85 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
BANDA: 4				
INFERIOR	310.66 KN	7 Ø 12 pml	4 Ø 8 pml	7.8300 Kg/m2
SUPERIOR	554.39 KN	7 Ø 16 pml	5 Ø 10 pml	14.1600 Kg/m2
BANDA: 5				
INFERIOR	406.00 KN	7 Ø 14 pml	4 Ø 10 pml	10.9500 Kg/m2
SUPERIOR	642.31 KN	8 Ø 16 pml	5 Ø 12 pml	17.0900 Kg/m2
BANDA: 6				
INFERIOR	310.66 KN	7 Ø 12 pml	4 Ø 8 pml	7.8300 Kg/m2
SUPERIOR	554.39 KN	7 Ø 16 pml	5 Ø 10 pml	14.1600 Kg/m2
BANDA: 7				
INFERIOR	183.13 KN	6 Ø 10 pml	4 Ø 8 pml	5.3200 Kg/m2
SUPERIOR	348.85 KN	8 Ø 12 pml	4 Ø 10 pml	9.6000 Kg/m2
BANDA: 8				
INFERIOR	486.08 KN	8 Ø 14 pml	4 Ø 10 pml	12.1600 Kg/m2
SUPERIOR	715.69 KN	6 Ø 20 pml	5 Ø 12 pml	19.2700 Kg/m2
BANDA: 9				
INFERIOR	651.76 KN	8 Ø 16 pml	5 Ø 12 pml	17.0900 Kg/m2
SUPERIOR	799.23 KN	6 Ø 20 pml	5 Ø 12 pml	19.2700 Kg/m2

ANEXO B.4. VERIFICACIÓN DE APARATOS DE APOYO

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NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

PROGRAMA PARA COMPROBACIÓN Y DIMENSIONAMIENTO DE APOYOS ELASTOMÉRICOS ZUNCHADOS

DEFINICIÓN GEOMÉTRICA DEL APARATO DE APOYO:

Dim paralela eje tablero (a)	= 300	mm
Dim perpendicular eje tablero (b)	= 400	mm
Espesor total (T)	= 52	mm
Espesor capas de elastómero (t)	= 8	mm
Espesor capas de acero (e)	= 3	mm
Número capas de acero (n)	= 5	
Espesor neto de elastómero (en)	= 37	mm
Coeficiente de forma (S)	= 10.71	

MATERIALES:

Modulo elasticidad transversal acciones lentas (G1)	= .9	N/mm2
Módulo elasticidad transversal acciones intantáneas (G2)	= 1.8	N/mm2
Límite elástico del acero (Fy)	= 240	N/mm2

SOLICITACIONES:

FUERZAS VERTICALES

FVmax = 1255.17 (KN)
FVmin = 614.59 (KN)

FUERZAS HORIZONTALES CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (KN)	EJE Y (KN)	EJE X (KN)	EJE Y (KN)
Frenado	0.00	45.00	0.00	45.00
Viento	0.00	0.00	0.00	0.00
Centrífuga	0.00	0.00	0.00	0.00
Sismo	0.00	0.00	0.00	0.00

GIROS CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (rad*1000)	EJE Y (rad*1000)	EJE X (rad*1000)	EJE Y (rad*1000)
Giro (alfa)	3.0000	0.0000	2.0000	0.0000

DEFORMACIONES REOLÓGICAS

	EJE X (mm)	EJE Y (mm)	TOTAL (mm)
Deformación	0.00	4.97	4.97

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

CÁLCULO DE LAS REACCIONES

DEBIDAS AL GIRO:

	EJE X (KN.m)	EJE Y (KN.m)	TOTAL (KN.m)
Momento concomitante FVmax =	16.71	0.00	16.71
Momento concomitante FVmin =	11.14	0.00	11.14

DEBIDAS A LAS DEFORMACIONES REOLÓGICAS:

	EJE X (KN)	EJE Y (KN)
FHreolog =	0.00	14.49

CÁLCULO DE LAS DEFORMACIONES MÁXIMAS

	EJE X (mm)	EJE Y (mm)	EJE Z (mm)
Deformación máxima =	0.000	12.673	1.336

CÁLCULO DE LAS TENSIONES

TENSIONES NORMALES

TVmax:Tensión vertical maxima= 10.46(N/mm2)
TVmin:Tensión vertical mínima= 5.12(N/mm2)

TENSIONES TANGENCIALES

ORIGEN	Fvmax EJE X (N/mm2)	Fvmax EJE Y (N/mm2)	Fvmax TOTAL (N/mm2)	Fvmin EJE X (N/mm2)	Fvmin EJEY (N/mm2)	Fvmin TOTAL (N/mm2)
TH1:Deformaciones	0.00	.12	.12	0.00	.12	.12
TH2:F.Horizontales	0.00	.38	.38	0.00	.38	.38
Talfa:Giro	.47	0.00	.47	.32	0.00	.32
Tn:F.Verticales			1.46			.72

ORIGEN	Fvmax (N/mm2)	Fvmin (N/mm2)
THTotal = TH1+TH2*(G1/G2)	.31	.31
T = Tn+Talfa+THtotal	2.25	1.34

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

COMPROBACIONES

NORMATIVA DE REFERENCIA:
(MOPU): Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (1982)
(ATC): Aparatos de apoyo de puentes.Asociación técnica de carreteras (1996)

1.1.-) COMPROBACIÓN DE COMPRESIÓN MÁXIMA(ATC)

120000 mm2 =< a * b = 120000mm2

Compresión máxima (N/mm2) = 10.46 = < 15.00 (N/mm2)

1.2.-) COMPROBACIÓN DE COMPRESIÓN MÍNIMA Y CONDICIÓN NO DESLIZAMIENTO(ATC)

120000 mm2 =< a * b = 120000mm2

Compresión mínima(N/mm2) = 5.12= > 3.00 (N/mm2)

1.3.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR EL GIRO(ATC)

Talfa (N/mm2) = .47< 1.5 * G1 = 1.35(N/mm2)

1.4.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS VERTICALES(ATC)

Tn (N/mm2) = 1.46< 3 * G1 = 2.70(N/mm2)

1.5.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS DEF. REOLÓGICAS(MOPU)

TH1 (N/mm2) = .12< 0.5 * G1 = .45(N/mm2)

1.6.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS HORIZONTALES(ATC)

THtotal (N/mm2) = .31< 0.7 * G1 = .63(N/mm2)

1.7.-) COMPROBACION DE TENSIÓN TANGENCIAL TOTAL(MOPU)

T (N/mm2) = 2.25< 5 * G1 = 4.50(N/mm2)

1.8.-) COMPROBACIÓN DE NO DESPLAZAMIENTO DEL APOYO DE SU POSICIÓN INICIAL(MOPU)

H = 59(KN) < = f * N = .22* 615 = 133(KN)

1.9.-) COMPROBACIÓN DE ESTABILIDAD(MOPU)

(a / 10) < en < (a / 5) ; 30 < 37 < 60(mm.)

1.10.-) COMPROBACIÓN DE NO LEVANTAMIENTO(MOPU)

Giro (rad*1000) = .750 < (3/S)*(t^2/a^2)*(TVmax/G1) = 2.314(rad*1000)

1.11.-) COMPROBACIÓN DE ESPESOR DE LOS ZUNCHOS(MOPU Y ATC)

e = 3mm > 1.220 = (a/S)*(TVmax / Fy)

3mm = e => 2 mm

ANEXO B.4. CÁLCULO DE LA PRUEBA DE CARGA

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Fecha:

El vehículo tipo a utilizar es el que se especifica en el Anexo 6.1.

El tablero se modeliza mediante el método del emparrillado plano para estudiar su comportamiento resistente.

En el Anexo 4.2 se indica la geometría del tablero y el sistema de coordenadas utilizado, y su discretización en barras.

La hipótesis de carga considerada se corresponde con los vehículos dispuestos tal como se indica en el Anexo 4.3.

Los máximos esfuerzos previstos para cada barra del emparrillado en esta hipótesis se expresan en el Anexo 4.4.

El momento máximo resultante es de 1388 mxkN, lo que representa un porcentaje del 59% del momento por sobrecargas (2356mxkN) que se considera aceptable.

2.- DEFORMACIONES PREVISTAS

La máxima deformación prevista es de 5 mm. (Ver Anexo nº 4.4)

3.- TOMA DE DATOS

La toma de datos se efectuará al menos en tres vigas, en el centro de su luz libre y en los apoyos. Se elegirán preferentemente la del centro y las de borde.

Se dispondrán al efecto flexímetros accionados directamente por la viga o por un peso suspendido de ésta, mediante un hilo indeformable y de baja dilatación térmica. Se recomienda complementar la observación con una estación fija de nivelación óptica.

La flecha final residual, para un solo ciclo de carga, deberá ser inferior al quinto de la máxima alcanzada, en cada viga.

4.- CONCLUSION

Finalizada la prueba de carga se redactará un acta conteniendo los siguientes puntos:

- Datos generales (personas, organismos o empresas asistentes, fecha y clave del proyecto)
- Descripción de la obra (características del puente objeto de la prueba)
- Estado previo (estado de la estructura y medios para la prueba)
- Tren de cargas (ver Anexo 3)
- Aparatos de medida (características de los empleados en la prueba de carga)
- Condiciones climatológicas.
- Puntos de referencia (puntos fijos de observación de la prueba de carga)

Fecha:

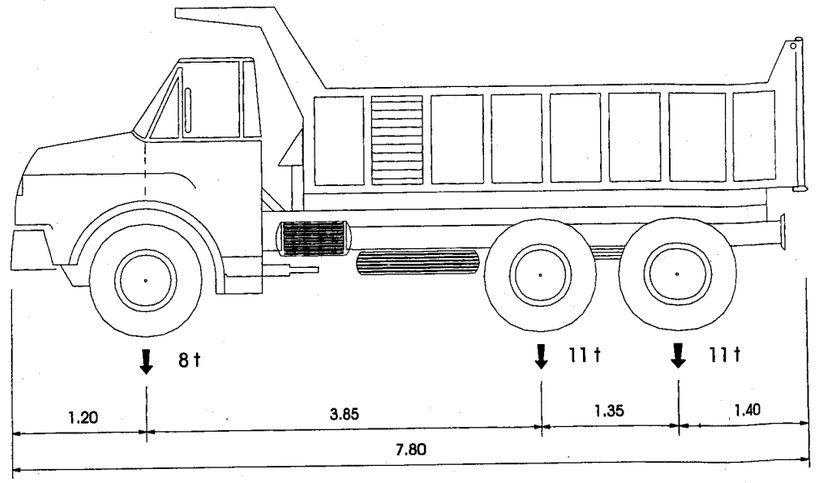
ANEXO B.4.1 : VEHICULO TIPO

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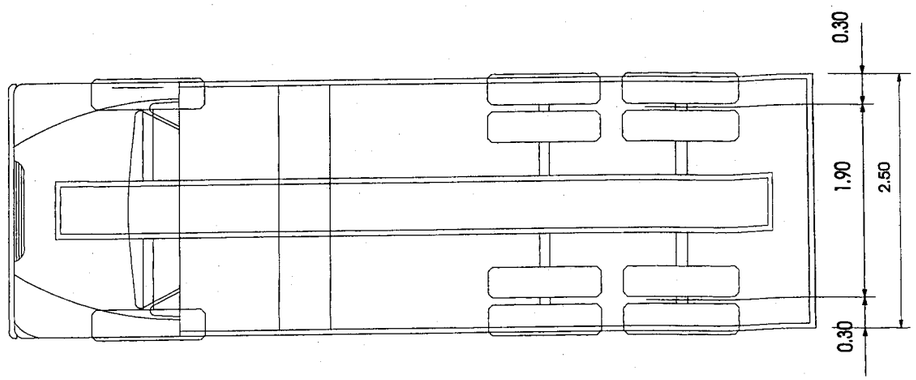
DEPARTAMENTO TECNICO

Fecha:

VEHICULO DE 3 EJES (DUMPER)



CARGAS POR EJES



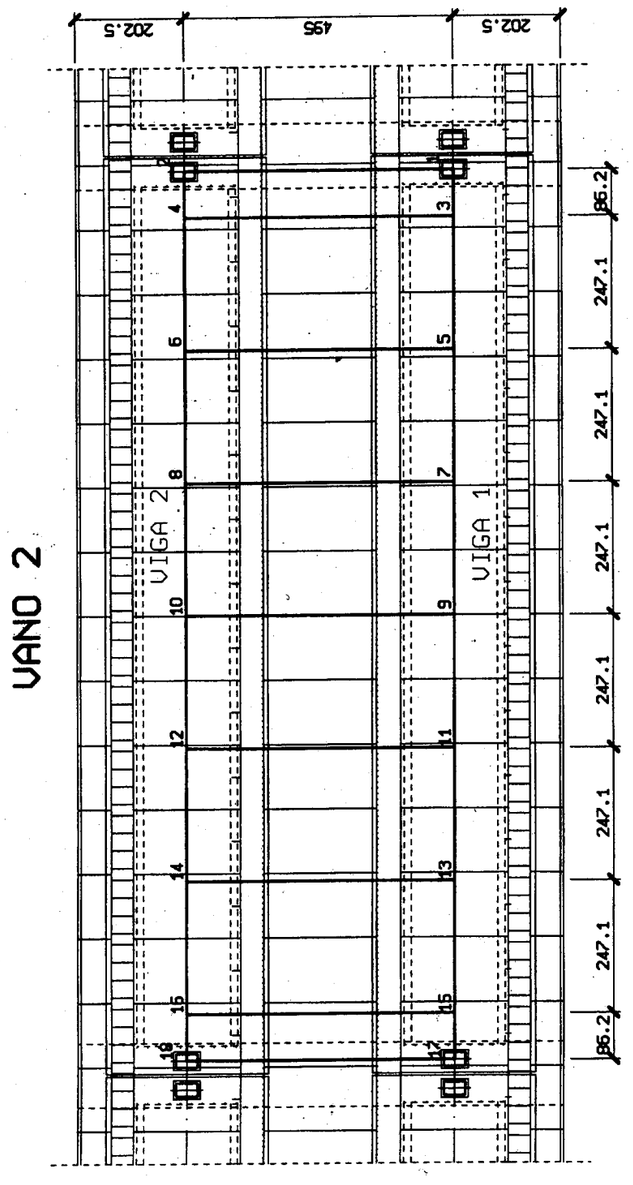
CARGA TOTAL: 30 t

ANEXO B.4.2: DISCRETIZACION DEL TABLERO

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Fecha:

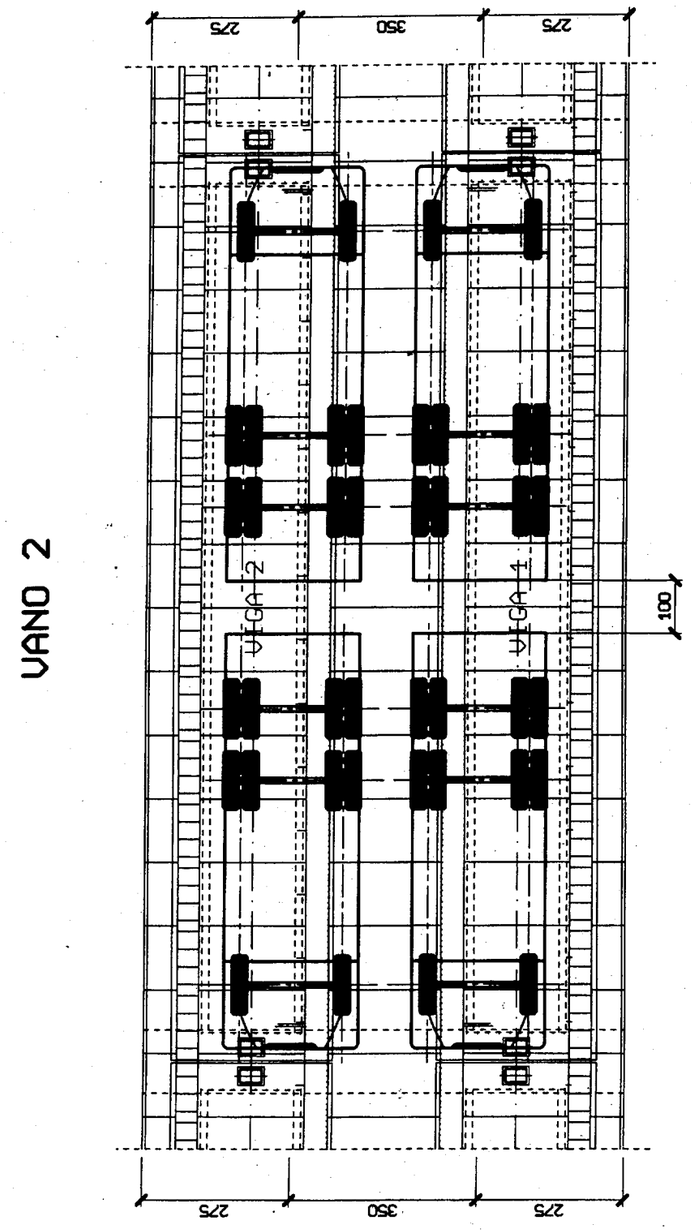


ANEXO B.4.3 : DISPOSICION DE LOS VEHICULOS PARA LA PRUEBA DE CARGA

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Fecha:



VANO 2

CARGA TOTAL 1.200 KN

ANEXO B.4.4 : CALCULO DE LA PRUEBA DE CARGA

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DESCRIPCION DEL VEHICULO TIPO

RUEDA	CARGA (KN)	COORDENADAS RELATIVAS Xq	Yq
1	40.00	0.00	0.00
2	55.00	3.85	0.00
3	55.00	5.20	0.00
4	55.00	9.00	0.00
5	55.00	10.35	0.00
6	40.00	14.20	0.00
7	40.00	0.00	1.90
8	55.00	3.85	1.90
9	55.00	5.20	1.90
10	55.00	9.00	1.90
11	55.00	10.35	1.90
12	40.00	14.20	1.90

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COORDENADAS DE LOS CENTROS DE GRAVEDAD DE LOS VEHICULOS TIPO

ABSCISA X (m)	ORDENADA Y (m)
8.275	2.750
8.275	6.250

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REPARTO DE CARGAS DEL VEHICULO 1

RUEDA 1 X= 15.375 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
3	33.972
0	0.000
5	6.028
SUMA POR RUEDA	40.000

RUEDA 2 X= 11.525 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
5	17.718
0	0.000
7	37.282
SUMA POR RUEDA	55.000

RUEDA 3 X= 10.175 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
7	41.645
0	0.000
9	13.355
SUMA POR RUEDA	55.000

RUEDA 4 X= 6.375 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
9	13.355
0	0.000
11	41.645
SUMA POR RUEDA	55.000

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RUEDA 5 X= 5.025 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
11	37.282
0	0.000
13	17.718
SUMA POR RUEDA	55.000

RUEDA 6 X= 1.175 Y= 1.800

NUDOS CARGADOS	CARGA POR NUDO (KN)
0	0.000
13	6.028
0	0.000
15	33.972
SUMA POR RUEDA	40.000

RUEDA 7 X= 15.375 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
3	15.528
4	8.042
5	9.684
6	6.746
SUMA POR RUEDA	40.000

RUEDA 8 X= 11.525 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
5	15.103
6	9.754
7	19.463
8	10.680
SUMA POR RUEDA	55.000

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RUEDA 9 X= 10.175 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
7	20.383
8	10.850
9	14.240
10	9.527
SUMA POR RUEDA	55.000

RUEDA 10 X= 6.375 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
9	14.240
10	9.527
11	20.383
12	10.850
SUMA POR RUEDA	55.000

RUEDA 11 X= 5.025 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
11	19.463
12	10.680
13	15.103
14	9.754
SUMA POR RUEDA	55.000

RUEDA 12 X= 1.175 Y= 3.700

NUDOS CARGADOS	CARGA POR NUDO (KN)
13	9.684
14	6.746
15	15.528
16	8.042
SUMA POR RUEDA	40.000

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REPARTO DE CARGAS DEL VEHICULO 2

RUEDA 1 X= 15.375 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
3	8.042
4	15.528
5	6.746
6	9.684
SUMA POR RUEDA	40.000

RUEDA 2 X= 11.525 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
5	9.754
6	15.103
7	10.680
8	19.463
SUMA POR RUEDA	55.000

RUEDA 3 X= 10.175 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
7	10.850
8	20.383
9	9.527
10	14.240
SUMA POR RUEDA	55.000

RUEDA 4 X= 6.375 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
9	9.527
10	14.240
11	10.850
12	20.383
SUMA POR RUEDA	55.000

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Fecha:

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RUEDA 5 X= 5.025 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
11	10.680
12	19.463
13	9.754
14	15.103
SUMA POR RUEDA	55.000

RUEDA 6 X= 1.175 Y= 5.300

NUDOS CARGADOS	CARGA POR NUDO (KN)
13	6.746
14	9.684
15	8.042
16	15.528
SUMA POR RUEDA	40.000

RUEDA 7 X= 15.375 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
4	33.972
0	0.000
6	6.028
0	0.000
SUMA POR RUEDA	40.000

RUEDA 8 X= 11.525 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
6	17.718
0	0.000
8	37.282
0	0.000
SUMA POR RUEDA	55.000

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

RUEDA 9 X= 10.175 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
8	41.645
0	0.000
10	13.355
0	0.000
SUMA POR RUEDA	55.000

RUEDA 10 X= 6.375 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
10	13.355
0	0.000
12	41.645
0	0.000
SUMA POR RUEDA	55.000

RUEDA 11 X= 5.025 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
12	37.282
0	0.000
14	17.718
0	0.000
SUMA POR RUEDA	55.000

RUEDA 12 X= 1.175 Y= 7.200

NUDOS CARGADOS	CARGA POR NUDO (KN)
14	6.028
0	0.000
16	33.972
0	0.000
SUMA POR RUEDA	40.000

* * * P R A I N S A * * * Programa EMPAR21 * * * Version: Julio 2003

RESUMEN DE CARGAS

NUDO	CARGA TOTAL (KN)
1	0.00
2	0.00
3	57.54
4	57.54
5	65.03
6	65.03
7	140.30
8	140.30
9	74.24
10	74.24
11	140.30
12	140.30
13	65.03
14	65.03
15	57.54
16	57.54
17	0.00
18	0.00
SUMA DE CARGAS	1200.00

HIPOTESIS DE CARGA NUM.: 1 CODIGO: 1 CARACTER: Permanentes

NUDO	TIPO	M-X (mKN)	M-Y (mKN)	F-Z (KN)
3	3	0.000	0.000	57.542
4	4	0.000	0.000	57.542
5	5	0.000	0.000	65.033
6	6	0.000	0.000	65.033
7	7	0.000	0.000	140.303
8	8	0.000	0.000	140.303
9	9	0.000	0.000	74.244
10	10	0.000	0.000	74.244
11	11	0.000	0.000	140.303
12	12	0.000	0.000	140.303
13	13	0.000	0.000	65.033
14	14	0.000	0.000	65.033
15	15	0.000	0.000	57.542
16	16	0.000	0.000	57.542
			TOTAL F-Z:	1200.000

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Fecha:

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DESPLAZAMIENTOS DE LOS NUDOS

NUDO	HIPOTESIS	GIRO X	GIRO Y	DESCENSO
1	F1	-0.00000	.00099	0.00000
2	F1	-0.00000	.00099	0.00000
3	F1	-0.00000	.00097	.00085
4	F1	-0.00000	.00097	.00085
5	F1	-0.00000	.00079	.00307
6	F1	-0.00000	.00079	.00307
7	F1	-0.00000	.00044	.00461
8	F1	-0.00000	.00044	.00461
9	F1	-0.00000	-0.00000	.00516
10	F1	-0.00000	-0.00000	.00516
11	F1	-0.00000	-.00044	.00461
12	F1	-0.00000	-.00044	.00461
13	F1	-0.00000	-.00079	.00307
14	F1	-0.00000	-.00079	.00307
15	F1	-0.00000	-.00097	.00085
16	F1	-0.00000	-.00097	.00085
17	F1	-0.00000	-.00099	0.00000
18	F1	-0.00000	-.00099	0.00000

ESFUERZOS

BARRA	HIPOTESIS	TOR. I (mKN)	TOR. J (mKN)	FLEC. I (mKN)	FLEC. J (mKN)	CORT. I (KN)	CORT. J (KN)
1- 3	F1	0.000	0.000	-0.000	258.750	-300.000	300.000
3- 5	F1	-0.000	-0.000	258.750	857.823	-242.458	242.458
5- 7	F1	-.001	-.001	857.823	1296.212	-177.425	177.425
7- 9	F1	-.001	-.001	1296.212	1387.935	-37.122	37.122
9- 11	F1	-.001	-.001	1387.935	1296.213	37.122	-37.122
11- 13	F1	-.001	-.001	1296.213	857.824	177.425	-177.425
13- 15	F1	-.001	-.001	857.824	258.750	242.458	-242.458
15- 17	F1	-0.000	-0.000	258.750	-0.000	300.000	-300.000
2- 4	F1	0.000	0.000	0.000	258.750	-300.000	300.000
4- 6	F1	-0.000	-0.000	258.750	857.825	-242.458	242.458
6- 8	F1	-.001	-.001	857.825	1296.213	-177.425	177.425
8- 10	F1	-.001	-.001	1296.213	1387.935	-37.122	37.122
10- 12	F1	-.001	-.001	1387.935	1296.212	37.122	-37.122
12- 14	F1	-.001	-.001	1296.212	857.824	177.426	-177.426
14- 16	F1	-.001	-.001	857.824	258.750	242.458	-242.458
16- 18	F1	-0.000	-0.000	258.750	0.000	300.000	-300.000
1- 2	F1	-0.000	-0.000	-0.000	0.000	-0.000	0.000
3- 4	F1	0.000	0.000	.001	-.001	0.000	-0.000
5- 6	F1	0.000	0.000	.001	-.001	0.000	-0.000
7- 8	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
9- 10	F1	0.000	0.000	0.000	-0.000	0.000	-0.000
11- 12	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
13- 14	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
15- 16	F1	0.000	0.000	-0.000	0.000	-0.000	0.000
17- 18	F1	0.000	0.000	-0.000	0.000	-0.000	0.000

REACCIONES DE LOS APOYOS RIGIDOS

NUDO	HIPOTESIS	MX (mKN)	MY (mKN)	FZ (KN)
1	F1	0.00000	0.00000	-299.99970
17	F1	0.00000	0.00000	-300.00030
2	F1	0.00000	0.00000	-300.00030
18	F1	0.00000	0.00000	-299.99970

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DESPLAZAMIENTOS DE LOS NUDOS

VIGA	HIPOTESIS	FLECHAS
1	F1	.005
2	F1	.005

ESFUERZOS

VIGA	HIPOTESIS	MOMENTO (mKN)
1	F1	1387.9
2	F1	1387.9

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Fecha:

C. APARATOS DE APOYO

ANEXO C.1 REPARTO DE FUERZAS HORIZONTALES

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Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

ARCHIVO: 12000·SO3

TABLERO CON LOSA DE CONTINUIDAD
PUENTE CON FUSTES EXENTOS (2 FUSTES)

CARACTERISTICAS DEL PUENTE

NOMBRE DEL PROYECTO: 12000·SO3

FECHA: 01.03.2004

CARACTERISTICAS MATERIALES Y COEFICIENTES DE SEGURIDAD EN ROTURA

Hormigón en fuste:	Fck=	35 N/mm2	Cc= 1.50
Acero arm pasiva:	Fyk=	500 N/mm2	Cs= 1.15

DATOS DEL TABLERO

NUMERO DE VANOS	3
NUMERO DE VIGAS POR VANO	2

TIPO DE VIGA:	U90	
VUELO TABLERO:	2.03 m	
ANCHO TABLERO:	9.00 m	
PENDIENTE TRANSVERSAL TABLERO:	0.00 %	
ANCHO ACERAS (IZQUIERDA, DERECHA):	.90 m	.90 m
ESPESOR DE LOSA+ENCOFRADO PERDIDO:	.25 m	
ESPESOR REAL DE AGLOMERADO:	.08 m	
ALTURA DE BARANDILLA:	2.00 m	
PESO POR METRO CUADRADO DE ACERA:	5.00 KN/m2	
PESO POR METRO LINEAL DE BARANDILLA:	10.00 KN/ml	
ENTREGA:	.25 m	

LONGITUDES DE LOS VANOS:

VANO	LONGITUD (m)
1	14.00
2	17.10
3	14.00

TABLERO CON LOSA DE CONTINUIDAD

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

DATOS DE LOS NEOPRENOS

SITUACION	TIPO (AZU)	ANCHO (mm)	LARGO (mm)	ESPESOR (mm)	No.LAM. ACERO	ESP.LAM. (mm)	ESP.NETO (mm)
ESTRIBO 1	18	250	400	52	5	3	37
PILA 1 EXTREMO 1	18	250	400	52	5	3	37
PILA 1 EXTREMO 2	21	300	400	52	5	3	37
PILA 2 EXTREMO 1	21	300	400	52	5	3	37
PILA 2 EXTREMO 2	18	250	400	52	5	3	37
ESTRIBO 2	18	250	400	52	5	3	37

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Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

PUENTE CON FUSTES EXENTOS (2 FUSTES)

DATOS DE LOS FUSTES

FUSTE DEL TIPO: FF100

ALTURA DEL DINTEL: 0.00 m.

FUSTE	ALTURA (m)
E-1	0.000
1	7.000
2	7.000
E-2	0.000

DATOS PARA EL CALCULO DEL EMPUJE DE VIENTO

VELOCIDAD DE REFERENCIA: Vref = 28 m/s
FACTOR DE TOPOGRAFIA: Ct = 1.00
TIEMPO DE RETORNO 100 años
TIPO DE ENTORNO II
PENDIENTE TRANSVERSAL DEL TABLERO 0.00 %

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

CARACTERISTICAS MECANICAS

MODULO DE ELASTICIDAD DEL HORMIGON DE LOS FUSTES: E = 35034 N/mm2

INERCIA DE LOS FUSTES (PARA FUERZAS LONGITUDINALES): I = 0.057425 m4

INERCIA DE LOS FUSTES (PARA FUERZAS TRANSVERSALES): I = 0.057425 m4

MODULO DE RIGIDEZ TRANSVERSAL DE LOS NEOPRENOS: G = 900 KN/m2 (acciones lentas)
G = 1800 KN/m2 (acciones rápidas)

RIGIDEZ DE CADA FUSTE:

FUSTE	ALTURA (m)	RIGIDEZ (KN/m) (para fuerzas long.)	RIGIDEZ (KN/m) (para fuerzas transv.)
1	7.00	17596	17596
2	7.00	17596	17596

RIGIDEZ DE CADA NEOPRENO:

NEOPRENO (mm) (ancho x largo x esp.neto)	RIGIDEZ (KN/m) (acciones lentas)	RIGIDEZ (KN/m) (acciones rápidas)
250 x 400 x 37	2432	4865
300 x 400 x 37	2919	5838

RIGIDECES CONJUNTAS:

FUSTE	Nº NEOPRENOS ASOCIADOS A CADA FUSTE	RIGIDEZ (KN/m) (acciones lentas) (para fuerzas longitudinales)	RIGIDEZ (KN/m) (acciones rápidas) (para fuerzas longitudinales)	RIGIDEZ (KN/m) (acciones rápidas) (para fuerzas transv.)
E-1	1	2432	9730	9730
1	2	4103	6655	6655
2	2	4103	6655	6655
E-2	1	2432	9730	9730

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

GENERACION DE CARGAS

FUERZAS REOLOGICAS (LONGITUDINALES LENTAS)

Coeficiente reológico = 0.0006

PUNTO DE DESPLAZAMIENTO NULO: x = 22.55

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	32.91	13.530
Pila 1 Extremo 1	10.53	3.934
Pila 1 Extremo 2	10.53	3.934
Pila 2 Extremo 1	10.53	3.934
Pila 2 Extremo 2	10.53	3.934
Estribo 2	32.91	13.530

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	32.91	-----
Pila 1	21.05	1.196
Pila 2	21.05	1.196
Estribo 2	32.91	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

FUERZAS DE FRENADO (LONGITUDINALES RAPIDAS)

NORMA IAP

Sobrecarga uniforme: 4.0 KN/m2

Ancho del tablero: 9.00 m.

Ancho de plataforma del tablero: 7.20 m.

Número de carros de la instrucción (600 KN): 1

Límite máximo del valor de frenado: 432 KN

Límite mínimo del valor de frenado: 144 KN

LAS HIPOTESIS DE SOBRECARGA CONSIDERADAS SON LAS SIGUIENTES:

Hipótesis A: Sobrecarga y carro en vano dorsal, nada en vano frontal y sobrecarga en resto de vanos.

Hipótesis B: Nada en vano dorsal, sobrecarga y carro en vano frontal y sobrecarga en resto de vanos.

Hipótesis C: Sobrecarga en todo el puente y carro en el vano dorsal

Hipótesis D: Sobrecarga en todo el puente y carro en el vano frontal

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DEPARTAMENTO TECNICO

Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS A

PILA 1

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	55.20
Vano 2	0.00
Vano 3	25.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS A

PILA 2

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	25.20
Vano 2	60.78
Vano 3	0.00

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

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Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS B

PILA 1

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	0.00
Vano 2	60.78
Vano 3	25.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS B

PILA 2

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	25.20
Vano 2	0.00
Vano 3	55.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

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Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS C

PILA 1

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	55.20
Vano 2	30.78
Vano 3	25.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS C

PILA 2

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	25.20
Vano 2	60.78
Vano 3	25.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE (mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS D

PILA 1

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	25.20
Vano 2	60.78
Vano 3	25.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE (mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

HIPOTESIS D

PILA 2

SOLICITACIONES:

SITUACION	FUERZA FRENADO (KN)
Vano 1	25.20
Vano 2	30.78
Vano 3	55.20

TOTAL FUERZAS FRENADO EN PUENTE = 144.00 KN (fuerza mínima de frenado)

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	15.20	3.125
Pila 1 Extremo 1	10.40	1.943
Pila 1 Extremo 2	10.40	1.943
Pila 2 Extremo 1	10.40	1.943
Pila 2 Extremo 2	10.40	1.943
Estribo 2	15.20	3.125

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	15.20	-----
Pila 1	20.80	1.182
Pila 2	20.80	1.182
Estribo 2	15.20	-----

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Fecha:

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

FUERZA DE VIENTO SOBRE TABLERO (TRANSVERSAL RAPIDA)

NORMA IAP

FUERZA TRANSVERSAL EN CADA VANO DEBIDO AL VIENTO: F = Cd x A x (1/2 x Ro x Vc^2)

MASA ESPECIFICA DEL AIRE: Ro = 1.25 Kg/m3

DATOS GEOGRAFICOS

Velocidad de referencia: Vref = 28 m/s

Factor de topografía: Ct = 1.00

Factor de riesgo: Cr = 1.04

Tipo de entorno II

DATOS GEOMETRICOS

Anchura total del tablero: B = 9.00 m

Altura equivalente: Heq = 3.27 m

COEFICIENTE DE ARRASTRE: Cd = 1.67

CALCULO DE EMPUJES:

SITUACION	AREA EXPUESTA A (m2)	Z (m)	Cz	Cg	VELOCIDAD CALCULO Vc (m/s)	EMPUJE EQUIVALENTE (KN/m2)
Vano 1	65.72	5.08	0.88	1.59	40.49	1.72
Vano 2	80.27	8.58	0.98	1.54	43.68	2.00
Vano 3	65.72	5.08	0.88	1.59	40.49	1.72

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

SOLICITACIONES:

SITUACION	FUERZA VIENTO (KN)
Vano 1	112.76
Vano 2	160.28
Vano 3	112.76

TOTAL FUERZAS DE VIENTO EN TABLERO = 385.79 KN

ESFUERZOS Y DESPLAZAMIENTOS EN CADA NEOPRENO:

SITUACION NEOPRENO	FUERZA EN NEOPRENO (KN)	DESPLAZ.ELASTICO NEOPRENO (mm)
Estribo 1	40.73	8.372
Pila 1 Extremo 1	27.86	5.206
Pila 1 Extremo 2	27.86	5.206
Pila 2 Extremo 1	27.86	5.206
Pila 2 Extremo 2	27.86	5.206
Estribo 2	40.73	8.372

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	40.73	-----
Pila 1	55.72	3.166
Pila 2	55.72	3.166
Estribo 2	40.73	-----

PROGRAMA: P I L A VERSION: Diciembre 2002 P R A I N S A

FUERZA DE VIENTO SOBRE TABLERO (LONGITUDINAL RAPIDA)

NORMA IAP

ESFUERZOS Y DESPLAZAMIENTOS EN CABEZA DE CADA FUSTE:

SITUACION	FUERZA EN CABEZA DE FUSTE (KN)	DESPLAZ.ELASTICO EN CABEZA DE FUSTE(mm)
Estribo 1	10.18	-----
Pila 1	13.93	.792
Pila 2	13.93	.792
Estribo 2	10.18	-----

ANEXO C.2 VERIFICACIÓN DE LOS APARATOS DE APOYO

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DEPARTAMENTO TECNICO

Fecha:

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

PROGRAMA PARA COMPROBACIÓN Y DIMENSIONAMIENTO DE APOYOS ELASTOMÉRICOS ZUNCHADOS

FECHA: 01.03.2004

PROYECTO: 12000 · SO3 · ESTRIBO

DEFINICIÓN GEOMÉTRICA DEL APARATO DE APOYO:

Dim paralela eje tablero (a)	=	250	mm
Dim perpendicular eje tablero (b)	=	400	mm
Espesor total (T)	=	52	mm
Espesor capas de elastómero (t)	=	8	mm
Espesor capas de acero (e)	=	3	mm
Número capas de acero (n)	=	5	
Espesor neto de elastómero (en)	=	37	mm
Coeficiente de forma (S)	=	9.62	

MATERIALES:

Modulo elasticidad transversal acciones lentas (G1)	=	.9	N/mm2
Módulo elasticidad transversal acciones intantáneas (G2)	=	1.8	N/mm2
Límite elástico del acero (Fy)	=	240	N/mm2

SOLICITACIONES:

FUERZAS VERTICALES

FVmax = 1095.43 (KN)
FVmin = 520.94 (KN)

FUERZAS HORIZONTALES CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (KN)	EJE Y (KN)	EJE X (KN)	EJE Y (KN)
Frenado	0.00	15.20	0.00	15.20
Viento	40.73	0.00	40.73	0.00
Centrífuga	0.00	0.00	0.00	0.00
Sismo	0.00	0.00	0.00	0.00

GIROS CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (rad*1000)	EJE Y (rad*1000)	EJE X (rad*1000)	EJE Y (rad*1000)
Giro (alfa)	2.0000	0.0000	1.0000	0.0000

DEFORMACIONES REOLÓGICAS

	EJE X (mm)	EJE Y (mm)	TOTAL (mm)
Deformación	0.00	13.53	13.53

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

CÁLCULO DE LAS REACCIONES

DEBIDAS AL GIRO:

	EJE X (KN.m)	EJE Y (KN.m)	TOTAL (KN.m)
Momento concomitante FVmax =	4.63	0.00	4.63
Momento concomitante FVmin =	2.32	0.00	2.32

DEBIDAS A LAS DEFORMACIONES REOLÓGICAS:

	EJE X (KN)	EJE Y (KN)
FHreolog =	0.00	32.91

CÁLCULO DE LAS DEFORMACIONES MÁXIMAS

	EJE X (mm)	EJE Y (mm)	EJE Z (mm)
Deformación máxima =	8.372	16.654	1.475

CÁLCULO DE LAS TENSIONES

TENSIONES NORMALES

TVmax:Tensión vertical maxima= 10.95(N/mm2)
TVmin:Tensión vertical mínima= 5.21(N/mm2)

TENSIONES TANGENCIALES

ORIGEN	Fvmax EJE X (N/mm2)	Fvmax EJE Y (N/mm2)	Fvmax TOTAL (N/mm2)	Fvmin EJE X (N/mm2)	Fvmin EJEY (N/mm2)	Fvmin TOTAL (N/mm2)
TH1:Deformaciones	0.00	.33	.33	0.00	.33	.33
TH2:F.Horizontales	.41	.15	.43	.41	.15	.43
Talfa:Giro	.22	0.00	.22	.11	0.00	.11
Tn:F.Verticales			1.71			.81

ORIGEN	Fvmax (N/mm2)	Fvmin (N/mm2)
THTotal = TH1+TH2*(G1/G2)	.55	.55
T = Tn+Talfa+THtotal	2.48	1.47

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

COMPROBACIONES

NORMATIVA DE REFERENCIA:
(MOPU): Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (1982)
(ATC): Aparatos de apoyo de puentes.Asociación técnica de carreteras (1996)

1.1.-)COMPROBACIÓN DE COMPRESIÓN MÁXIMA(ATC)

40000 mm2 < = a * b = 100000mm2 < 120000 mm2

Compresión máxima (N/mm2)= 10.95= < 12.50 (N/mm2)

1.2.-)COMPROBACIÓN DE COMPRESIÓN MÍNIMA Y CONDICIÓN NO DESLIZAMIENTO(ATC)

40000 mm2 < = a * b = 100000mm2 < = 120000 mm2

Compresión mínima(N/mm2) = 5.21= > 2.50 (N/mm2)

1.3.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR EL GIRO(ATC)

Talfa (N/mm2) = .22< 1.5 * G1 = 1.35(N/mm2)

1.4.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS VERTICALES(ATC)

Tn (N/mm2) = 1.71< 3 * G1 = 2.70(N/mm2)

1.5.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS DEF. REOLÓGICAS(MOPU)

TH1 (N/mm2) = .33< 0.5 * G1 = .45(N/mm2)

1.6.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS HORIZONTALES(ATC)

THtotal (N/mm2) = .55< 0.7 * G1 = .63(N/mm2)

1.7.-)COMPROBACION DE TENSIÓN TANGENCIAL TOTAL(MOPU)

T (N/mm2) = 2.48< 5 * G1 = 4.50(N/mm2)

1.8.-)COMPROBACIÓN DE NO DESPLAZAMIENTO DEL APOYO DE SU POSICIÓN INICIAL(MOPU)

H = 63(KN) < = f * N = .22* 521 = 112(KN)

1.9.-)COMPROBACIÓN DE ESTABILIDAD(MOPU)

(a / 10) < en < (a / 5) ; 25 < 37 < 50(mm.)

1.10.-)COMPROBACIÓN DE NO LEVANTAMIENTO(MOPU)

Giro (rad*1000) = .500 < (3/S)*(t^2/a^2)*(TVmax/G1) = 3.889(rad*1000)

1.11.-)COMPROBACIÓN DE ESPESOR DE LOS ZUNCHOS(MOPU Y ATC)

e = 3mm > 1.187 = (a/S)*(TVmax / Fy)
3mm = e => 2 mm

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

PROGRAMA PARA COMPROBACIÓN Y DIMENSIONAMIENTO DE APOYOS ELASTOMÉRICOS ZUNCHADOS

FECHA: 01.03.2004

PROYECTO: 12000 · SO3 · PILA VANO 1

DEFINICIÓN GEOMÉTRICA DEL APARATO DE APOYO:

Dim paralela eje tablero (a)	=	250	mm
Dim perpendicular eje tablero (b)	=	400	mm
Espesor total (T)	=	52	mm
Espesor capas de elastómero (t)	=	8	mm
Espesor capas de acero (e)	=	3	mm
Número capas de acero (n)	=	5	
Espesor neto de elastómero (en)	=	37	mm
Coeficiente de forma (S)	=	9.62	

MATERIALES:

Modulo elasticidad transversal acciones lentas (G1)	=	.9	N/mm2
Módulo elasticidad transversal acciones intantáneas (G2)	=	1.8	N/mm2
Límite elástico del acero (Fy)	=	240	N/mm2

SOLICITACIONES:

FUERZAS VERTICALES

FVmax =	1095.43	(KN)
FVmin =	520.94	(KN)

FUERZAS HORIZONTALES CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (KN)	EJE Y (KN)	EJE X (KN)	EJE Y (KN)
Frenado	0.00	10.40	0.00	10.40
Viento	27.86	0.00	27.86	0.00
Centrífuga	0.00	0.00	0.00	0.00
Sismo	0.00	0.00	0.00	0.00

GIROS CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (rad*1000)	EJE Y (rad*1000)	EJE X (rad*1000)	EJE Y (rad*1000)
Giro (alfa)	2.0000	0.0000	1.0000	0.0000

DEFORMACIONES REOLÓGICAS

	EJE X (mm)	EJE Y (mm)	TOTAL (mm)
Deformación	0.00	3.93	3.93

ALVISA Prefabricados, S.A.

DEPARTAMENTO TECNICO

Fecha:

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

CÁLCULO DE LAS REACCIONES

DEBIDAS AL GIRO:

	EJE X (KN.m)	EJE Y (KN.m)	TOTAL (KN.m)
Momento concomitante FVmax =	4.63	0.00	4.63
Momento concomitante FVmin =	2.32	0.00	2.32

DEBIDAS A LAS DEFORMACIONES REOLÓGICAS:

	EJE X (KN)	EJE Y (KN)
FHreolog =	0.00	9.56

CÁLCULO DE LAS DEFORMACIONES MÁXIMAS

	EJE X (mm)	EJE Y (mm)	EJE Z (mm)
Deformación máxima =	5.727	6.068	1.475

CÁLCULO DE LAS TENSIONES

TENSIONES NORMALES

TVmax:Tensión vertical maxima= 10.95(N/mm2)
TVmin:Tensión vertical mínima= 5.21(N/mm2)

TENSIONES TANGENCIALES

ORIGEN	Fvmax EJE X (N/mm2)	Fvmax EJE Y (N/mm2)	Fvmax TOTAL (N/mm2)	Fvmin EJE X (N/mm2)	Fvmin EJEY (N/mm2)	Fvmin TOTAL (N/mm2)
TH1:Deformaciones	0.00	.10	.10	0.00	.10	.10
TH2:F.Horizontales	.28	.10	.30	.28	.10	.30
Talfa:Giro	.22	0.00	.22	.11	0.00	.11
Tn:F.Verticales			1.71			.81

ORIGEN	Fvmax (N/mm2)	Fvmin (N/mm2)
THTotal = TH1+TH2*(G1/G2)	.24	.24
T = Tn+Talfa+THtotal	2.17	1.17

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

COMPROBACIONES

NORMATIVA DE REFERENCIA:
(MOPU): Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (1982)
(ATC): Aparatos de apoyo de puentes.Asociación técnica de carreteras (1996)

1.1.-) COMPROBACIÓN DE COMPRESIÓN MÁXIMA (ATC)

40000 mm2 < = a * b = 100000mm2 < 120000 mm2

Compresión máxima (N/mm2) = 10.95= < 12.50 (N/mm2)

1.2.-) COMPROBACIÓN DE COMPRESIÓN MÍNIMA Y CONDICIÓN NO DESLIZAMIENTO (ATC)

40000 mm2 < = a * b = 100000mm2 < = 120000 mm2

Compresión mínima (N/mm2) = 5.21= > 2.50 (N/mm2)

1.3.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR EL GIRO (ATC)

Talfa (N/mm2) = .22< 1.5 * G1 = 1.35 (N/mm2)

1.4.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS VERTICALES (ATC)

Tn (N/mm2) = 1.71< 3 * G1 = 2.70 (N/mm2)

1.5.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS DEF. REOLÓGICAS (MOPU)

TH1 (N/mm2) = .10< 0.5 * G1 = .45 (N/mm2)

1.6.-) COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS HORIZONTALES (ATC)

THtotal (N/mm2) = .24< 0.7 * G1 = .63 (N/mm2)

1.7.-) COMPROBACION DE TENSIÓN TANGENCIAL TOTAL (MOPU)

T (N/mm2) = 2.17< 5 * G1 = 4.50 (N/mm2)

1.8.-) COMPROBACIÓN DE NO DESPLAZAMIENTO DEL APOYO DE SU POSICIÓN INICIAL (MOPU)

H = 34 (KN) < = f * N = .22* 521 = 112 (KN)

1.9.-) COMPROBACIÓN DE ESTABILIDAD (MOPU)

(a / 10) < en < (a / 5) ; 25 < 37 < 50 (mm.)

1.10.-) COMPROBACIÓN DE NO LEVANTAMIENTO (MOPU)

Giro (rad*1000) = .500 < (3/S)*(t^2/a^2)*(TVmax/G1) = 3.889 (rad*1000)

1.11.-) COMPROBACIÓN DE ESPESOR DE LOS ZUNCHOS (MOPU Y ATC)

e = 3mm > 1.187 = (a/S)*(TVmax / Fy)
3mm = e => 2 mm

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DEPARTAMENTO TECNICO

Fecha:

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

PROGRAMA PARA COMPROBACIÓN Y DIMENSIONAMIENTO DE APOYOS ELASTOMÉRICOS ZUNCHADOS

FECHA: 01.03.2004

PROYECTO: 12000 · SO3 · PILA VANO 2

DEFINICIÓN GEOMÉTRICA DEL APARATO DE APOYO:

Dim paralela eje tablero (a)	=	300	mm
Dim perpendicular eje tablero (b)	=	400	mm
Espesor total (T)	=	52	mm
Espesor capas de elastómero (t)	=	8	mm
Espesor capas de acero (e)	=	3	mm
Número capas de acero (n)	=	5	
Espesor neto de elastómero (en)	=	37	mm
Coeficiente de forma (S)	=	10.71	

MATERIALES:

Modulo elasticidad transversal acciones lentas (G1)	=	.9	N/mm2
Módulo elasticidad transversal acciones intantáneas (G2)	=	1.8	N/mm2
Límite elástico del acero (Fy)	=	240	N/mm2

SOLICITACIONES:

FUERZAS VERTICALES

FVmax = 1255.17 (KN)
FVmin = 614.59 (KN)

FUERZAS HORIZONTALES CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (KN)	EJE Y (KN)	EJE X (KN)	EJE Y (KN)
Frenado	0.00	10.40	0.00	10.40
Viento	27.86	0.00	27.86	0.00
Centrífuga	0.00	0.00	0.00	0.00
Sismo	0.00	0.00	0.00	0.00

GIROS CONCOMITANTES CON LAS FUERZAS VERTICALES

	FVmax		FVmin	
	EJE X (rad*1000)	EJE Y (rad*1000)	EJE X (rad*1000)	EJE Y (rad*1000)
Giro (alfa)	3.0000	0.0000	2.0000	0.0000

DEFORMACIONES REOLÓGICAS

	EJE X (mm)	EJE Y (mm)	TOTAL (mm)
Deformación	0.00	3.93	3.93

NEOPRENO ******* PRAINSA ******* VERSIÓN: FEBRERO 2000

CÁLCULO DE LAS REACCIONES

DEBIDAS AL GIRO:

	EJE X (KN.m)	EJE Y (KN.m)	TOTAL (KN.m)
Momento concomitante FVmax =	16.71	0.00	16.71
Momento concomitante FVmin =	11.14	0.00	11.14

DEBIDAS A LAS DEFORMACIONES REOLÓGICAS:

	EJE X (KN)	EJE Y (KN)
FHreolog =	0.00	11.47

CÁLCULO DE LAS DEFORMACIONES MÁXIMAS

	EJE X (mm)	EJE Y (mm)	EJE Z (mm)
Deformación máxima =	4.772	5.711	1.336

CÁLCULO DE LAS TENSIONES

TENSIONES NORMALES

TVmax:Tensión vertical maxima= 10.46(N/mm2)
TVmin:Tensión vertical mínima= 5.12(N/mm2)

TENSIONES TANGENCIALES

ORIGEN	Fvmax EJE X (N/mm2)	Fvmax EJE Y (N/mm2)	Fvmax TOTAL (N/mm2)	Fvmin EJE X (N/mm2)	Fvmin EJEY (N/mm2)	Fvmin TOTAL (N/mm2)
TH1:Deformaciones	0.00	.10	.10	0.00	.10	.10
TH2:F.Horizontales	.23	.09	.25	.23	.09	.25
Talfa:Giro	.47	0.00	.47	.32	0.00	.32
Tn:F.Verticales			1.46			.72

ORIGEN	Fvmax (N/mm2)	Fvmin (N/mm2)
THTotal = TH1+TH2*(G1/G2)	.22	.22
T = Tn+Talfa+THtotal	2.16	1.25

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COMPROBACIONES

NORMATIVA DE REFERENCIA:
(MOPU): Recomendaciones para el proyecto y puesta en obra de los apoyos elastoméricos para puentes de carretera (1982)
(ATC): Aparatos de apoyo de puentes.Asociación técnica de carreteras (1996)

1.1.-)COMPROBACIÓN DE COMPRESIÓN MÁXIMA(ATC)

120000 mm2 =< a * b = 120000mm2

Compresión máxima (N/mm2) = 10.46 = < 15.00 (N/mm2)

1.2.-)COMPROBACIÓN DE COMPRESIÓN MÍNIMA Y CONDICIÓN NO DESLIZAMIENTO(ATC)

120000 mm2 =< a * b = 120000mm2

Compresión mínima(N/mm2) = 5.12= > 3.00 (N/mm2)

1.3.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR EL GIRO(ATC)

Talfa (N/mm2) = .47< 1.5 * G1 = 1.35(N/mm2)

1.4.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS VERTICALES(ATC)

Tn (N/mm2) = 1.46< 3 * G1 = 2.70(N/mm2)

1.5.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS DEF. REOLÓGICAS(MOPU)

TH1 (N/mm2) = .10< 0.5 * G1 = .45(N/mm2)

1.6.-)COMPROBACIÓN DE TENSIÓN TANGENCIAL PRODUCIDA POR LAS FUERZAS HORIZONTALES(ATC)

THtotal (N/mm2) = .22< 0.7 * G1 = .63(N/mm2)

1.7.-)COMPROBACION DE TENSIÓN TANGENCIAL TOTAL(MOPU)

T (N/mm2) = 2.16< 5 * G1 = 4.50(N/mm2)

1.8.-)COMPROBACIÓN DE NO DESPLAZAMIENTO DEL APOYO DE SU POSICIÓN INICIAL(MOPU)

H = 35(KN) < = f * N = .22* 615 = 133(KN)

1.9.-)COMPROBACIÓN DE ESTABILIDAD(MOPU)

(a / 10) < en < (a / 5) ; 30 < 37 < 60(mm.)

1.10.-)COMPROBACIÓN DE NO LEVANTAMIENTO(MOPU)

Giro (rad*1000) = .750 < (3/S)*(t^2/a^2)*(TVmax/G1) = 2.314(rad*1000)

1.11.-)COMPROBACIÓN DE ESPESOR DE LOS ZUNCHOS(MOPU Y ATC)

e = 3mm > 1.220 = (a/S)*(TVmax / Fy)
3mm = e => 2 mm

D. RECORRIDO DE LAS JUNTAS DE DILATACIÓN

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Fecha:

La determinación del recorrido de las juntas de dilatación se efectúa a partir de la deformación máxima prevista de los aparatos de apoyo situados bajo esa junta.

En el caso de tratarse de una junta situada en un estribo el valor del recorrido de la junta de dilatación equivale a 2 veces la deformación máxima prevista (Ver figura 1 adjunta)

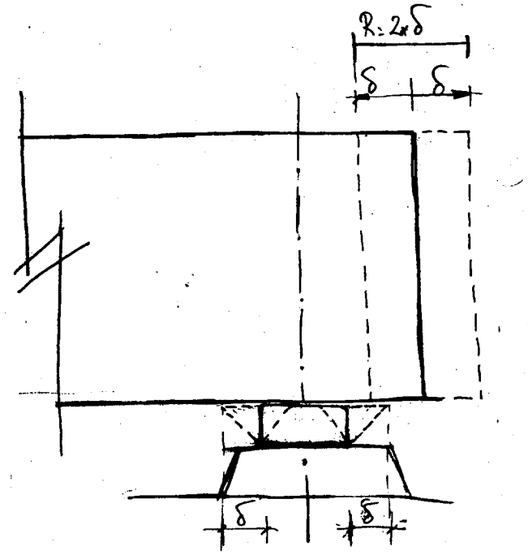


figura 1

El desplazamiento máximo de los aparatos de apoyos está indicado en el Anexo C de esta Memoria de Cálculo:

δ_{max} = 16.65mm

por tanto Recorrido = 2 x δ_{max} = 33.30 mm ≈ 35 mm